

EFFECTS OF DRESSING ROOM LIGHTING DIRECTION ON  
CONSUMERS' PERCEPTIONS OF SELF AND ENVIRONMENT

By

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To my family.

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Dressing rooms are key to the retail experience and often represent that final moment where the consumer decides whether or not to make a clothing purchase. Therefore retailers need to understand what affects this decision point in order to increase sales. The main retail servicescape has long been the focus of examination as researchers attempt to understand how aspects of the physical environment affect users' emotional states and personal evaluations. Specifically, the effects of lighting have been investigated in retail environmental studies. However, despite the acknowledged importance of dressing room lighting by professionals and lighting authorities, no researcher to date has examined how the physical environment affects consumers along any key dimensions in the dressing room. This study was conducted to examine the effect of dressing room lighting direction on the dependant variables: emotional state (arousal and pleasure), lighting perception and preference, self-evaluations (facial appearance and body appearance), dressing room evaluations, and the overall dressing room experience due to their importance in the dressing room or their relationship to lighting.

A field study was conducted in the dressing rooms of a local apparel store. A total of sixty female participants between the ages of 18 and 35 were randomly assigned to one of two

dressing room lighting conditions, overhead and frontal. The overhead lighting condition was created using the store's track-mounted fixture with two incandescent PAR lamps while the frontal lighting consisted of two fluorescent strip fixtures, one mounted on each side of the mirror. The color and the illumination level were controlled. Participants then completed a short demographics questionnaire and then shop for a couple different outfits in the store. After making a selection, the participants proceeded to the dressing room and tried on the items.

Differences between the two lighting conditions were compared using independent sample t-tests. The results revealed no statistical significance between lighting direction and any of the variables. However, there was statistical significance along single word-pairs used to assess dressing room perception and personal appearance: cramped/roomy ( $p = 0.002$ ) and harsh shadows/no shadows ( $p = 0.003$ ). Frontal lighting was considered superior to overhead lighting when the main concern was to eliminate facial shadowing or to make the dressing room seem more spacious. Comments revealed a more definitive preference for frontal lighting. Consumers appear to focus on the environment or the self, which influences their ratings of lighting direction. Environmentally focused shoppers made negative comments on overhead lighting. Self-focused shoppers believed frontal lighting superior.

Results indicate that lighting direction affects the dressing room experience based on participant comments where frontal lighting is superior. However, quantitative data do not offer overwhelming support for frontal lighting, except when shadowing or spaciousness is the focus. Frontal lighting appears to be superior despite the absence of effect on emotional states. Findings offer insight into the differences of the two different lighting directions and help inform the decisions of retailers and interior designers regarding their lighting direction choices.

## CHAPTER 1 INTRODUCTION

It is commonly believed that clothing store dressing room experiences are key moments in the purchase decision process and poor atmospherics, which constitute the physical design of the space, can negatively affect the shopping experience and result in a lost sale (Osborn, 2000; Rea, 2000; Wilson, 2002; Winchip, 2008). Considering the large amounts of money some retailers spend on their main store atmospherics, to attract customers and make sales, it is believed by some professionals that retailers may be missing opportunities by not paying attention to the dressing room design. Interior designers agree that retailers commonly overlook the dressing rooms despite the knowledge that dressing rooms can influence consumer behavior (All Dressed Up, 2006; The perfect fit, 2007; Osborn, 2000; Wilson, 2002).

It is also recognized that consumer behavior is influenced by the atmospherics of the store environment (Bitner, 1992; Donovan & Rossiter, 1982; Donovan, Rossiter, Marcoolyn, & Nesdale, 1994). Bad store atmospherics can distract the shopper (Baker, Grewal, & Parasuraman, 1994) and discourage consumers from staying in the store (Maxwell & Kover, 2003); whereas good atmospherics enhance the shopper's mood and help increase sales (Baker, 1986). Lighting designers point out that lighting can change how people perceive and experience the space (Winchip, 2008) and lighting is a key element for the retail designer that helps create a positive store experience (Rea, 2000; Schlosser, 1998).

In retail lighting studies, researchers found that lighting, used as an environmental stimulus, affects product evaluation (Obermiller & Bitner, 1984) and can greatly enhance or hinder the store's atmospherics (Areni & Kim, 1994; Donovan & Rossiter, 1982; Donovan, et.al., 1994; Park & Farr, 2007; Summers & Hebert, 2001) and the consumer's shopping experience (Hegde, 1996; Kotler, 1974; Roush, 1994). However, though the effects of lighting

on the main sales floor have been studied in some depth, nothing is known about how dressing room lighting influences the experience of the consumer. Yet, the industry is beginning to view the dressing room as an important and singular part of the store experience as they make “a slew of changes in changing rooms: upgraded, sleeker materials; softer, better-positioned lighting; more space for social interactions; and clearer, more convenient locations (Mang, 2008).”

Dressing room lighting direction may be a strong factor influencing a shopper’s dressing room experiences but research is needed to understand how and along what dimensions.

Dressing room users may evaluate the dressing room and experiences occurring in the dressing room in much the same way as they evaluate the experience on the main sales floor. Considering the emotional evaluations taking place in the dressing room (Underhill, 1999), users could experience the same types of emotional reactions in the dressing room as they do in the main store, which are often measured by states of arousal and pleasure (Donovan & Rossiter, 1982, 1994). However, despite similarities to the main store experiences, the dressing room may be governed by different experiential qualities and modes of evaluation in the customer.

As one of the most critical sales areas (Mang, 2008; Underhill, 1999), clothing store dressing rooms are where consumers try on clothes and make their final evaluations and decision to buy (Rea, 2000) and possibly evaluate the price and need for the product. However, it is clear that, in the dressing room, users evaluate the color, texture, and design of the clothes (Rea, 2000). It is generally assumed by designers that the dressing room is the moment where shoppers evaluate their appearance and where customers form their most important impressions of the clothes, including its fit and appearance on the body (All Dressed Up, 2006; The perfect fit, 2007; Fitting Designs, 1999; Mang, 2008). Also, the dressing room may be a moment of emotional reaction to environmental attributes that can affect shoppers as they try on the clothes.

Lighting this space is critical to allowing the customers to evaluate the product and their personal appearance under optimal conditions thereby facilitating the completion of the sale (Rea, 2000).

The Lighting Handbook (Rea, 2000) of the Illuminating Engineering Society of North America (IESNA) makes lighting design recommendations for the dressing room. It is suggested that modeling of faces and color appearance is important. They recommend the use of both vertical (frontal) and horizontal (overhead) illumination to favorably represent the clothes and the person trying them on without deep shadows (Rea, 2000). As well, it has been shown that frontal lighting is preferred to top lighting in a dressing room (The perfect fit, 2007).

Although lighting direction is already shown to be important (The perfect fit, 2007; Rea, 2000), no empirical studies of dressing room lighting have been published. Therefore, this study seeks to explore the effects of dressing room lighting direction as an environmental stimulus on the shopper's emotional state and appearance as well as the dressing room experience.

### **Research Purpose**

It is unclear how lighting direction affects consumers in the dressing room despite the assumptions of lighting authorities, retailers, and designers. Considering the lack of studies available to designers, research is needed to explore how lighting direction affects the processes occurring in the dressing room so as to inform designers as to the effects of their choices. The purpose of this study is to investigate the effects of lighting direction in the dressing room on consumers' emotional states, lighting perceptions and preferences, self-evaluations, dressing room evaluations, and the consumer's overall dressing room experience.

Emotional states are the amount of arousal and pleasure experienced in a retail setting (Donovan & Rossiter, 1982, 1994). Arousal is the amount of stimulation and excitement that the space causes consumers while pleasure is how satisfied or good the person feels in the

environment (Donovan & Rossiter, 1982, 1994). High levels of arousal accompany high levels of pleasure in high-end retail stores but are inversely related in low-end retail stores where high levels of arousal affect low pleasure (Kaltcheva & Weitz, 2006). Arousal and pleasure may also measure the emotional effects of lighting direction in the dressing room.

Lighting perceptions are how lighting is perceived along dimensions of lighting quality: brightness and color of light. Lighting preference is defined as consumers favoring one lighting direction over another. Self-evaluations are the personal assessment of how favorably lighting renders the consumers facial and body appearance and are important in the dressing room (Rea, 2000). Dressing room evaluations are measured to see how lighting direction affects perceptions of size, cleanliness, convenience, and spaciousness among other dimensions of the dressing room. Finally, the overall dressing room experience is the total experience along dimensions of satisfaction.

However, men and women are different shoppers (Underhill, 1999). Women are more likely to try on clothes than are men and prefer to view products in actual settings and in use before making a purchase decision. Therefore, only women were included in this study since they are more frequent dressing room users and focus more on the shopping experience than do men (Underhill, 1999).

### **Research Questions**

The specific research questions are:

1. How does lighting direction affect female shoppers' emotional state of **arousal** in the dressing room?
2. How does lighting direction affect female shoppers' emotional state of **pleasure** in the dressing room?

3. How does lighting direction affect female shoppers' **lighting perceptions** in the dressing room?
4. How does lighting direction affect female shoppers' **lighting preference** in the dressing room?
5. How does lighting direction affect female shoppers' **self-evaluations of facial appearance** in the dressing room?
6. How does lighting direction affect female shoppers' **self-evaluations of body appearance** in the dressing room?
7. How does lighting direction affect female shopper's **dressing room evaluations**?
8. How does lighting direction affect female shoppers' **overall dressing room experience**?

### **Conceptual Framework**

Mehrabian and Russell (1974) proposed a model of stimulus–organism–response (S–O–R) to understand the effects of environmental stimuli on emotional responses, the amount of arousal, pleasure, and dominance that users feel in the physical environment. Donovan and Rossiter (1982) applied Mehrabian and Russell's (M-R) model to assess the effects of environmental cues on emotional states to reveal arousal and pleasure are effective measures in retail settings but not dominance. These emotional states then affect approach-avoidance behavior in the store environment. Approach is willingness to remain in the environment whereas avoid is the negative response to the environment whereby users retreat from the experience. Poor atmospheric and design can cause users to leave whereas good design can encourage users to stay longer. Since then, environmental stimuli have been the focus of many marketing studies that have sought to explain the relationship between environmental cues and the shopping experience (Alpert, Alpert, & Maltz, 2005; Kaltcheva & Weitz, 2006). It has been

found that environmental stimuli including *music* (Alpert et al., 2005; Baker, Levy & Grewal, 1992; Kotler, 1974), *scent* (Chebat & Michon, 2003), *crowding* (Eroglu, Machleit, & Barr, 2005), *color* (Babin, Hardesty, & Sutter, 2003; Bellizzi & Hite, 1992), and *lighting* (Baker et al., 1992, 1994; Boyce, Lloyd, Eklund, & Brandston, 1996; Roush, 1994; Schlosser, 1998; Summers & Hebert, 2001) affect emotional responses, arousal and pleasure, and willingness to remain in the store and make a purchase.

Other marketing researchers have used the same model or adapted the model to study shopping motives (Kaltcheva & Weitz 2006), emotional states (Dawson, Bloch & Ridgway 1990), and negative environmental affect (Maxwell & Kover 2003). Emotional reactions, as measured by pleasure and arousal, have been shown to relate directly to and affect the shopping experience (Donovan and Rossiter, 1982) and translate into shoppers spending more time and money in the store (Donovan et al., 1994). As well, emotional responses vary by store type (Machleit & Eroglu, 2000) and shopping motivations (Kaltcheva & Weitz, 2006). These effected emotions can be translated to people or objects in the environment (Maslow & Mintz, 1956) or the experience (Mehrabian & Russell, 1974).

It is evident that emotional states act as a mediator between the physical store environment and retail outcomes (Baker et al., 1992; Donovan et al., 1994; Kaltcheva & Weitz, 2006; Summers & Hebert, 2001). Lighting is a complex variable composed of color of light, intensity, pattern, and direction and is an important part of the overall retail store environment (Babin et al., 2003; Baker et al., 1992; Bitner, 1992; Roush, 1994). Yet, few studies have adapted the Mehrabian and Russell (M-R) framework to investigate the effects of lighting as an environmental characteristic on consumers' moods and behavior in a retail environment (Areni & Kim, 1994; Park & Farr, 2007; Summers & Hebert, 2001). By applying the M-R model, Areni

& Kim (1994) investigated the effects of lighting intensity on consumers' approach-avoidance behavior, as did Summers and Hebert (2001). In a retail store, Park & Farr (2007) compared the effects of color of light on emotional states of arousal and pleasure between consumers from the U.S. and Korea to find that these consumers do differ in their reactions to lighting.

Considering that lighting affects consumers' emotional states and shopping behavior in the main store environment, it is expected that lighting would also affect consumers' emotional states in the dressing room. Dressing room lighting should be studied to understand its effect on consumers' emotional states and shopping experience. Therefore, this study adapted the Mehrabian and Russell (M-R) model to investigate the effects of lighting direction on emotional states of arousal and pleasure and the overall dressing room experience with the understanding that high levels of arousal and pleasure are predictors of buying behavior (Figure 1-1).

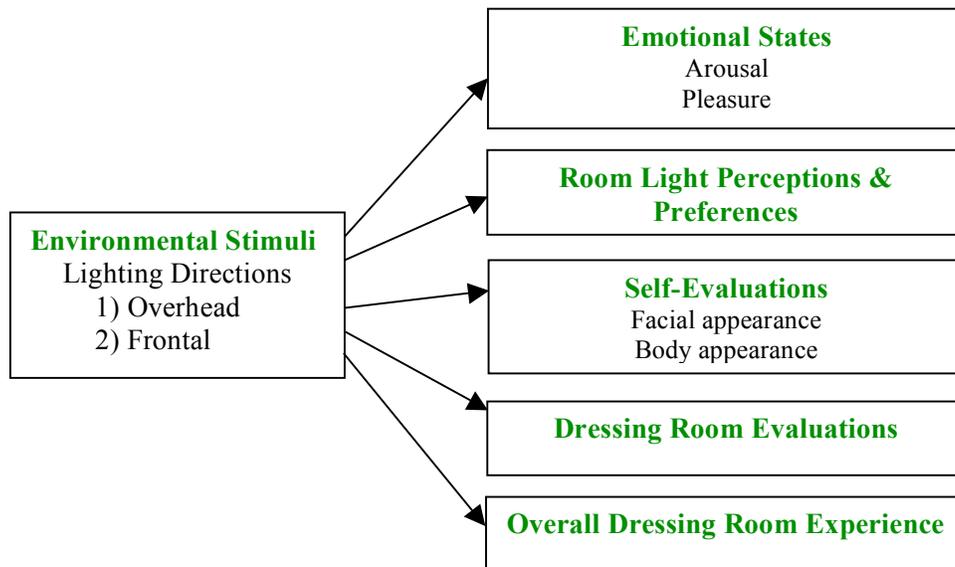


Figure 1-1. Conceptual model

Though emotional states are important in retail environments, additional variables are also critical to the experience within the dressing room. First, the perceived quality of the

dressing rooms and preferences for one or another environmental dimension seem to be important and may affect or be related to the dressing room experience and decision to buy (The perfect fit, 2007). Lighting direction affects the perceived quality of a space (Chayutsahakij, 1998; Flynn, 1977; Rea, 2000) and needs to be assessed to determine its relationship to the overall experience. Dressing room quality is affected by cleanliness, privacy, and convenience among other things (The perfect fit, 2007).

Second, consumers may also prefer one lighting direction above another in the dressing room. In general interior environments, Flynn (1977) found that lighting composition heightens the perception of and preference for different interior scenarios. Dim peripheral lighting is linked to perception of privacy while lighting composition amplifies the feeling of spaciousness. However, in retail settings shoppers have been shown to prefer downward lighting (Chayutsahakij, 1998). It is unclear what users prefer in the dressing room though Flynn (1977) and Chayutsahakij (1998) have uncovered preferences for different lighting conditions in other environments.

Furthermore, personal appearance is important in the dressing room. The Illuminating Engineering Society of North America (IESNA) recommends dressing room lighting should accentuate personal appearance and facial modeling. A combination of diffused and directional light from overhead and frontal sources most clearly defines facial and body appearance (Rea, 2000). Some designers suggest providing more frontal light than overhead light to highlight facial features in a dressing room (All Dressed Up, 2006; The perfect fit, 2007). This study adapted the M-R model and explores the effects of lighting direction on these additional variables for female consumers in a field setting.

## **Summary**

It appears that though there is a decent understanding of lighting's effect on consumer emotional states and behavior in the main retail environment, less is known about the role of lighting on the consumer's perception of and experience in the dressing room. Some lighting dimensions, like lighting intensity (Summers & Hebert, 2001), have been studied and proven to affect the shopping experience; yet, none of them have been assessed in the dressing room. Specifically, nothing is conclusive about lighting direction despite its perceived importance. Therefore, this study seeks to begin understanding the effect of lighting direction on consumers in the dressing room.

## CHAPTER 2 LITERATURE REVIEW

This chapter consists of two sections that describe existing literature pertaining to the purpose of this study. The first part of this chapter reviews literature on the retail atmosphere, the application of the M-R model to study retail lighting, and retail lighting practices. The second part of this chapter focuses on literature regarding the dressing room and lighting.

### **Retail Atmosphere and Lighting**

Donovan and Rossiter (1982) were the first to assess the relationship between store atmospherics and emotional states and adapted the Mehrabian and Russell (1974) Pleasure-Arousal-Dominance (PAD) model to study emotions associated with purchase decisions and retail outcomes. Donovan and Rossiter (1982) found that arousal and pleasure are effective gauges of consumers' response to the environment and could be measured with simple semantic differential word pairs. Many subsequent research studies have been conducted to explain the emotional response to environmental cues along general and specific measures, like lighting (Baker et al., 1992; Roush, 1994; Summers & Hebert, 2001), crowding (Eroglu et al., 2005; Hui & Bateson, 1991), scent (Chebat & Michon, 2003), music (Alpert et al., 2005; Baker et al., 1992), and expectations of service quality (Gagliano & Hathcote, 1994), among others.

Mehrabian and Russell (1974) determined that there is a measurable environmental "load" that is comprised of novelty and complexity in the environment and that this directly affects the person's experience of arousal and/or pleasure. These emotional states then moderate approach or avoidance behavior to/within that environment (Bitner, 1992; Donovan & Rossiter, 1982; Mehrabian & Russell, 1974). They found that approach and avoidance are themselves strong predictors of "consumers spending extra time in the store and spending more money than intended" (Donovan et al., 1994, 291).

Baker et al. (1992) further reinforced the relationship among environmental stimuli, emotional states, and retail outcomes through the use of videotape research methods. Over the years, a multitude of approaches have confirmed the effect of mood and emotional states on the retail shopping experience and the emotion model was further refined demonstrating that arousal acts as an antecedent to the experience of pleasure in a retail setting and is moderated by shopping motivations (Kaltcheva & Weitz, 2006). High levels of arousal can negatively affect people with utilitarian motivations whereas high arousal levels more positively affect people with recreational motivations, resulting in higher levels of pleasure. This signifies that in the high-end apparel industry, high levels of arousal results in shopping pleasure. Understanding what affects pleasure and arousal may affect greater degrees of satisfaction and willingness to buy (Donovan & Rossiter, 1982).

Furthermore, expectations of service also affect ratings of the shopping experience and decisions to buy (Gagliano & Hathcote, 1994). Shoppers' expectations of store service are in part dictated by their first impression of the store and by product prices. High-end stores, as indicated by better design and higher price points, generated higher expectations in shoppers that were less frequently met for married, Caucasian shoppers with higher annual income.

In addition to reinforcing consumer expectations, the physical store's design can directly affect appraisals of merchandise within the store environment. Maslow and Mintz (1956) investigated the effect of the physical environment on the perceptions of other people and objects within an environment. The researchers asked people to rate the faces of people in 'beautiful,' 'average,' and 'ugly' environments along dimensions of fatigue/energy and displeasure/well-being. It was found that perceptions within a space can be transferred to or affect the perception of objects or people also occupying the space. For example, people were perceived as healthier

and better looking in beautiful interiors. Gardner and Siomkos (1985) confirmed this finding; they found that environmental attributes affect the perception of perfume quality. Perfume sold in high-end department stores was rated higher than the same product sold in discount stores. This supports the findings of other researchers that the physical environment is key to creating positive associations with product.

However, experiences within a space cannot be defined by one overall rating of pleasure or arousal or by one isolated part of the experience. Instead, the experience in the retail setting is an evolving dialogue between the consumer and the different atmospheric variables, people, or products the shopper encounters throughout the store (Kunkel & Berry, 2002). Tai and Fung (1997) studied emotional reactions throughout the store experience and believe that the emotional states of consumers are not consistent through the shopping experience and can be affected by different encounters occurring within a retail store. Tai and Fung's (1997) findings indicate that though researchers may measure the experience in a certain part of the store, these findings may not be applicable to other areas within the store.

Even before the consumer enters the store they begin to formulate initial impressions that affect their overall experience (Burns & Neisner, 2006). Expectations affect perceptions of the retail experience and create a standard against which the experience is judged. The consequence of this is that those retailers whose customers have "high expectations may need to place explicit attention on their customer's emotions (Burns & Neisner, 2006)." High-end stores foster high expectations of the dressing room atmospherics since the entire encounter is expected to be a united experience. Failure to meet high expectations can result in low arousal and pleasure and thus decrease buying behavior.

Though there are many atmospheric variables that can affect the entire experience, lighting

has been the focus of many studies because of the many ways in which it can be manipulated to serve multiple functions and create different moods within a space or store atmosphere (Rea, 2000) There is not always one clear solution to lighting a space, however, it is one key part of the atmosphere and has a large potential affect on perception and action in the retail setting (Areni & Kim, 1994; Donovan & Rossiter, 1982; Donovan et al., 1994; Obermiller & Bitner, 1984; Park & Farr, 2007; Summers & Hebert, 2001).

Several studies have used the Mehrabian-Russell (M-R) model as a lens through which to understand the effectiveness of retail lighting. Areni & Kim (1994) were among the first to substantively apply their work to the study of retail lighting. They tested for the difference between two lighting conditions (soft and bright light) over a two-month period. They found that though bright lighting had the effect of increasing customer interaction with product, it did not necessarily influence increased sales. This may mean that though lighting may attract attention, other factors are being considered as shoppers evaluate product.

Summers and Hebert (2001) followed suit using the M-R model to examine the effect display lighting has on approach – avoidance behavior. They installed temporary lighting over displays and alternated the lighting each day from on to off. Consumer behavior was assessed using store video in a single store with a total of 2367 participants. The people observed touched merchandise in the ‘on’ setting most frequently and in one of the store’s sections users remained longer in the ‘on’ condition than in the ‘off’ condition. Essentially, this study found that lighting influenced the length and level of consumer engagement with product.

Park & Farr (2007) additionally used the M-R model to investigate the effects of lighting on retail emotional states, behavioral intentions, and perceptions between Korean and U.S. participants. They used a 2 x 2 x 2 factorial design to assess the mutual effects of color

temperature, color rendering, and cultural differences. In an experimental setting, users were asked to complete a two-part questionnaire inside and outside the test setting and were exposed to each lighting scenario for as much time as they required for completing the questionnaire. The researchers found that higher color temperature (5000K) lighting was considered more arousing than lower color temperature (3000K) lighting. As well, participants assessed the lower color temperature setting as more pleasant than the higher color temperature setting and participants in the U.S. preferred higher CRI levels than Korean participants. Visual clarity was also rated higher for higher color temperature levels.

Emotional states and mood are important measures of the effect the environment has on consumers but other considerations are also significant when designing for a retail environment. Retail lighting's goal is to attract consumers and, more specifically, to facilitate the appraisal of self and product in dressing rooms (Rea, 2000). Lighting affects the retail experience and is an acknowledged atmospheric tool that can be adapted for different retail strategies: attracting attention, providing visual focus and creating moments of pause, generating interest, lending form, making colors appealing, creating a comfortable atmosphere, and directing consumer traffic (Roush, 1994; Winchip, 2008). Light is proven to affect customer interest and interaction with displays (Areni & Kim, 1994; Summers & Hebert, 2001) and the number and length of interactions with product has sometimes been shown to translate into higher sales. Colored light is also known to attract attention to window displays and affect emotional state (Babin et al., 2003) and can be a powerful element in the general sales floor (Rea, 2000).

The IESNA states that general retail lighting should: attract customers, allow the customers to evaluate the merchandise, and facilitate the completion of the sale (Rea, 2000). As well, general store lighting is shown to correlate with store image. Within the retail environment,

high levels of even, ambient lighting are associated with discount or lower end stores whereas lower levels of soft, focused, and zoned lighting is associated with higher end retail venues (Rea, 2000; Winchip, 2008). As well, Baker (1986) found that people expect high-end stores to have soft, mood lighting whereas discount stores are expected to use brighter lighting.

However, as energy costs become more of a concern, retailers in both high-end and discount stores are increasingly using energy efficient sources. Specifically, fluorescent lighting is the most commonly used lighting source in retail (Merchandise Blooms, 2005). The main reasons retailers choose the lighting sources they do are energy efficiency, life-cost cycle, initial cost, and maintenance concerns, in that order (Merchandise Blooms, 2005). Despite the focus on energy efficiency and maintenance, appearance was rated the most important aspect of lighting by 72% of specialty stores and 47.1% of department stores. This indicates that visual qualities of light are still of prime importance and studying how consumer perception and preference is affected by light may translate into increased sales venue. It is increasingly important to balance multiple needs when designing retail lighting (Winchip. 2008), but consumer preferences are less clear than retailer preferences.

Though there are clear guidelines, consumer lighting preference has not been heavily researched. Only Chayutsahakij (1998) investigated consumer retail lighting preferences. This study took a specific look at lighting direction preferences using pictorial representations of the same interior space with different lighting strategies. Users were asked to evaluate these interiors based on a rank order of preference. However, the sorting method proved difficult and time consuming for larger numbers of scenes because users were asked to make several ranking groups. Chayutsahakij (1998) found that though humans tend to prefer certain levels of mystery

and complexity in their environment, they have very basic requirements of lighting, preferring overhead illumination. People reported they preferred the condition with downward spotlights.

This contradicts Flynn's (1977) landmark findings that are still used by designers. Flynn (1977) was one of the first to investigate the effects of different lighting strategies. He investigated lighting preferences by asking people to rate pictures of different lighting scenarios and devised four main categories to evaluate subjective lighting impressions. These were: spaciousness, privacy, visual clarity, and relaxation. Further, he investigated preferences for different lighting revealing that people prefer peripheral and non-uniform lighting to more uniform lighting. Each of these categories was created using different combinations of lighting focus and direction to study the psychological perception of the lit environment.

Since then, other researchers have taken different approaches to researching lighting perceptions and preferences. Butler & Biner (1987) used pictures of settings to solicit brightness preferences for different settings. They simply asked people their lighting preferences and it was found that people expected certain settings to be either dimmer or brighter based on social situations, activities, or moods associated with the space. They found that people prefer or expect different lighting illumination levels in certain areas within the home and different venues like the office, classroom, library, and dorm (Butler & Biner, 1987). For example, office lighting was expected and preferred to be brighter than rooms in the home. However, brightness is only one lighting dimension. Lighting is described by its illumination level, color, source type, and color rendering. Illumination level is measured by footcandles (FC) or by lux. Kelvin (K) measures the color of light, such as its color appearance or color temperature; while lighting's ability to render the color of objects is measured by color-rendering index (CRI). Each of these dimensions can affect the mood within a space (Rea, 2000) and different combinations of lighting illumination

level, color temperature, and CRI affect male and female moods differently (Knez, 1997).

Women are singular consumers and are affected by the retail environment differently than men (Underhill, 1999). In his book, “Why We Buy,” Underhill discusses the differences between male and female shoppers. Women, for instance, are more likely to try on clothes out of a desire to see the product in use before making a purchase. Also, if men decide to use the dressing room, they will purchase that product 65% of the time. However, women are less certain of their purchase decisions entering the dressing room buying only 25% of the time. Also, where men focus on fit, women consider many more factors like need. Still little is known about women’s thought processes occurring in the dressing room despite the importance of this space.

Personal evaluations are also affected by different properties of lighting. People with different skin tones perceive different CCT levels differently and preferences appear to be statistically different by lighting conditions (Quellman & Boyce, 2002). Veitch, Tiller, Pasini, Arsenault, Jaekel, and Svec (2002) examined the specific effect of fluorescent lamps on skin appearance. They found that people with lighter skin tones, rose and olive, seemed to prefer lamps with a reddish hue rather than those with a greenish hue. However, other skin tones were not assessed.

Facial rendering and favorability are also affected by lighting direction. Veitch, Miller, McKay & Jones (2006) conducted a study to see how different office lighting conditions affected peoples’ ratings of facial appearance based on the direction of the lighting. They assessed four conditions created by a panel of lighting designers: “suspended direct/indirect; furniture-mounted indirect with supplemental compact fluorescent task lighting; recessed 1 x 4 troffers with semi-specular parabolic deep-cell louvers; and, recessed 1 x 4 troffers with K-12 prismatic lenses (Veitch et al., 2006).” They found that facial appearance was rated superior under ceiling

mounted lights more than under furniture-mounted lights, which contradicts some of the common assumptions about lighting preference in dressing rooms (Rea, 2000). When rating for glare control they found that furniture mounted lighting was rated higher than ceiling mounted lighting (Veitch et al., 2006). However, it seems that despite common beliefs, overhead lighting is also capable of rendering faces favorably and warrants further research into the effect the lighting direction has on personal evaluations.

Much research has examined the role of store atmospherics in drawing attention to merchandise and on increasing spending dollars. The M-R model has been shown to be a reliable measure of the experience in the retail environment. Lighting is one of the many parts of the store environment experience and has also been investigated using the M-R model and along other experiential variables. However, though dressing rooms are key to the apparel shopping experience there is little research available on the effects of lighting on dressing room experience variables. Research that looks at the effects of lighting direction are conflicting and at times contradict the assumptions made about dressing room lighting.

### **Dressing Room Lighting**

Dressing rooms are one moment in the entire experience, the culmination of the shopping trip, and the last chance to sell the product (All Dressed Up, 2006; The perfect fit, 2007; Osborn, 2000; Wilson, 2002); poorly conceived dressing rooms send the wrong impression to consumers. The IESNA Lighting Handbook presents several recommendations regarding dressing room lighting. They indicate, the “space requires the utmost sensitivity from the designer to ensure appropriate vertical illuminance ... and the elimination of harsh shadows (Rea, 2000, 17-3).” Harsh shadows are most often created by spotty, point sources located over the shopper in the dressing room. To minimize shadows, it is important to use either directional lighting in front of

the face, even illumination, or frontal illumination from mirror lights. Mirror lighting offers the best opportunity for even illumination of the entire body, which is key when trying on clothes. Most dressing room lighting is overhead fluorescent fixtures but high-end stores usually have mirror lighting for even frontal illumination (Rea, 2000).

Dressing room lighting should also provide good color rendering to favorably represent facial appearance and fabric color and texture (Rea, 2000) since dressing rooms require a certain degree of color acuity, as afforded by higher CRI, to allow users to color match several objects (Rea, 2000). Visual clarity is also an important element to the dressing room experience. Aside from the more intangible experience and personal evaluation, users are also evaluating the product through material and detail inspection (Rea, 2000). Consumers need to be able to read garment and price tags. It is recommended that illumination levels should be sufficient enough to read labels with the IESNA recommending high illuminance levels for detailed work (Rea, 2000). However, short readings tasks do not require higher illumination levels to reduce fatigue or eye strain. These different requirements may require different lighting scenarios and levels. Dressing room lighting must increase legibility with high levels of direct lighting but should also create moods conducive to retail experiences by creating higher contrast, peripheral lighting.

Higher CRI levels and warmer color temperatures are thought superior in the dressing room (Rea, 2000). The IESNA recommends sources with 3000K for dressing rooms and high color rendering of at least 80 CRI (Rea, 2000). Currently, stores are trending toward higher efficiency lighting types only as they become increasingly comparable to incandescent in color rendering ability.

Only one study has used the IESNA's standards to evaluate dressing room lighting (Hegde, 1996). Hegde (1996) took an inventory of retail dressing room footcandle measurements

and source CRI values using three representative dressing rooms in the same urban area with similar lighting strategies and sources. All three fitting rooms surveyed used overhead surface mounted fluorescent lighting fixtures, which is typical in lower end retail stores (Rea, 2000). These measurements were then compared against the IESNA's recommended standards to reveal that the footcandle levels were significantly below the recommended FC level. Hedge (1996) believed that the discrepancy was the result of the dressing rooms being under lit and that this would affect product inspection. However, this article fails to elucidate people's perceptions of the lighting levels to see how these standards measure up against consumer perceptions and sales levels.

The IESNA provides a good set of guidelines but untested assumptions do little to inform the designer about the nature of their lighting choices. It is not known how well these guidelines work in a myriad of stores types from boutiques to department stores. Currently, some use frontal illumination and others use overhead illumination. Some use incandescent and others use fluorescent. Even the lighting fixtures differ among store types and product base. It seems that in practice, there is no universal standard for dressing room lighting.

Lighting dimensions and recommendations have never been assessed in the dressing room. However, several studies have looked at their overall effect in other settings and along dimensions that may be important to dressing room experience, like personal and product evaluations, lighting color, and lighting levels. Color matching is important in the dressing room, and different color temperatures and illumination levels affect the ability of individuals to see and compare colors. This may be due to metamerism, the perceived differences in a single color under different lighting sources (Diaz, Chiron, & Viénot, 1998; Rich & Jalijali, 1995), or changes in visual acuity due to age (Ishida, 2002; Navvab, 2002). Aging affects the human's

ability to accurately perceive color and detail due to the yellowing of the eye and the weakening of the muscles (Ishida, 2002; Navvab, 2002). Therefore, the effects of and preferences for lighting scenarios or variables can vary greatly between different age groups. Researchers need to control for age when testing the importance of different lighting variables.

Much of what designers do in the dressing room is based on the image of the store and it is an important element in creating a brand and experiential quality for a space. However, there has been an effort to understand more about shoppers' perceptions of and preferences in the dressing room. *Chain Store Age* and Leo J. Shapiro & Associates of Chicago (The perfect fit, 2007) utilized a phone survey to define the consumers' ideal fitting room. It was found that people prefer seating and mirrors inside the dressing room rather than outside (The perfect fit, 2007). This provides insight into what people prefer but does not offer any explanation of why they want it or how it affects their experience. Lighting was found to be of lesser importance in the dressing room (The perfect fit, 2007). However, this information is the result of a phone interview and users were asked to choose between two options without trying to evaluate the reasons for their choices. Lighting may have a larger effect even though people do not self-report it does.

Lighting has already been proven to have a significant impact on the customer's shopping experience and designers have suggested that the dressing room is an even more important part of the decision to purchase (All Dressed Up, 2006; Mang, 2008). Lighting has been shown to affect the perception of space and preference but it is unclear how dressing room lighting is perceived or if the industry perceived benefits are equal to the shopper perceived benefits. Visual clarity and comfort have also been shown to relate to lighting direction but there is no

understanding of the effect in the dressing room (Rea, 2000; Veitch et al., 2006). Designers seem to understand the key importance of dressing room lighting but it is still often overlooked.

Despite the lack of empirical research, a number of research articles address the relationship between store atmospherics and increasing length of stay (Donovan et al., 1994; Maxwell & Kover, 2003), consumer's interaction with product (Areni & Kim, 1994; Summer & Hebert, 2001), product evaluation (Obermiller & Bitner, 1984), shopping experience (Hegde, 1996; Kotler, 1974; Roush, 1994), and purchase behavior (Baker, 1986; Donovan et al., 1994) but not on their affect on the final decision moment in the dressing room. However, some in the industry perceive a link between purchase behavior and the design of dressing rooms and other designers and retail professional understand the key role dressing rooms play in making the sale.

Mark Holman, senior lighting designer at RPA, argued that "If you need to cut [costs], don't do [it] in the dressing room because that's where the sale is made" and "it is in the retailers best advantage to do everything possible so that the shopper feels good about how she looks" (Fitting Designs, 1999, 106). As well, Byron Merritt, stated in "All Dressed Up," that "the fitting room can provide one of the 'critical moments' for consumers in terms of the purchase decision" (All Dressed Up, 2006, 88).

Osborne (2000) sees dressing room lighting as key and suggests offering three settings: "daylight, office light and night time" (Osborn, 2000, 36). Additionally, Sullivan Enterprises suggests that frontal illumination is superior because it reduces shadows and uses the mirror as a light source (All Dressed Up, 2006). Others cite that overhead fluorescent lights have seen their day and other methods of dressing room lighting, like frontal illumination, would be a welcome change (Wilson, 2007).

Even beyond the lighting, dressing rooms are often overlooked, poorly maintained, and underutilized as a sales tool. Wilson (2007) laments that dressing rooms still often have only one hook. Osborn (2000) envisions the power of dressing room atmospherics in making the sale or in stopping it: “Alas, the sole mirror and bad lighting make Sally look pale and fat. Sally half-heartedly tries on a few more items, then leaves frustrated without purchasing anything.” Mang (2007) also highlights the lack of attention historically paid to dressing rooms but realizes that as consumers begin to expect more “every detail counts.” Dressing rooms are moving away from the very utilitarian to focusing on the experiential. Lighting needs to be used in strategic ways.

*Chain Store Age* articles like “Fitting Designs,” “All Dressed Up,” “Little Things Make A Big Difference,” and “Fitting Room Blues” highlight the importance of the dressing room’s design and lighting in the selling of clothes. Many retailers address this space only as an ‘afterthought.’ Although these articles are anecdotal and do little in the way of proving an association between lighting and purchase behavior, they help to illustrate the industry perceived link between purchase behavior and the design of these spaces.

The dressing room is a well-acknowledged moment of self-evaluation. The IESNA (Rea, 2000) recommends lighting that flatters the shopper and trade magazines highlight the importance of women’s perceptions of self in the dressing room (Osborn, 2000). Lighting quality is universally necessary, though indefinably elusive, and can affect the experiential aspect of the dressing room decision moment where the shoppers evaluate the self equally with the product. However, there is no sufficient level of understanding regarding how lighting affects personal appearance and evaluations of self. No empirical research has been conducted to understand how atmospherics can be used to affect the final decision moment in the dressing room. This study is necessary in clarifying the role of lighting, specifically lighting direction, in dressing rooms. This

study seeks to determine whether overhead or frontal illumination is preferred and how they affect personal and spatial evaluation and preference.

### **Summary**

In conclusion, a great deal of research has been conducted to understand consumer reactions and emotional responses to retail and non-retail environments along many environmental dimensions. Lighting has been a focus for many researchers seeking to understand its effect on perception and consumer behavior in the main retail environment. Such studies have focused on every dimension of lighting: including illumination level, color temperature, CRI and its effect on visual acuity, emotional state, perception, personal evaluations, and approach /avoidance behavior.

However, no research has investigated the effects of lighting in the dressing room, which is a key part of the shopping experience. Guidelines have been set forth by the IESNA but these standards have not been empirically assessed using actual consumers. Specifically, little is known about how lighting direction affects consumers despite the widespread industry assumptions and a slew of contradictory evidence. This study is necessary to clarifying the role of dressing room lighting, specifically lighting direction, on the dressing room experience and personal and product evaluations.

## CHAPTER 3 RESEARCH METHODS

The objective of this study is to understand the influence of lighting direction on the consumers' dressing room experience by examining its possible effects along different key variables: emotional states, lighting perceptions and preferences, self-evaluations, dressing room evaluations, and the overall dressing room experience. To accomplish the study objective, a field experiment was conducted in the dressing rooms of a local apparel store. This chapter presents the research methods by specifically addressing the study participants, the field experiment settings, the dependent measures, the pilot study, and the study procedure.

### **Participants**

A convenience sample was generated by asking for volunteers from the store's customers. Additional participants were solicited via campus advertisements, flyers, and through personal references. A total of sixty individuals over the age of 18 participated in the field experiment for this study. Given that women are a very unique set of consumers in an apparel store (Underhill, 1999), only female shoppers were asked to participate in the study.

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 (IRB) (Appendix A). Before the participants proceeded with the study, the process for the experiment was explained and the Informed Consent Form was presented for participant agreement (Appendix B). All participants received a \$10 gift certificate for the participating store as an expression of gratitude for their involvement in the study.

## **Field Experiment Setting**

### **Main Store Area**

The field experiment took place at a local area boutique. The store is located three blocks from the University of Florida main campus in Gainesville, FL. This local apparel store carries upscale men and women's clothing; however, the majority of the store is dedicated to women's apparel. The store is about 822 square feet (18'10" by 43'8"), with a ceiling height of 14'1". The walls are concrete blocks painted with white semi-gloss paint (Figure 3-1). The ceiling is also white textured concrete. The back wall is slanted backward by 5 degrees and is covered with mirror panels (Figure 3-2).

The dressing rooms are located in the back of the store (Figure 3-3). They are located in a small hallway accessed via a doorway in the floor to ceiling slanted wall. At the back of this hall is a door leading to the storage area and is finished with a mirror for when customers wish to step outside the dressing rooms to look at the clothes. From the main sales floor, it appears as though the back mirror wall is continuous and offers additional mirror space for dressing room users.

### **Dressing Rooms**

There are three dressing rooms in the back of the store (Figures 3-3). The front two dressing rooms (1 & 2) were used for this field experiment because they are identical in size, shape, and surface finish (Figure 3-4). The walls and ceiling are flat white painted drywall. The floor is finished with light grey concrete paint. At the floor plane, they are approximately 4'1" by 7'4" with 7'8" high ceilings.



Figure 3-1. View of the store from the back



Figure 3-2. View of the store from the front

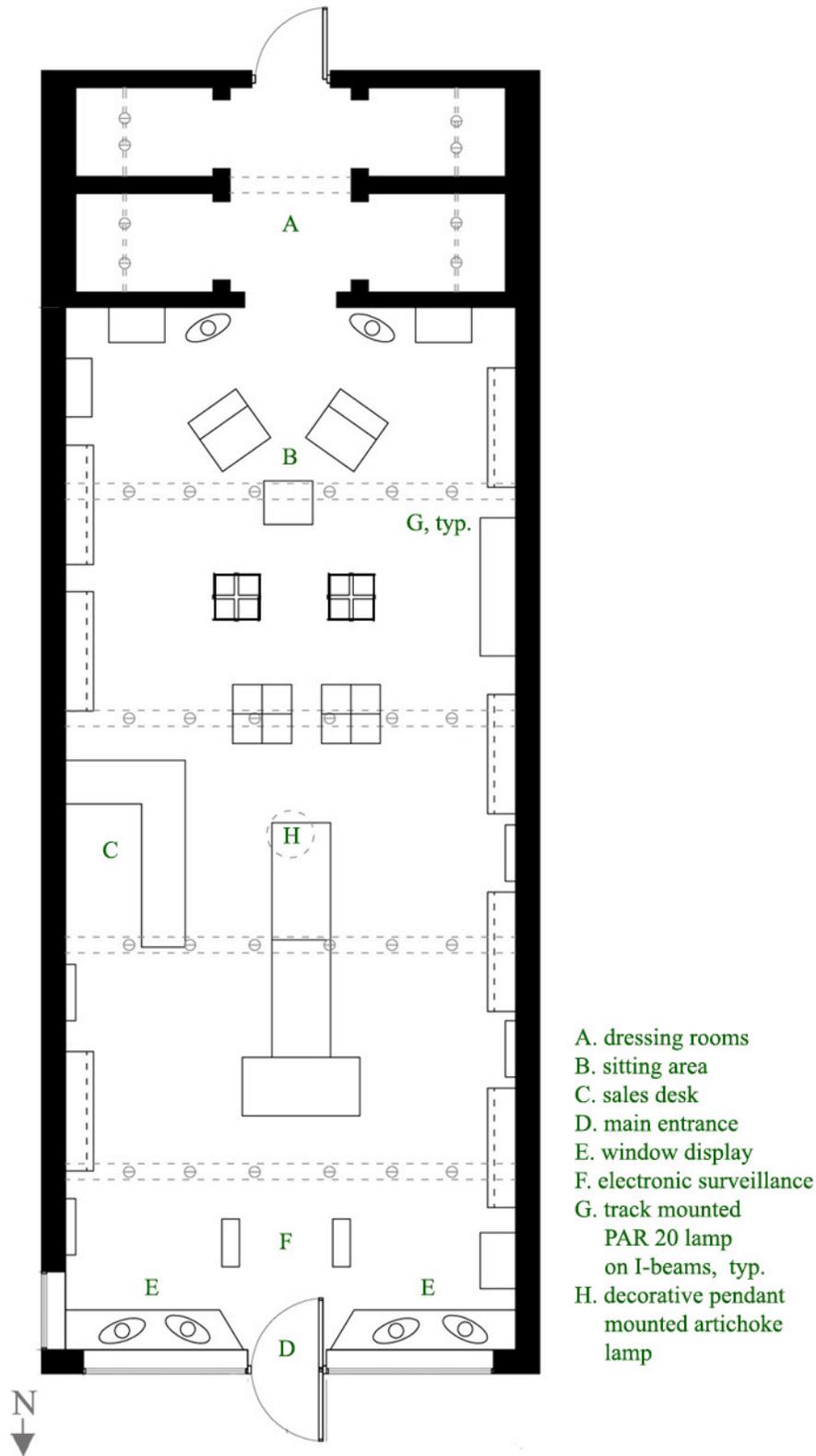


Figure 3-3. Store floor plan with lighting overlay

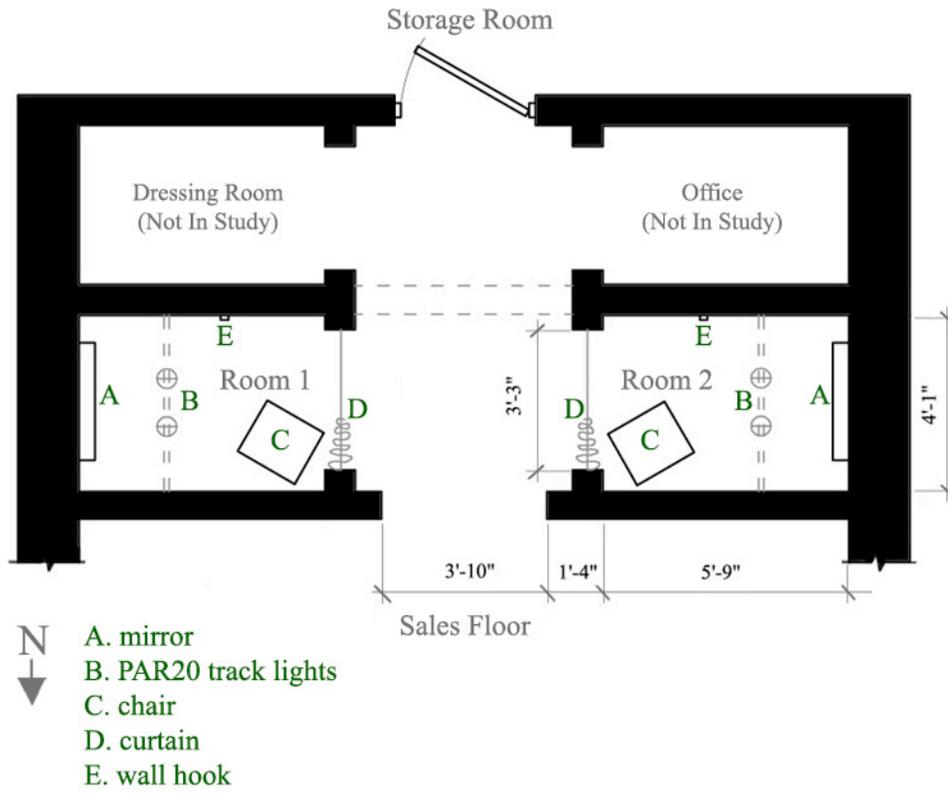


Figure 3-4. Dressing room floor with lighting overlay

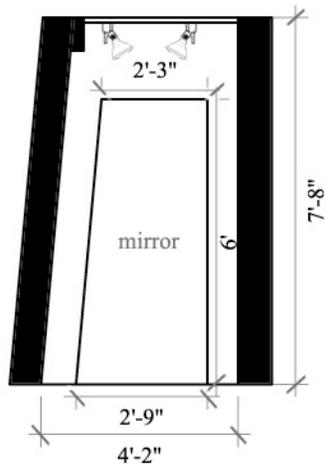


Figure 3-5. Dressing room section

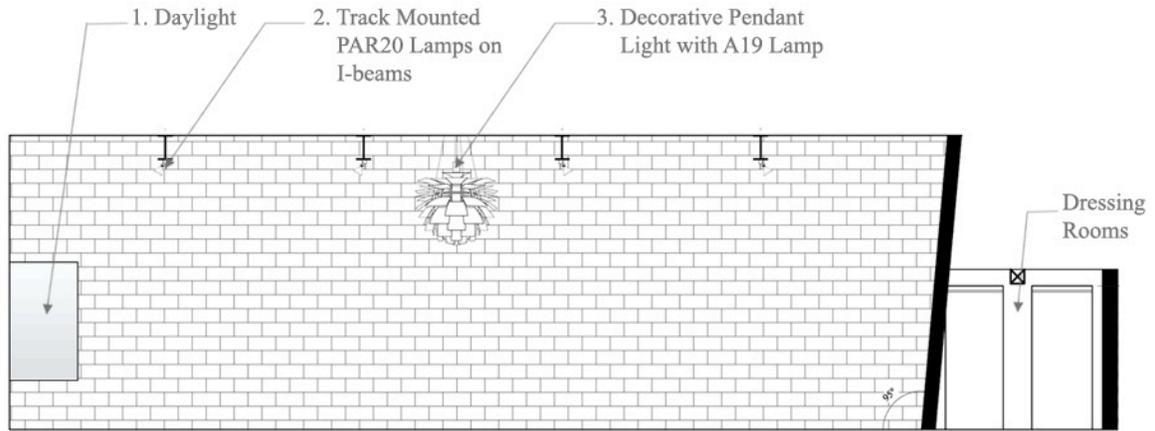


Figure 3-6. East section of the store



Figure 3-7. Frontal lighting condition



Figure 3-8. Overhead lighting condition

As can be seen in Figure 3-4, the two experimental dressing rooms are mirror images of one another containing a chair, a hook, and a wall mounted mirror. The chair is black plastic and there is a single hook on the south wall. The mirror in each dressing room has a slanted side to echo the slant of the wall (Figure 3-5) and a straight edge at the other side. Thus, the 6'0" high mirror is 2'9" wide at the bottom and 2'3" wide at the top. It is slanted backward toward the wall by five degrees. Black curtains hung from a steel curtain rod cover the dressing room entry from top to bottom.

## **Lighting Conditions**

### **Store Lighting Conditions**

There are three sources of lighting in the store (Figure 3-6). The first is daylight from the large windows in the front of the store. The second is directional light from track-mounted incandescent lamps (PAR20) located along the four I-beams spanning the width of the store. The third source is an incandescent lamp (A19) in the decorative pendant mounted artichoke lamp located in the center of the store (Figure 3-6). The illumination appears even throughout the store and the store is bright. The illumination levels are 958 lux (89 FC) in the front of the store, 463 lux (43 FC) in the seating area, and 237 lux (22 FC) on the merchandise located under the pendant fixture.

### **Dressing Room Lighting Conditions**

Two directions of lighting were assessed in this study: overhead and frontal in both dressing rooms. The characteristics of the two directional lighting schemes are shown in Table 3-1. The researcher was granted permission by the store's owner to set up the two lighting conditions. Each dressing room had overhead lighting from track mounted incandescent lights (two PAR20) (Figure 3-7). The track lighting was located 2'0" from the mirror wall and the

bottom of the light fixture is 7'0" above the floor. The illuminance for each condition was measured on the floor 18 inches from the center of the mirror and on the front of the body at 18 inches from the center of the mirror and five feet up (Table 3-1). This was based on where people stood in the dressing room when looking in the mirror. The lights were unshielded sources, which minimized the effect of preference from a certain light fixture. Since both sources are visible, bias was limited from preference for visible or hidden light sources.

Table 3-1. Illumination levels measured in each lighting condition

| Location  | Lighting type | Left dressing room | Right dressing room |
|---|---------------|--------------------|---------------------|
| Floor @ 18" from center of mirror                   | Overhead      | 414 lux (38.5 FC)  | 438 lux (40.7 FC)   |
|   | Frontal       | 371 lux (34.5 FC)  | 395 lux (36.7 FC)   |
| Vertical @ 5' from floor, 18" from center of mirror | Overhead      | 376 lux (35.0 FC)  | 344 lux (32.0 FC)   |
|   | Frontal       | 624 lux (58.0 FC)  | 617 lux (57.3 FC)   |

Table 3-2. Light source types and properties

|                   | Overhead lighting  | Frontal lighting |
|-------------------|--------------------|------------------|
| Lamp type         | Incandescent (PAR) | Fluorescent (T8) |
| Color rendering   | 95 CRI             | 86 CRI           |
| Color temperature | 2800K              | 3000K            |

The frontal lighting was achieved using four-foot fluorescent sidelights (GE Lighting F32T8/SPX30/ECO) mounted in Lithonia standard strip light fixtures located at each side of the mirror (Figure 3-7). The lamp was 32 watts with a color temperature of 3000K, 86 CRI, and a mean lumen output of 2800. The lamps were centered vertically along the mirror for even illumination. The color of light in this study met the IESNA recommendation for a minimum 85 CRI and 3000K light source (Rea, 2000). The IESNA also recommends overhead lighting in dressing rooms be 323 lux (30 FC) and frontal lighting be 54 lux (5 FC) (Rea, 2000). Lighting levels were kept even in this study to compare the differences resulting from lighting direction alone. The lighting levels were measured for each of the conditions and were within 65 lux (6 FC) of each other as measured on the floor.

## Dependent Measures

The data-collection instrument for this study was a self-administered questionnaire, presented in two parts. Part one was designed to obtain demographic and background information for each participant (Appendix C). Part two entailed a series of questions to ascertain the effect of lighting direction on 1) emotional states, 2) overall room light perception, 3) self-evaluation, 4) dressing room evaluations, and 5) the dressing room experience (Appendix D).

1) Measures for emotional states (arousal and pleasure) were selected from Mehrabian and Russell's pleasure-arousal scales (Mehrabian & Russell, 1974). The arousal scale has four items with bipolar semantic differentials, including wide awake/sleepy, aroused/unaroused, stimulated/ relaxed, and excited/calm. Pleasure was measured using four items with paired adjectives on a seven-point Likert scale. These were comfortable/uncomfortable, satisfied/dissatisfied, relaxing/tense, and pleasant/unpleasant.

2) To investigate the participants' perception of and preference for the lighting conditions, an additional nine items were adapted from various lighting studies (Babin et al., 2003; Donovan et al., 1994; Hendrick, Martyniuk, Spencer, & Flynn, 1977). Lighting perceptions were measured using word pairs: warm/cool, bright/dim, clear/hazy, distinct/vague, and glaring/not glaring. Lighting preference was measured using word pairs: like/dislike and bad/good. Seven-point Likert scales were used to differentiate between the bipolar adjectives.

3) As it relates to lighting, self-evaluation is usually measured by how lighting affects skin (Quellman & Boyce, 2002; Veitch et al., 2002) and face perception (Veitch et al., 2006). However, self-evaluation in the dressing room does not focus only on skin and face perception but also on body and overall appearance. Therefore, a five-item scale for facial appearance and a three-item scale for overall body appearance were developed by the researcher to test the unique

effects of dressing room lighting on self-evaluation. The measures of facial appearance were bipolar adjectives including good/bad, young/old, healthy/unhealthy, harsh shadows/no shadows, and flattering skin tones/unflattering skin tones. Three paired adjectives (positive/negative, attractive/unattractive, and slender/heavy) on a seven-point Likert scale were used to measure the overall perception of body appearance.

4) Dressing room evaluations were measured using nine bipolar adjective word pairs like those used in Mehrabian and Russell (1974) and Donovan and Rossiter (1982). These were inconvenient/convenient, cramped/roomy, dirty/clean, lack of privacy/adequate privacy, small/large, unkempt/well kept, low quality/high quality, unimpressive/impressive, and bad/good. 5) The dressing room experience was also assessed using 7-point Likert scales to determine how successful the dressing rooms were in creating a positive experience. Users were asked to provide their level of agreement to statements: “The dressing room met my expectations”; “The dressing room fit in the store”; “The dressing room encouraged me to stay and try things on”; and “My overall dressing room experience was satisfying.” This question model was adapted to this study from previous environmental research like Mehrabian and Russell (1974) and Donovan and Rossiter (1982).

To understand the importance of lighting and other environmental cues in dressing rooms, ratings of atmospheric cues were also solicited using a 7-point Likert scale rating dimensions from 1 = Very Not Important to 7 = Very Important. These dimensions were selected from previous research into dressing room atmospherics (The perfect fit, 2007) and included lighting, cleanliness and seating among others (Appendix C). Demographic questions were also asked, including age, level of environmental affect, level of self-esteem, number of items tried on and number of items intending to purchase. Environmental affect has been shown to be of relative

importance to different shopper types (Moye & Kincade, 2000; Shim & Kotsiopoulos, 1993) and people are different in how they are affected by the environment being either screeners or non-screeners (Mehrabian, 1977). A set of questions was developed to assess people's self-reported levels of sensitivity to environmental cues, particularly lighting. Self-esteem was also measured to control the effects of poor self-image on the perception of self as related to lighting. Questions are adapted from Blascovich and Tomaka (1991) to suit the effects of self-esteem related to body image.

### **Pilot Study**

A pilot study was administered to three female university students in the dressing rooms. This test was used to detect any defects in the proposed study instrument, such as issues with wording or terminology, and to check the experimental procedure's timing and sequencing. It was also used to discover and resolve problems with ambiguity in the questionnaire and to estimate the time required to complete the experimental procedure for each individual. All three took about 25 minutes after which they were asked if anything was confusing or anything about the survey or the experience could be improved. Pilot study participants did not express any confusion or difficulty with the questionnaire and no changes were made for content.

### **Procedure**

The study was conducted over a three-week period from April 21<sup>st</sup> to May 12<sup>th</sup> 2008 mainly on Mondays through Fridays from 11:00am until 2:00pm. Half of the participants were random shoppers in the store (n=30, 50%) while students in an interior design lighting class referred additional participants to the study. The interior design students were not allowed to participate themselves because they may have been more sensitive to differences within the

environment. Upon arriving at the store and agreeing to participate, the procedure of the experiment was explained to participants.

First, the subjects were asked to complete the short demographic and preference questionnaire after which they were given the gift certificate to have in hand while shopping. They were then asked to shop for several outfits for about 10 to 15 minutes. When they were ready to try them on, the subjects were escorted to one of the dressing rooms. Participants were randomly assigned to one of the two lighting conditions in the dressing rooms. Both the left and right dressing rooms were used for each lighting condition. The conditions were alternated when there was enough time between participants. The subjects were told to follow the written instructions printed on each page of the questionnaire in the dressing room and complete the second questionnaire while standing in front of the mirror. Each subject experienced only one lighting condition and was randomly assigned to one of the lighting conditions. The average length of time for subjects to select and try on clothes and to complete the two parts of the questionnaires was approximately 20-30 minutes.

Despite the strengths of testing within an actual retail setting, it is impossible to control for the effects of all possible variables like in a controlled lab setting. However, additional lighting dimensions like lighting illumination and color were controlled and day lighting from the front windows was managed by testing during the same time during the day. Yet, other personal variables, like initial consumer mood and participants trying on different clothes may also affect the results. However, the insights that can be gained from testing in real settings with actual consumers outweigh the loss of control over the experience.

## CHAPTER 4 RESULTS

This chapter presents findings for each of the variables. It begins with descriptive statistics on participant demographic characteristics and presents findings from the independent sample t-test for the dependant variables for the two lighting direction. A p-value of 0.05 was used to assess statistical significance. Finally, a content analysis of the qualitative data was conducted and related to the tested variables.

### Participant Characteristics

A total of 60 women aged 18 and over participated in the study. Table 4-1 presents the frequency and percentage distributions for the participant demographic characteristics. The average age of participants was 22 ranging from 18 to 33 years old. Half (n = 30, 50%) of the participants were between the ages of 21-25 years old. Twenty-four participants (40%) were between 18-20 years old, four participants (7%) were between 26-29 years old, and the remaining two participants (3%) were 30 or over. Participants were predominantly White (n = 47, 78%) and the remaining participants were Asian (n = 7, 12%) and Hispanic (n = 6, 10%).

Table 4-1. Participant characteristics

| Age Group | <u>n</u> (%) | Ethnicity <sup>1</sup> | <u>n</u> (%) | Sampling Method        | <u>n</u> (%) |
|-----------|--------------|------------------------|--------------|------------------------|--------------|
| 18-20     | 24 (40%)     | White                  | 47 (78)      | Store Customers        | 30 (50)      |
| 21-25     | 30 (50%)     | Asian                  | 7 (12)       | Class References       | 15 (25)      |
| 26-29     | 4 (7%)       | Hispanic               | 6 (10)       | Participant References | 13 (22)      |
| Over 30   | 2 (3%)       | --                     | --           | Advertisement          | 2 (3)        |
| Total     | 60 (100%)    | Total                  | 60 (100)     | Total                  | 60 (100)     |

<sup>1</sup>Only three ethnicities were observed.

Participants were drawn from the store's customers (n = 30, 50%) or were recruited from the university in close proximity to the store. The average length of time participants spent in the dressing room was 11 minutes with a range from 5 to 25 minutes. The average number of

garments tried on was 2.85 (SD = 1.219) and the average number of items purchased was 0.362 (SD = 0.659).

All participants were randomly assigned to one of two lighting conditions in one of two rooms: 1) overhead lighting in the left dressing room, 2) overhead lighting in the right dressing room, 3) frontal lighting in the left dressing room, and 4) frontal lighting in the right dressing room. Although two different lighting conditions were measured in this study, the random assignment to one of the four groups was utilized in order to control for the effect of the slanted wall being on different sides of the participant, however statistical analysis showed the slanted wall had no effect on the response variables.

### **Reliability of Measures**

The Cronbach's alpha test was performed to evaluate the internal consistency of scales measuring variables: emotional states of arousal and pleasure, lighting preference, self-evaluations of facial and body appearance, dressing room evaluations, and the overall dressing room experience. Results of the Cronbach's alpha test for these variables are shown in Table 4-2.

To measure the participants' state of arousal, four items of bipolar adjectives were combined including: unaroused/aroused, relaxed/stimulated, sleepy/wide awake, and calm/excited. The reliability value was low at 0.58, which indicates that in the dressing room word pairs within the arousal scale were not measuring the intended emotion. Participant state of pleasure in the dressing room was also measured using four bipolar adjectives: unhappy/happy, dissatisfied/satisfied, unpleasant/pleasant, and uncomfortable/comfortable. The reliability of the scale was very good at 0.80. Lighting preference was measured using two bipolar adjective word pairs: like/dislike and bad/good with a reliability of 0.93.

Also, the effect of lighting on self-evaluations was measured through ratings of facial and body appearance. The scale used to assess facial appearance used five bipolar adjective pairs: bad/good, old/young, unhealthy/healthy, harsh shadows/no shadows, and unflattering skin tones/flattering skin tones with an internal reliability of 0.84. Body Appearance was measured using three bipolar adjectives: negative/positive, unattractive/attractive, and heavy/slender and had an internal consistency of 0.84.

Dressing room evaluations were assessed using nine bipolar adjective word pairs: inconvenient/convenient, cramped/roomy, dirty/clean, lack of privacy/adequate privacy, small/large, unkempt/well kept, low quality/high quality, unimpressive/impressive, and bad/good. The scale exhibited very good reliability at 0.83. The overall dressing room experience was measured using level of agreement with four statements: “The dressing room met my expectations”; “The dressing room fit in the store”; “The dressing room encouraged me to stay and try things on”; and “My overall dressing room experience was satisfying.” The scale had very strong internal consistency at 0.86. Therefore, all these dependant variables were accepted for further analysis.

Table 4-2. Reliability results (Cronbach’s alpha)

| Variables                 | N of Items | Mean | SD   | Cronbach’s Alpha |
|---------------------------|------------|------|------|------------------|
| State of Arousal          | 4          | 4.40 | 0.94 | 0.58             |
| State of Pleasure         | 4          | 5.17 | 1.07 | 0.80             |
| Lighting Preference       | 2          | 5.03 | 1.45 | 0.93             |
| Facial appearance         | 5          | 4.97 | 1.07 | 0.84             |
| Body Appearance           | 3          | 4.86 | 1.23 | 0.84             |
| Dressing Room Evaluations | 9          | 4.89 | 0.86 | 0.83             |
| Dressing Room Experience  | 4          | 5.16 | 1.22 | 0.86             |

### **Effects of Lighting Direction on Response Variables**

Independent sample t-tests were performed to compare the differences between the two lighting directions for each research question. Table 4-3 shows the mean and standard deviation

scores for the two lighting directions and the t-test value and resulting p-values for the dependant variables.

Table 4-3. Means, standard deviations, and t-test results by lighting condition

| Source                    | <u>n</u> | Mean | SD   | t-value | <u>p</u> |
|---------------------------|----------|------|------|---------|----------|
| State of Arousal          | --       | --   | --   | -0.83   | 0.413    |
| Frontal Lighting          | 30       | 4.30 | 1.01 | --      | --       |
| Overhead Lighting         | 30       | 4.50 | 0.86 | --      | --       |
| State of Pleasure         | --       | --   | --   | 0.51    | 0.612    |
| Frontal Lighting          | 30       | 5.24 | 1.00 | --      | --       |
| Overhead Lighting         | 30       | 5.10 | 1.15 | --      | --       |
| Lighting Preference       | --       | --   | --   | 0.40    | 0.693    |
| Frontal Lighting          | 30       | 5.10 | 1.35 | --      | --       |
| Overhead Lighting         | 30       | 4.95 | 1.57 | --      | --       |
| Facial Appearance         | --       | --   | --   | 1.19    | 0.241    |
| Frontal Lighting          | 30       | 5.13 | 0.92 | --      | --       |
| Overhead Lighting         | 30       | 4.81 | 1.20 | --      | --       |
| Body Appearance           | --       | --   | --   | -0.07   | 0.945    |
| Frontal Lighting          | 30       | 4.84 | 1.20 | --      | --       |
| Overhead Lighting         | 30       | 4.87 | 1.28 | --      | --       |
| Dressing Room Evaluations | --       | --   | --   | 0.82    | 0.417    |
| Frontal Lighting          | 30       | 4.98 | 0.95 | --      | --       |
| Overhead Lighting         | 30       | 4.80 | 0.76 | --      | --       |
| Dressing Room Experience  | --       | --   | --   | -0.03   | 0.979    |
| Frontal Lighting          | 30       | 5.16 | 1.37 | --      | --       |
| Overhead Lighting         | 30       | 5.17 | 1.09 | --      | --       |

### States of Arousal and Pleasure

Despite expectations, the results indicate that for the combined arousal scale there was no significant difference between the overhead and the frontal lighting,  $t(58) = -0.83$ ,  $p = .413$ . The average response for the frontal lighting ( $M = 4.30$ ,  $SD = 1.01$ ) was not significantly different from that of the overhead lighting ( $M = 4.50$ ,  $SD = 0.86$ ). Lighting direction had no effect on the level of arousal experienced.

As well, similar results were observed for the effects of dressing room lighting direction on the state of pleasure; there was no statistical significance,  $t(58) = 0.51$ ,  $p = .612$ . The mean

response for the frontal lighting was 5.24 (SD = 1.00) and the mean of the overhead lighting was 5.10 (SD = 1.15).

Yet, within the arousal scale the single item of level of relaxation/stimulation approached significance at the 95% CI,  $t(58) = 1.894, p = 0.063$ . That is, the mean response for the frontal lighting ( $M = 4.63, SD = 1.377$ ) was slightly different from that of the overhead lighting ( $M = 3.93, SD = 1.484$ ).

### Lighting Perception

Three variables including cool/warm, dim/bright, and hazy/clear were measured in order to ascertain if other lighting variables held constant were sufficiently controlled. As expected, the two directional lighting conditions did not exhibit any statistically significant differences along any of the dimensions: cool/warm ( $p = 0.243$ ), dim/bright ( $p = 0.377$ ), and hazy/clear ( $p = 0.157$ ). Table 4-4 shows the means, standard deviations, and t-test results for the lighting perception variables.

Table 4-4. Means, standard deviations, and t-test results for lighting perception

| Source              | <u>n</u> | Mean | SD   | t-value | <u>p</u> |
|---------------------|----------|------|------|---------|----------|
| Cool/Warm           | --       | --   | --   | -1.18   | 0.243    |
| Frontal Lighting    | 30       | 4.40 | 1.52 | --      | --       |
| Overhead Lighting   | 30       | 4.83 | 1.32 | --      | --       |
| Dim/Bright          | --       | --   | --   | 0.891   | 0.377    |
| Frontal Lighting    | 30       | 5.27 | 1.41 | --      | --       |
| Overhead Lighting   | 30       | 4.93 | 1.48 | --      | --       |
| Hazy/Clear          | --       | --   | --   | 1.435   | 0.157    |
| Frontal Lighting    | 30       | 5.83 | 1.09 | --      | --       |
| Overhead Lighting   | 30       | 5.40 | 1.23 | --      | --       |
| Glaring/Not Glaring | --       | --   | --   | 0.545   | 0.588    |
| Frontal Lighting    | 30       | 4.73 | 1.70 | --      | --       |
| Overhead Lighting   | 30       | 4.50 | 1.61 | --      | --       |

Two-tailed test of significance: \* $p < .05$

For cool/warm the mean of the frontal lighting ( $M = 4.40, SD = 1.52$ ) was not significantly different from the mean of the overhead lighting ( $M = 4.83, SD = 1.32$ ). For

dim/bright the mean of the frontal lighting ( $M = 5.27$ ,  $SD = 1.41$ ) was close to that of the overhead lighting ( $M = 4.93$ ,  $SD = 1.48$ ). As well, along hazy/clear there was no difference between the frontal lighting ( $M = 4.73$ ,  $SD = 1.70$ ) and the overhead lighting ( $M = 5.40$ ,  $SD = 1.23$ ). As well, there was no statistical significance between the two lighting directions along glaring/not glaring ( $p = 0.59$ ). The mean of the frontal lighting was 4.73 ( $SD = 1.70$ ) and the mean of the overhead lighting was 4.50 ( $SD = 1.61$ ).

### **Lighting Preference**

As with arousal and pleasure, there was no significant finding between the two directions of lighting for the reported lighting preference,  $t(58) = 0.40$ ,  $p = .693$ . The mean of the frontal lighting was slightly higher ( $M = 5.10$ ,  $SD = 1.35$ ) than that of the overhead lighting ( $M = 4.95$ ,  $SD = 1.57$ ).

### **Self-Evaluations of Facial and Body Appearance**

For facial appearance there was no statistical significance observed between the two lighting conditions,  $t(58) = 1.19$ ,  $p = .241$ . The mean of the frontal lighting ( $M = 5.13$ ,  $SD = 0.92$ ) was not significantly different from that of the overhead lighting ( $M = 4.81$ ,  $SD = 1.20$ ). However, one item of harsh shadows/no shadows within the personal appearance scale was statistically significant,  $t(58) = 3.09$ ,  $p = .003$  (Table 4-5). The participants noted fewer shadows on their faces in the frontal lighting condition ( $M = 5.37$ ,  $SD = 1.33$ ), while the other participants experienced harsh shadows under the overhead lighting ( $M = 4.33$ ,  $SD = 1.27$ ).

As with facial appearance, in this study for body appearance there was no statistically significant difference between the frontal lighting and the overhead lighting,  $t(58) = -0.07$ ,  $p = .945$ . The mean of the frontal lighting was 4.84 ( $SD = 1.20$ ) and the mean of the overhead

lighting was 4.87 (SD = 1.28) for body appearance. Also, there was no significant difference among any of the individual dimensions within the scale.

### **Dressing Room Evaluations**

The dressing room conditions also exhibited no difference between lighting directions. The overall dressing room conditions did not exhibit a statistical significance,  $t(58) = 0.82$ ,  $p = .417$ . The mean for the frontal lighting was 4.98 (SD = 0.95) and the mean for the overhead group was 4.80 (SD = 0.76) for dressing room evaluations.

However, one item within the dressing room evaluations scale did exhibit a significant statistical differences between the two lighting directions. This was the word pair cramped/roomy,  $t(58) = 3.18$ ,  $p = .002$  (Table 4-4). The participants perceived the dressing room was less cramped in the frontal lighting condition ( $M = 5.3$ ,  $SD = 1.21$ ) than under the overhead lighting condition ( $M = 4.23$ ,  $SD = 1.33$ ).

### **Overall Dressing Room Experience**

Dressing room experience exhibited no statistical significance between the two lighting directions,  $t(58) = -0.03$ ,  $p = .979$ . The mean of the frontal lighting was 5.16 (SD = 1.37) and the mean of the overhead lighting was 5.17 (SD = 1.09). There were no significant differences along any of the dimensions within the scale.

### **Qualitative Findings by Lighting Condition**

In order to understand the qualitative data and make it comparable to the quantitative results presented earlier in the chapter, the types and frequency of comments made on the two lighting directions were analyzed. A content analysis was conducted to determine the ratio of positive and negative phrases for each of the two lighting conditions (Neuendorf, 2002). The coding method is similar to that used by Weaver & Carroll (1985) who were looking at shoplifter

monologues to determine what they were affected by when walking through a retail environment. They coded content into phrases and then broke these phrases into categories.

For this study, as in Weaver and Carroll (1985), comments were considered to be phrases or thoughts that related to a specific topic and several phrases on the same topic could count as multiple comment phrases. That is if a participant said, “I liked the lighting, but it was too bright and too shadowy” it counted as one positive and two negative comments. This allowed for participants with a stronger reaction to a lighting condition and using more phrases to comment on the lighting to be accounted for. A total of 34 comment phrases were made on frontal lighting. Of these, 20 (59%) were positive while 14 (41%) were negative. A total of 36 comments phrases were made by participants in the overhead lighting condition. Of these, 25 comments (69%) were negative while 11 (31%) comments were positive. The majority of comments made in the frontal lighting condition were in favor of frontal lighting except for occasional comments on its being too bright. As well, despite some positive comments from people in the overhead lighting condition, the overhead lighting was reported to be too shadowy, too hot, and improperly located. All written comments are presented in Appendix G. There is a propensity in favor of frontal lighting though participants reported both that they disliked and liked both lighting conditions. The contradictions within comments are evident in an investigation of preference and body and facial appearance.

For example, written comments on the frontal lighting were both positive and negative. Positive comments focused on the lighting’s effects on physical appearance and comments included the following.

- 1) I loved the lighting. It made me look like my skin had a healthy glow.
- 2) I really like the lighting. I wish more dressing rooms were done like this.
- 3) I love the lighting! I feel like it is flattering, slimming, and exciting. It looks modern.

However, negative written comments were also made on the frontal lighting. They focused on how poorly it made people look and how bright the lighting was in the room.

Examples of these negative comments included the following.

- 1) Didn't really make me look my best.
- 2) Lighting should be a little less harsh.
- 3) [Needs] overhead lighting
- 4) [Add] down lights
- 5) The light gives me a headache.
- 6) The light was too white for me.

As well several contradictory written comments were made on the overhead lighting. Participants made both positive and negative comments. Examples of positive comments on overhead lighting did not exhibit any trends. However, like in other conditions people focused on self-evaluations and preference. Comments included the following.

- 1) I like the lighting the way it is.
- 2) Lighting is the best part except for heat.
- 3) The lighting was very good on the facial and body appearance.

Respondents also made negative written comments on the overhead lighting.

Negative comments reflected how poorly the lighting rendered facial appearance and the heat that the lights created. Some examples of comments included the following.

- 1) Maybe less overhead they bring out any circles you have under your eyes.
- 2) It was way too bright and the lights caused my head to make a shadow on my face.
- 3) I prefer the lighting when I step back, but the chair is in the way.
- 4) The light is too yellowish.

Furthermore, participant comments were examined for trends. A content analysis of the 60 participant's comments revealed that some consumers only commented on the environment (n=22). They focused on the flaws of the space, the effect of the lighting, and how to improve the environment. These participants were termed environmentally focused or distracted shoppers because negative aspects of the environment diverted their attention. Other consumers only

commented on their appearance, focusing on shadowing and the effects of lighting on personal appearance and body shape (n=7). These participants were termed self-oriented shoppers because of the focus they place on their appearance. Other participant’s comments focused on both environment and self (n=7). However, 20 participants made no comments or neutral comments like: “Nothing I can think of.” These participants were coined unaffected or utilitarian shoppers because the environment produced no strong reactions. However, these categories are exploratory and were created to further the understanding of the qualitative data. They provide a starting point for additional research and should be assessed further.

Table 4-5. Number of comment phrases by participant focus, lighting direction, and type

| Environment Focused | #  | Self Focused        | # | Both                | # |
|---------------------|----|---------------------|---|---------------------|---|
| Front – Positive    | 8  | Front – Positive    | 7 | Front – Positive    | 3 |
| Front – Negative    | 6  | Front – Negative    | 3 | Front – Negative    | 2 |
| Overhead – Positive | 3  | Overhead – Positive | 2 | Overhead – Positive | 5 |
| Overhead - Negative | 13 | Overhead - Negative | 4 | Overhead - Negative | 6 |

Analysis of shopper comments within each of these categories revealed there were more positive comments on frontal lighting and more negative comments on overhead lighting (Table 4-5). Environment focused shoppers in the frontal lighting condition made 14 comment phrases. Eight were positive and six were negative. Those in the overhead lighting condition made 16 comment phrases. Only three were positive while 13 were negative. Environment focused participants made about the same number of positive and negative comments on frontal lighting. However, the majority of comment phrases for overhead lighting were negative signifying that environment focused participants perceived overhead lighting negatively. One participant commented on the overhead lighting saying: “Could be in the back rather than right in your face.”

Of the participant’s 10 comment phrases made by participants focusing on the self in the frontal lighting condition, seven were positive and three were negative; while of the 6 comment

phrases made on the overhead lighting condition, two were positive and four were negative. Self-focused consumers rated frontal lighting more positively and overhead lighting more negatively. Frontal lighting was perceived to be better and one participant commented: “I loved the lighting. It made me look like my skin had a healthy glow. Also, my eyes looked amazing. The light was very flattering.”

Of the five comment phrases made by participants focusing on both environment and self in the frontal lighting condition, three were positive and two were negative; while of the 11 (100%) comment phrases made on the overhead lighting condition, five were positive and six (55%) were negative. For people focusing on both, about the same number of positive and negative comments were made under each lighting condition showing no difference between perceptions and no preference for one or the other.

### **Environmental Preference**

In addition to lighting, other environmental cues are also important in the dressing room (The perfect fit, 2007) and can affect the overall experience. In order to understand the significance of these variables, participants were asked to rate the importance of several environmental dimensions in the dressing room from one to nine (Appendix C) to compare the ratings of lighting with to other environmental factors. Participants rated most dimensions, including lighting, cleanliness, mirror size, etc., (1 = very not important to 7 = very important) and the results are shown in Figure 4-2. Dimensions that were rated highest with a mean over six were clean floors (M = 6.53), lighting (M = 6.52), mirror size (M = 6.45), cleanliness (M = 6.38), privacy (M = 6.37), mirror type (M = 6.17), and safety/security (M = 6.07). These least important dimensions with a mean score of less than five were seating (M = 4.81) and music (M = 4.60).

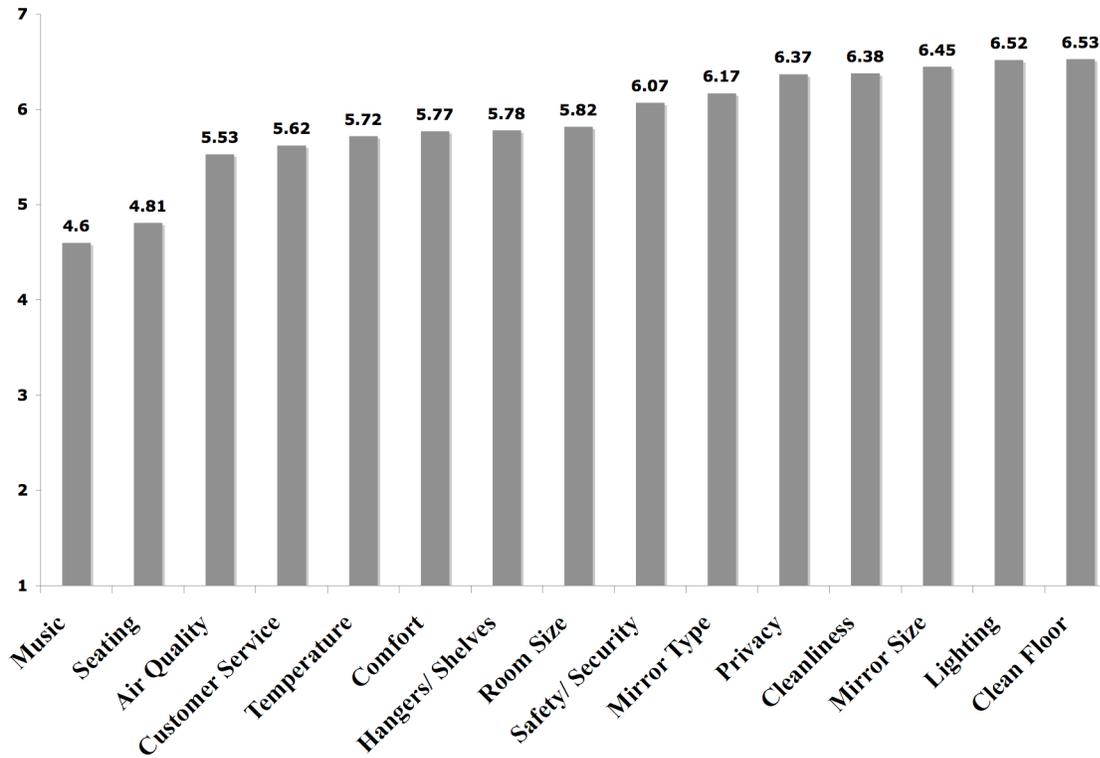


Figure 4-1. Importance of environmental cues in a dressing room

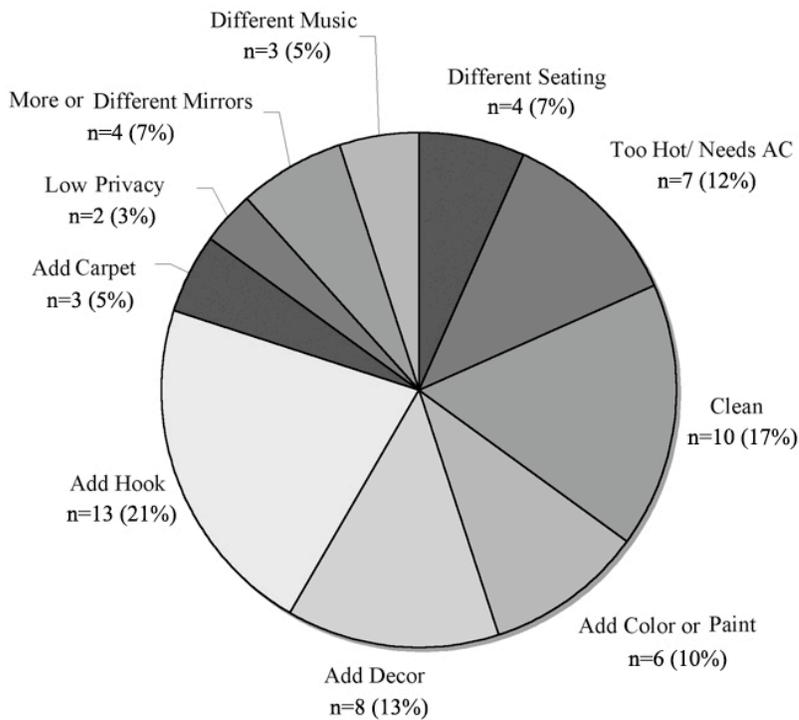


Figure 4-2. Participant qualitative comments (number of written comment phrases = 136)

In order to understand the effect of lighting in relation to these other design factors, participants were asked to make additional comments on other parts of the dressing room. Of the total 136 (100%) comment phrases made, 70 (51%) comment phrases were made on lighting. The other 66 (49%) comments phrases were made on other design factors. These were grouped into categories and the results are shown in Figure 4-1.

Of these, the largest share of comments ( $n = 13$ , 21%) was made on the need for more hooks or hangers in the space. Additionally, many comments were made on the lack of cleanliness in the rooms ( $n = 10$ , 17%), the need for added décor ( $n = 8$ , 13%), the temperature or need for air conditioning as a result of the heat of the lights, ( $n = 7$ , 12%), the need for new paint or more colorful walls ( $n = 6$ , 10%), and different seating ( $n = 4$ , 7%). These comments were generally consistent except for a few participants who were pleased with the stark appearance of the dressing rooms. As well, two participants commented on the need for another or a multiple-panel mirror, while one person commented on the mirrors being too small and another person on the mirror being too big.

Although, there was no statistical difference between the two lighting directions for the study variables (emotional state, lighting preference and perception, self-appearance, dressing room evaluations, and dressing room experience), lighting was the second most important environmental cue with a mean rating of 6.52 out of a possible 7 points.

Contradictions among comments and preferences reveal a lack of solidity despite more positive frontal lighting comments. The ambiguities within comments further confound our understanding and reveal a complexity within lighting perception that may result from individual sensitivity or preference. These results are discussed further in the next chapter in order to understand these contradictions and present possible explanations.

## CHAPTER 5 DISCUSSION

This chapter provides a discussion of findings framed by the research questions posed in Chapter One. Each variable: states of arousal and pleasure, lighting preference and perception, self-evaluation (facial appearance and body appearance), overall dressing room conditions, and the dressing room experience, is discussed based on the study's findings, previous theory, how and why the findings of this study either support or contradict previous research, as well as limitations and suggestions for future research. Later, general limitations, conclusions, and implications for future research are presented.

### **States of Arousal and Pleasure**

Arousal and pleasure are well-accepted measures for the prediction of in-store purchases and these emotional states are affected by environmental cues like lighting (Baker et al., 1992; Park & Farr, 2007; Roush, 1994; Summers & Hebert, 2001). Due to the recognized impact of lighting in the main store area and lighting's assumed but empirically untested importance in the dressing room (Rea, 2000; Roush, 1994; Winchip, 2008), this study examined lighting's emotional affect in the dressing room.

The findings of this study suggest that lighting direction has little impact on the dimensions used to measure emotional states of arousal and pleasure in the dressing room. Separately, the majority of the individual items used to measure arousal and pleasure dimensions also exhibited no effect by different lighting directions. Yet, the effect of lighting direction, as part of the arousal scale, on the level of relaxation/stimulation approached statistical significance ( $p = 0.063$ ). Frontal lighting was rated as more stimulating than overhead lighting. Furthermore, though the differences are statistically weak, the means of the four items within both the arousal (wide awake/sleepy, aroused/unaroused, stimulated/ relaxed, and excited/calm) and pleasure

(comfortable/uncomfortable, satisfied/dissatisfied, relaxing/tense, and pleasant/unpleasant) scales were consistently higher for the frontal lighting (Appendix E). A more pronounced effect may have been observed if a larger sample with different age groups were used.

Since many retail lighting studies have applied the M-R model to study store atmosphere revealing a strong connection, this study assumed that lighting direction, as one of the environmental factors, in the dressing room would have an impact on the states of arousal and pleasure. This expectation was reinforced by the findings of other researchers using the M-R model to investigate the specific effects of retail lighting on the experience of arousal and pleasure (Areni & Kim, 1994; Park & Farr, 2007; Summers & Hebert, 2001). These studies found that lighting can elicit a change in behavior by changing lighting intensity or the color quality of the light.

Of course, this may be due in part to the different foci and methodologies used in the current study compared to previous studies. Areni & Kim (1994) and Summers & Hebert (2001) used observational techniques to measure the effect of lighting intensity on approach and avoidance in the retail store, whereas the current study examined lighting direction in the dressing room using questionnaires. As well, though Park and Farr (2007) used similar experimental methods, their study investigated color of light. Furthermore, these studies looked at lighting in the main store environment whereas this study only looked at lighting in the dressing room.

This study's findings also conflicts with what is known about the connection between lighting and emotional affect (Baker et al., 1992; Roush, 1994; Summers & Hebert, 2001). Yet, previous studies did not take a specific look at dressing rooms. The dressing room is a very separate part of the shopping experience and since each part of the interaction with the store

environment can have a different emotional reaction (Tai & Fung, 1997) it may be that these results cannot be directly compared to previous research.

Other possible reasons for a lack of connection between lighting direction and emotional states are: misinterpretation of the words by participants, the inapplicability of the M-R scale in the dressing room, extraneous variables (initial emotional state and personal variables), the study method (users rated only one lighting condition rather than being asked to compare), or the relative unimportance of lighting direction on emotional state in the dressing room. Each of these possibly confounding factors is further discussed.

During the experiment, several participants asked the researcher for clarification on the words used to measure arousal, especially with the word, “arousal” itself. Although the importance of emotional states has been proven by many marketing researchers studying the effects of store atmospherics, study results regarding arousal have been inconsistent (Machleit & Eroglu, 2000). There may have been confusion along other dimensions as well.

In the current study, the word pair relaxed/stimulated was the only dimension that approached significance in the arousal scale, contradicting Flynn’s (1977) finding that peripheral sources with no variation in illumination levels afford greater relaxation. Instead this dressing room study, using the M-R model, showed that frontal lighting was more stimulating, without varying illumination levels. Specific reasons for this may have been the differences in the operational definitions of relaxation. Flynn (1977) used relaxation as a positive psychological impression or assessment of the spatial quality whereas the traditional M-R (1974) model used relaxation as a lack of emotional excitement in a space and in a negative capacity. It is unclear how users interpreted this word pair, but the M-R model is most applicable for measuring in-store emotional states and therefore was used in this study.

Otherwise, lighting direction may not be a strong dimension that affects emotional states. Lighting intensity has an effect on emotional states, with brighter lighting eliciting higher levels of arousal (Areni & Kim, 1994; Summers & Hebert, 2001). Since its effect has been well documented, lighting intensity was controlled in this study, yet lighting intensity may have affected ratings of arousal and pleasure in the dressing room. There was no statistical difference between the two lighting conditions' intensities; there was the same amount of light hitting the floor in each lighting condition. However, in qualitative comments several people wrote frontal lighting was too bright (Appendix G) and the overall mean for dim/bright was higher due to the proximity of the participant to the frontal lighting when filling out the questionnaire and due to the frontal lighting being in the direct field of vision (Appendix E). The lighting level on the front of the body may have affected the results and further testing may be necessary to determine if the direction of the lighting, the brightness of the lighting, or a combination of the two are correlated to states of arousal and pleasure in the dressing room.

Also, retail studies have shown that certain environmental stimuli affect emotional reactions; the dressing room may not be governed by the same set of evaluations or perceptual criteria. In small dressing rooms, the shopper tries on clothes, evaluates its fit and look, and makes a purchase decision within a short period of time in the dressing room. Thus the influence of lighting on emotional affect may be less critical since the focus is on the clothes and the self. Mehrabian and Russell's emotion scale may not be suited to the unique dressing room decision-making model or experience, in regards to lighting direction, unless one condition is appreciably different than the other. This is likely considering the very low alpha for the arousal scale, despite its being confirmed by many studies. The M-R model of emotions does not appear to be a relevant tool for assessing emotional reactions in the dressing room environment.

Researchers may wish to generate a new set of dimensions to examine the appropriateness of different sets of words by engaging the users themselves in the generation of vocabulary as had Richins' (1997). Words like "fulfilled," "enticed," and "connected" may be better approximations of the consumption experience emotions considering shopping's effect on our sense of belonging and fulfillment (Zukin, 2005).

Overall, there is no statistical difference between the two lighting directions' reported levels of arousal and pleasure suggesting that, in the dressing room, the direction of the lighting does not have any significant effect on the emotional states of pleasure and arousal. Even participants' comments did not include emotional responses and it appears that participants are not sensitive to lighting direction, when not asked to simultaneously compare lighting conditions. Other variables, such as the intensity and color of light, may have a stronger influence on the dressing room states of arousal and pleasure. Specifically, further study should investigate the effect of lighting direction on arousal and pleasure along with the cumulative influence of other key variables in a holistic model, as have other retail researchers (Turley & Bolton, 1999). The overall dressing room environment may be perceived as a whole, like in Gestalt theory (Lauer & Pentak, 2000). Instead of focusing on individual environmental dimensions, the shopper evaluates the entire environment as one, and focuses on perceptions of themselves and of the clothes unless one factor is markedly out of balance or viewed as wrong or out of place.

### **Lighting Perception**

Lighting properties like color temperature, color rendering index, and illumination level have been shown to affect skin perception (Quellman & Boyce, 2002; Veitch et al., 2006, 2002) and color perception (Diaz et al., 1998; Rich & Jalijali, 1995), which are both key to the dressing room experience (Rea, 2000). However, color temperature, color rendering index, and

illumination level were held constant in this study in order to measure the unique effects of lighting direction along key variables. In order to determine if these elements were appropriately controlled, other lighting dimensions were also measured. As expected, the controls were sufficient and there were no statistical differences in how warm/cool the lighting was, which is determined by the color temperature of light, or how dim/bright and hazy/crisp the lighting was, as influenced by the lighting illumination level.

However, in this study two different light sources were used. Frontal lighting was created using a fluorescent source (3000K) and overhead lighting using incandescent PAR lamps (2800K). One of the concerns in this study was controlling for the effects of these different lighting sources but there was no difference in the color perception of lighting in the dressing room. Within comments, only two users were sensitive to differences in color of light despite the lack of statistical significance along the dimension cool/warm. One user said the overhead lighting was too yellow and another said that the frontal lighting was too white. It may be that participants are attributing the effects of the lighting to a particular aspect without knowing why. Strong comments like these may be more subjective reactions to unknown lighting dimensions. However, for the qualitative data, the controls used in this study were effective and the differences between fluorescent and incandescent light sources did not appear to be noticed or affect any of the variables. The implications for retailers and designers are that while the color quality of fluorescent lighting continues to improve it is becoming a more viable energy efficient light source in retail settings. When the lighting is chosen appropriately there is no reason to assume that incandescent is superior to fluorescent.

There was also no statistical difference between ratings of glaring/not glaring as might be expected for the frontal lighting used in this study, which was an unshielded light source in the

participant's field of vision, or even for overhead lighting, due to the shape of the PAR lamp. Though some users commented that the frontal lighting was more intense and one user commented it gave her a headache, frontal lighting did not seem to produce any direct glare. However, if a different sample were taken with older shoppers, glare might have a more pronounced effect on the shopper.

### **Lighting Preference**

The IESNA suggests a combination of frontal and overhead lighting is best while many designers in the field believe that frontal lighting is preferable to overhead lighting field (All Dressed Up, 2006; Osborn, 2000, 36; Rea, 2000; Wilson, 2007). This study evaluated them separately since no study has investigated how users view lighting direction separately. Before, consumers were only asked what dimensions of the dressing room they would prefer through phone interviews, which depends on the reliability of consumer recall (The perfect fit, 2007). Asking people while they are in an actual retail setting can help improve reliability. This study sought to explore which lighting condition would be rated higher without asking users to simultaneously compare the two. Instead, two separate groups were asked to evaluate each condition independently.

Despite an industry predilection for frontal lighting, quantitative methods used in the current study did not reveal a statistically strong preference for either lighting direction. Yet, study participants' written comments aligned more closely with retail and design professionals' suppositions. Overall, there were more positive comments on frontal lighting and more negative comments on overhead lighting. As well, shoppers focusing on the environment made significantly more negative comments on overhead lighting. This indicates that lighting direction, as a part of the environment, did affect participants' perceptions of the environment.

Overhead lighting has a negative effect on the perception of the overall environment and is perceived considerably more negatively than frontal lighting. Consumers who focused on their appearance in the environment showed a clear preference for frontal lighting. It appears that participants preferred frontal lighting to overhead lighting.

However, some negative comments on overhead lighting focused on the heat in the dressing rooms. No temperature readings were taken but the overhead lighting seemed to produce more heat because incandescent PAR lamps generate more heat than fluorescent lamps (Rea, 2000). This could have affected the results considering that of the 66 (100%) general atmosphere comment phrases, seven (21%) comment phrases were on the heat in the dressing room.

Previously, only two studies have looked specifically at lighting direction preference. Flynn (1977) examined lighting preferences in general interior settings using different lighting compositions. Chayutsahakij (1998) investigated retail lighting direction preferences on the main sales floor comparing simple direct downward lighting with more dynamic lighting compositions.

Flynn (1977) found that participants prefer peripheral, uneven lighting. Flynn used pictorial representations and examined preferences in general rather than specific environments. The current study's findings offer weak (preliminary) affirmation of Flynn's conclusions because of the different needs of dressing room lighting as indicated by the IESNA (Rea, 2000). Furthermore, the complex lighting compositions used in Flynn's (1977) study are not directly comparable to the straight forward lighting used in this study, frontal and overhead.

In contrast, Chayutsahakij (1998) found consumers prefer simple downward lighting in retail settings to more spotty and dramatic lighting. Though Chayutsahakij's (1998) study was

conducted in a retail setting, the results are not directly comparable to lighting preference in the dressing room. It also used pictorial representations rather than real settings. The current study asked participants to evaluate two lighting conditions independently of each other where each participant was exposed to only one condition, whereas Chayutsahakij (1998) asked users to rank all scenarios in relation to each other.

The findings of this study reveal no preference for one or the other lighting direction when compared between two independent samples using quantitative methods in actual dressing rooms. There are some strong differences in the methods of this study and those of Flynn (1977) and Chayutsahakij (1998). They used pictorial representations; the current study used actual environments with shoppers in the field. Their studies also asked users to compare or rank different conditions side-by-side; this study asked participants to rate only one lighting condition in a real dressing room in the field. Flynn used general interior spaces and Chayutsahakij looked at retail environments; the current study addressed dressing rooms.

Dressing rooms may be unlike any previously studied space. Requirements of the dressing room encompass needs for visual clarity, experiential quality, and convenience (Rea, 2000). Comparing findings in dressing rooms with findings in different spaces using different methods is difficult. However, shoppers may not readily perceive any difference between conditions when not comparing them side-by-side and when not made aware of the differences between them.

Individuals may also prefer different lighting or lighting may impact people in different ways. For instance, though some said that the overhead lighting made them look bad, others said it made them look good. The same was observed for frontal lighting. Also, some participants in the frontal lighting condition said that they liked the lighting and others suggested overhead

lighting would be better. Other participants in the overhead lighting condition said they like the lighting and some suggested frontal lighting would be better.

The ability of consumers to readily perceive differences among quality lighting sources may be much lower than previously believed and obviously requires more research. However, comments do reveal some sensitivity to the effects of lighting direction and a preference for frontal lighting. The majority of overhead lighting comments phrases were negative whereas the majority of frontal lighting comments were positive. Some participants had very strong comments on the conditions even though a large number of participants had more neutral reactions to lighting. However, based on the numbers participants in this study prefer frontal lighting. The findings suggest that if designers have to make a choice between frontal or overhead lighting, they should default to frontal lighting unless they can use both. However, not all consumers agree and consumer preferences may be complex and personal in nature.

However, shoppers who traditionally lament on poor overhead lighting may be reacting more to poor color rendering or to differences in color-temperature rather than the lighting direction. In this study, the lighting's color-rendering and color-temperature were controlled to limit these variables' effects and no differences were observed along any dimensions of lighting preference. Lighting preference may be more associated with other lighting dimensions such as illumination levels, color temperature, and color rendering ability.

In summary, the methods used in this study to assess lighting preference are unlike previous studies' side-by-side comparisons and therefore make the results difficult to compare. Other studies generally solicited direct comparisons and rankings of sources rather than asking users to rate only one real world condition without reference to another. Previous findings of preference are dependant upon self-reported preferences, which do not always reflect actual

effect. In this study, when looking at the individual assessment of sources, there was no quantitative support for frontal lighting preference. However, there was strong qualitative support for frontal lighting.

### **Self-Evaluations of Facial and Body Appearance**

Differences in lighting direction can influence personal evaluation, and in an office setting overhead lighting is superior for facial appearance (Veitch et al., 2006). Lighting can also affect complexion perception (Quellman & Boyce, 2002; Veitch et al., 2002) and overhead lighting can create harsh shadows on the face and body (Rea, 2000). The IESNA recommends the use of frontal lighting with overhead lighting to properly model faces and reduce harsh shadows (Rea, 2000). Although facial and body appearance in the dressing room is important, no study has looked at how lighting direction affects personal appearance in this space. This study measured facial and body appearance in order to understand how lighting direction might affect personal appearance ratings in the dressing room.

Despite a strong assumption that lighting direction affects physical appearance, there was no statistical difference from lighting direction for facial or body appearance. Along all sub-dimensions except one there were no statistically significant differences between the two lighting conditions. Lighting direction had an effect on one item in the facial appearance scale, harsh shadows/no shadows ( $p = 0.003$ ). As expected, the frontal lighting group experienced fewer harsh shadows than the overhead lighting group, which supports the IESNA's recommendations.

Despite the low level of statistical significance observed between facial and body appearance and lighting direction in the quantitative data, the qualitative data revealed that consumers are aware of the effects of lighting direction on personal appearance. Comments like those in Appendix H reflect a sensitivity to the positive effects of frontal lighting as regards

facial and body appearance. However, participants in both lighting directions had both positive and negative comments on the lighting's effect.

The comments also highlighted participant sensitivity to increased shadowing in the overhead condition. But despite increased shadowing there was no clear preference for one or the other in regards to personal appearance, even though comments often highlighted personal appearance issues and observations. Though qualitative data offer insights that humanize the personal dressing room experience, quantitative data still revealed no definitive connection.

The lack of statistical difference from lighting direction on facial appearance conflicts with previous research where lighting direction affected how positively people rated facial appearance in an office setting (Veitch et al., 2006). Furniture-mounted lighting resulted in lower ratings of facial appearance than did overhead ceiling mounted lighting. However, perceptions of office lighting cannot readily be compared to dressing room lighting and the effects of furniture-mounted lighting are not necessarily tantamount to those of dressing room frontal lighting. Differences between this and previous findings may be due to variations in study setting, the methodology, and the mounting techniques used. As well, there seems to be no shopper sensitivity to differences in lighting direction or source, when users are not asked to evaluate the source of the lighting or to compare two sources, but rather to rate one lighting condition in a real world setting.

These findings also contradict perceptions of lighting direction by both lighting authorities (Rea, 2000) and lighting design professionals (All Dressed Up, 2006; The perfect fit, 2007; Wilson, 2007) and do not confirm the industry perception that lighting direction affects body appearance (All Dressed Up, 2006; The perfect fit, 2007; Rea, 2000; Wilson, 2007). Of course, these assumptions have never been tested before and are the impressions of designers and

retailers who pay more direct attention to environmental cues as a professional necessity and therefore may be considered non-screener who as a result of training notice more about the environment (Mehrabian, 1977). Actual consumers in real settings may be less affected by or sensitive to differences in lighting direction when not directly comparing them and the effects may be much smaller than previously supposed.

The difference in shadowing does support the industry perceived effects of overhead lighting (All Dressed Up, 2006), which is assumed to create more dramatic shadows that can affect facial and body appearance (Rea, 2000). However, lighting direction was not statistically significant to other facial and body appearance scale items. Lighting direction's effects on shadowing appear to be a unique and specific outcome.

People may either be able to overlook the effects when judging the experience or may focus on different variables that have a higher level of effect on perception, preference, and experience. Personal variables may also be important but it is unclear how important they are or how they affect the overall experience based on the quantitative results. The importance of facial rendering and shadowing needs to be assessed or ranked against other variables in future studies.

Just as there was no association measured between lighting direction and general facial and body appearance, the effects of lighting direction had no effect on the positive or negative evaluation of skin tone. Ancillary to the main effect, the different lighting sources, fluorescent frontal and incandescent overhead, also had no effect on complexion appearance. This is despite common perception and previous research that fluorescent lighting affects skin tone perception and is not preferred to incandescent sources (Quellman & Boyce, 2002; Veitch et al., 2002). The lack of effect from lighting color on skin tone perception suggests that the color temperature was effectively controlled in this study. Furthermore, differences between this study and other

literature may be that users were previously asked to rate the skin on the back of their hand in a laboratory setting whereas this study asked users to evaluate their skin color through the mirror. This study required a less direct evaluation of skin tone to reveal no strong effect from lighting direction or bias from the incandescent or fluorescent sources.

Very few comments were made on how the lighting affected skin tone, but occurred equally in each lighting condition (Appendix H). One woman commented that frontal lighting “made me look like my skin had a healthy glow. Also, my eyes looked amazing.” The only other person to mention skin perception was in the overhead lighting condition and said “Good for skin tone. Shadows not too bad on cellulite.” Contradictions within comments and the lack of a strong preference may be indicative of the unique effect lighting has on different people. Though lighting can be created to suit a majority, it may not have the same effect for everyone along dimensions of personal appearance. Not all people may have the same preferences for or perceptions of lighting direction.

Most participants did not comment on skin tone suggesting that users do not focus on their skin color within the dressing room. Instead, other aspects of personal appearance seem to be of greater importance. Participant comments revealed that personal appearance is a key focus in the dressing room. Comments on attractiveness or slenderness (n=12) and shadowing (n=5) highlight the importance of personal evaluations. However, when participants mentioned shadows they did not expand on how it affected their appearance ratings. Only one woman noted that overhead lighting caused shadows under her eyes. Another woman in the same lighting condition noted that it did not make her cellulite look “too bad.” It may be that the survey primed them to notice shadowing or investigate personal appearance ratings along previously mentioned dimensions. A more qualitative exploration of dressing room thought processes might produce a

clearer understanding of how important personal appearance is within the dressing room and how different aspect of the lighting affect this.

Yet, shadowing may have caused users to be uncomfortable or anxious despite lack of statistical significance for the word pair uncomfortable/comfortable. Shadowing served as a kind of glare that caused people to move around to find the best lighting. Though shadowing did not affect the quantitative ratings of facial appearance, two participants did say the overhead lighting caused shadows on the face. Others mentioned that the overhead lighting required them to “step back” or “stand back” from the mirror (n=3). Additional participants mentioned that under the overhead lighting condition they could not “stand too close to the mirror” (n=2). Instead of affecting facial appearance, improperly located overhead lighting may cause users to waste time finding a suitable position or angle from which to evaluate the product and self. The focus on the clothes is lost and interrupts the experiential quality retailers are trying to attain in the dressing room. Neutral atmospherics and even good atmospherics allow the user to evaluate the product and self while going unnoticed; whereas negative atmospherics produce an interruption that can cause users to avoid or prematurely retreat from the experience (Donovan & Rossiter, 1994). This is evidenced by one participant’s comment that the overhead lighting made her “get very annoyed and [not] want to try things on.” Another participant in the frontal lighting condition said “Too bright. I can’t stay long time and I don’t want to try much.”

In summary, overhead lighting does produce more noticeable shadows on the face and body than does frontal lighting, meaning frontal lighting is superior to overhead lighting when the primary purpose is to eliminate facial shadowing. This supports the recommendations of the IESNA and other lighting designers to use frontal lighting since overhead lighting produces harsh shadows. However, along dimensions of preference and body appearance, there was no

great statistical difference. This means that though overhead and frontal lighting produce different levels of shadowing on the face and body, they have an isolated effect that does not appear to translate into differences in preference or personal appraisals. However, qualitative results indicate frontal lighting is superior. Though quantitative scales may be insensitive to differences in self-evaluations, qualitative data produced a much richer illustration of their different effects. This may mean that though consumers notice a difference and prefer frontal lighting they are unable to quantify the effects along set scales. Within quantitative results, consumers may either be less attuned to even large differences in lighting direction and quality or consumers are able to overlook differences of lighting in lieu of more important factors in the dressing room experience.

### **Dressing Room Evaluations**

The overall environment has been known to affect how people perceive other things and products (Gardner & Siomkos, 1985; Obermiller & Bitner, 1984) or people (Maslow & Mintz , 1956) occupying a space. Lighting is one element within the environment that affects perception (Flynn, 1977; Hendrick et al., 1977). Dressing room evaluations were measured in order to understand how lighting direction affects different elements within the environment, much the same way as the environment affects the evaluation of people or products in a space.

However, there was no statistical significance between lighting direction and the overall dressing room conditions or along specific dimensions: cleanliness, room size, convenience, privacy, quality, or maintenance. Comments also revealed lighting direction had no effect on dressing room quality perception and comments on dressing room conditions occurred equally within each group. The majority of variables listed above has not been researched for their relationship with lighting but are important to the dressing room experience (The perfect fit,

2007). However, three variables have been studied for their relationship to lighting direction. These are spaciousness, room size, and privacy.

The most interesting finding was the contradiction between perceived differences in roominess versus no perceived difference in actual room size. Lighting direction had a significant impact on how cramped/roomy but not on how small/large the space appeared. This signifies that the frontal lit dressing room appeared roomier to users than did the overhead lit dressing room. However, there was no difference between the two groups' experiences of how small or large the space was.

This supports findings by Flynn (1977) that lighting composition affects perception of spaciousness. Yet it contradicts those of Stamps and Krishnan (2006) who found boundary roughness does not have a significant relationship with the reported spaciousness of the room but that the actual size of the room dictates perception of spaciousness. Flynn (1977) found that dimensions of spaciousness, privacy, visual clarity, relaxation, and preference were correlated to directional qualities of lighting like differences in peripheral emphasis or evenness. The difference between these two findings may be a result of different expectations generated by the questions. Spaciousness may be perceived either as subjective (roominess) or actual (size) spaciousness and thus judged differently.

Hendrick et al. (1977) also investigated the effect of lighting direction on spaciousness using simulated methods and real settings to reveal that people are sensitive to differences in lighting arrangements in both methods. However, Hendrick et al. (1977) suggested that some experiential measures might be:

[R]elatively insensitive to subtle variations in lighting quality. However, that does not mean that the human in the situation is insensitive [to the variations, and] evaluative feelings and other subjective reactions varied widely by arrangements" even if differences were not great. (p. 509)

Though lighting does not affect the perception of variables, the user may still be aware of differences in lighting. The findings of this study support this conclusion since the qualitative data revealed lighting direction had no impact on dressing room evaluations despite its perceived importance by consumers as well as the sensitivity to lighting direction's effects, as evident from written comments. Only one customer commented that lighting, though "clean" and "crisp," did "show all the rooms flaws." However, no other participant connected the lighting to the condition of the dressing room despite a large number of comments focusing on the condition of the dressing rooms along dimensions like temperature, cleanliness, and availability of convenience features (hooks and setting). The most important quantitative finding for lighting perception related to the perceived size of the dressing room.

The contradiction between cramped/roomy and small/large may mean that users are able to judge the size of a space by compensating for differences in lighting direction but that the experience of the space, along dimensions of roominess, is greatly affected by lighting direction. The lighting direction seems to have a significant statistical relationship with how constraining the dressing room feels. This may suggest that retailers with limited space might consider using frontal lighting to reduce the feeling of being cramped, even though the space itself does not appear any larger to the user. However, slightly higher lighting levels on the front of the body may also have affected this.

The findings of this study align with those of Flynn (1977) that lighting direction affects spaciousness. In the same study, Flynn (1977) also researched the effects of lighting composition on privacy. Again he used simulated methods to reveal that lighting orientations are related to privacy. However, the current study found no differences in the perception of privacy. This may be because Flynn (1977) investigated what people prefer for private situations, dim, uneven,

peripheral lighting, whereas the current study looked at how lighting direction affected perception of privacy and he varied lighting levels and lighting contrast whereas this study did not. Lighting level may be more important to privacy perception (Gifford, 2002).

Furthermore, social settings have different requirements for privacy than those of the dressing room. The effect of lighting direction on privacy may not be as important in the dressing room as in other settings. Some participants commented on how exposed they felt because of the location of the dressing rooms and the thin curtain partitions (Appendix G). Different results may have been observed if the dressing rooms were further removed from the sales floor and if the rooms had doors rather than curtains, since consumers prefer doors (The perfect fit, 2007). Only after these primary privacy requirements are met may lighting direction show any relationship to perceived privacy.

It seems that differences in the quality of the space, as observed between the two test groups, were not statistically significant and that overhead lit and frontal lit dressing rooms do not differ in their perceived quality except along dimensions of roominess. This effect is supported by previous literature. However, it is unclear how this difference affects the dressing room experience, if at all, and further research is needed. Additionally, other key personal variables may be affecting the perception of and the preference for one or the other lighting directions and lighting direction does not affect the majority of more tangible dressing room evaluations.

### **Overall Dressing Room Experience**

Though a great many researchers have taken a look at how the main retail experience is affected by a myriad of environmental cues (Colored LEDs, 2005; Donovan & Rossiter, 1982; Hegde, 1996; Kotler, 1974; Roush, 1994; Bitner, 1992), no one has looked at the how these cues

affect the dressing room experience. Considering the effect lighting can have on people in a retail setting, statements were used in this study to measure how lighting direction affects the overall dressing room experience.

The direction of the lighting did not appear to be statistically related to the reported experience in the dressing room in this study. However, frontal lighting was consistently more highly rated along all items within the scale measuring dressing room experience. Only one participant made a direct comment on how the lighting affected the experience or changed how they viewed the space itself. One woman in the frontal lighting condition remarked: “I like it. It's calming and seems like a bar or restaurant in the evening.” Otherwise, no one commented on the experience.

Lighting direction may not be directly linked to assessments of the dressing room experience but may be instead a small part of a much larger set of assessments. Further exploratory research is needed to understand the level of importance of and the direct nature of effect resulting from different variables within the dressing room experience. It may also be possible to measure the cumulative effects of all variables on the experience through multivariate analysis to determine the relative significance of each in the decision to buy. The magnitude of other variables was highlighted within participant comments and assessments of each variable's importance.

The most commented on aspect of the dressing room was the need for more hooks. This may signify the high requirements for convenience in dressing rooms. People also commented on the perceived lack of cleanliness, the need for more A/C, and the need for more décor and more color or different paint. Even though lighting may not demonstrate a very strong relationship

with variables measured in this study, other environmental variables seemed to be important and their effect may supersede that of dressing room lighting direction.

The majority of comments focused on personal appearance, preference, brightness, and shadowing. Almost no comments focused on emotional reactions or the overall experience. Shoppers focused in on more concrete aspects of the space and of themselves. However, this does not signify that people do not respond emotionally or that the lighting does not affect their experience. Instead, these variables may have a more subliminal effect. Otherwise, if users were asked to comment on their emotional reactions, different answers may have been observed.

Instead of there being one large sweeping effect on the entire experience each variable may have very focused effects on different dimensions of the experience. Lighting may change how roomy/cramped the room feels but other variables like flooring and color may affect how homey it feels. Chairs and hooks may affect how convenient it is and how consumers feel about themselves and the clothes may affect personal evaluations. All of these variables may work in tandem to affect the entire experience. The effects of small changes in the environment along single variables may go unnoticed and only large differences or very good/bad environments may elicit behavioral changes. A holistic look at the dressing room experience may prove more useful and afford greater insight into how the environment affects spatial perception, emotional state, personal evaluations, and experience and dressing room evaluations.

### **Consumer Experience Types**

In order to understand the experience, consumer comments were investigated to reveal specific participant focus segments. Out of the 60 participants, 22 focused on the environment. Most focused on negative aspects but this might have been due in part to the questions, which asked participants to describe how the dressing room could be improved. These participants

seemed to be affected or distracted by the negative aspects of the dressing room. Still, others focused on their personal appearance in relation to the lighting or commented on both the environment and personal appearance. Finally, twenty people either made no comment or made short neutral comments. These participants did not seem to be greatly affected by the experience and were less likely to register strong feelings or insights. Only one person commented on the product, but this may have been because questions did not prompt participants to do so. Based on these findings, shopper profiles were developed and include: environmentally distracted shoppers, self-focused shoppers, and unaffected utilitarian shoppers. A short description for each is provided with a short narrative, created using participant comments, about their possible dressing room experience.

### **Environmentally Distracted Shoppers Say: I Hate Dirty Floors**

Many comments focused on the general quality of the space and the lighting. Negative comments for overhead lighting (n=13) were more common than those of frontal lighting (n=6). Dirty floors, improperly located lighting, and warm, poorly ventilated air caused this shopper type to focus on the wrong things and miss out on the experience the designer was trying to create. A brief narrative was created to highlight this shopper's thoughts within the context of their dressing room experience.

The consumer walks in with two dresses and notices the "lint [and] dirt on the floor." She starts to think about standing on her shoes while she tries on the clothes. But then, she thinks she could try the dresses on over her pants and get an idea of how it looks on. She goes inside and sets her things down on the chair and hangs the clothes on the single wall hook. She starts to take her shirt off and sees someone walk in front of the dressing room through the sheer curtain. She is a little embarrassed and hopes other shoppers and sales associates cannot see her. The "curtain [is] semi-transparent and the dressing room seem[s] a little to opened to the store." She had been under a lot of stress lately and ate too much over the last month. Oh! She looks in the mirror and sees the stretch marks on her love handles. "Cellulite"! The lighting does not "make me look my best." She hates to try things on. She tries on the dress and when she has it on stands in front of the

mirror to evaluate it. The light creates “harsh shadows” on her face and body. She steps closer to the mirror and the lighting gets much brighter: I guess, “it’s not important if it gets brighter as I get closer.” She steps back and bumps into the chair thinking “I prefer the lighting when I step back, but the chair is in the way.” She knocks over her purse and keys fall out. She puts them back in and hearing the music getting louder thinks: I don’t really “want to try much,” and don’t need to buy anything anyway. “I really try to avoid stores with this type of music because I get very annoyed and don’t want to try things on.” She leaves without buying anything.

Here the product went unevaluated and the lighting had little effect except to distract her from the product. The overhead lighting failed because she could not focus on the clothes or her own appearance. Instead, she focused on the flaws of the room. She decided to go home without engaging in the experience and therefore the sale was lost. Some shoppers are capable of overlooking the bad in favor of the good. However, the environment significantly affects these hedonic shoppers (Babin & Attaway, 2000) and positive affect improves the experience.

The designer can best serve this type of shopper by creating appropriate, quality, and easily maintainable atmospherics. Mang (2008) notes that some retailers are even moving away from carpet because it shows wear too easily, even though consumers prefer the comfort it brings to the space. Lighting is only one small part of the experience for this shopper but will not go unnoticed if it is poor. Frontal and overhead lighting will suffice for this shopper as long as they are not distracting. Overhead lighting is fine but needs to be appropriately positioned, perhaps aimed at the mirror rather than the shopper, to create less direct and glaring lighting. This would help to minimize distractions and allow her to evaluate the product.

### **Self-Oriented Shoppers Say: It’s All About Me**

Many other comments focused on the personal appearance and it appears lighting can greatly influence self-evaluations. Participants in the overhead lighting condition made four negative and two positive comments. Similarly, participants in the frontal lighting condition

made three negative and seven positive comments. Findings indicate that lighting direction is key to representing personal appearance with frontal lighting being superior. A brief narrative of this profile's possible experience was created to highlight what they think about in the dressing room.

The consumer walks in and the light is soft. "Softer lighting [is] better and more flattering" she thinks. The lighting on the side of the mirror looks "calming and seems like a bar or restaurant in the evening." It is trendy and it fills the room with even light. I look pretty good for having been out most of the night, she thinks. She leans into the mirror and starts to trace her fingers over her face. Maybe a little tired. She sets her bag down on the chair and hangs her clothes on the hook. She takes off her shirt and pants and does not mind seeing herself in the mirror. "I love the lighting. It [makes] me look like my skin ha[s] a healthy glow. Also, my eyes look amazing. The light is very flattering." She puts on what she picked out and twirls in front of the mirror briefly before fixing herself in one place and evaluating her appearance more closely. She is glad she has been going to the gym because she looks skinny. Or is it the lighting? "I feel like it is flattering," she thinks "slimming, and exciting." Still looking in the mirror she evaluates the hem of the dress. It hits her at just the right place on the leg. Not too long and not too short. It makes her legs look slender. The color is good too she thinks. She decides to buy it. She tries on another dress. It is a little longer and black. She immediately hates the way it looks. It is too long and against the black curtain it is "hard to see how well the dress fits me." The other dress was more vibrant and now that she thinks about it, made her more tan. She buys the first dress.

This type is self-focused and the environment is essential to enhancing self-evaluations.

These shoppers are a type of hedonic shopper who focuses on the fulfillment that personal appearance affords (Babin & Attaway, 2000) and is affected by the environment. The lighting appears to be a means through which to evaluate personal-appearance. This does not mean that the shopper will not notice if the lighting is bad, but only if it affects how she looks. The atmospherics should not hinder this profile's self-evaluations like the black curtain affected how well the shopper could evaluate the fit of the dress. This shopper type is likely to focus on personal appearance and if the lighting can facilitate the positive evaluation of her appearance, she may be more likely to buy. For this shopper, frontal lighting minimized shadowing and

reduced the appearance of bags/circles under the eyes. Frontal lighting is superior for rendering facial and personal appearance.

### **Unaffected or Utilitarian Shoppers Say: No Comment**

No matter the product or the environment, this group of shoppers is not likely to have strong reactions. Of the 60 total consumers, these consumers either made no comments in either question (n=14) or they made short and neutral statements without strong emotions (n=6). These consumers seem to try on clothing and make decisions to buy without strong emotional reasons based on the environment or the self. This kind of shopper probably will not focus on atmospherics and is not likely to react strongly to anything within the experience unless it is very bad. A short narrative of her possible experience was created.

The consumer walks in carrying a stack of clothes. She is looking for a pair of dress pants to wear to work since she got a coffee stain on the last pair. She does not pay attention to the environment around her but looks for the hook and notices the chair. She puts on the first pair of pants. They are too tight and she takes them off right away. She tries on the second pair and notices they fit well until she turns around and sees they are stretching in back. She tries on the third and thinks they are much better but she cannot tell what color they are. She walks closer to the mirror to take a more detailed look. She takes off the pants and holds them up to her black purse. I guess they are navy, she thinks. Navy might be better during the day. She looks for another hook so she can hang the pants up as a “maybe” in a separate pile. There is no additional hook so she throws them on the chair. She tries on the last pair and thinks they might work. She takes both of them out of the dressing room to look at the colors before she decides to purchase the third pair. She heads toward the sales counter with her credit card in hand.

This shopper did not notice the dressing room lighting or worry that there were not enough hooks. For this shopper, the lighting direction will probably have less effect since she feels comfortable making the necessary adjustments within the environment. Even though they are affected by positive atmospherics like hedonic shoppers (Babin & Attaway, 2000), they do not dwell on them. Instead, visual acuity afforded by color rendering and sufficient illumination levels are important to allowing her to compare products even though she may not attribute this

to any dimension of the space. Perhaps, in another circumstance she would have more focused on herself. When asked to comment on the space these consumers either made no comment or made neutral statements like: “It’s just right,” “Nothing I can think of [to change],” or “I like it overall.”

## **Summary**

Lighting should satisfy each of these shopper profile’s needs and manage the perceptions of, what appear to be, very different shopper intentions and foci. Some of these profiles may be prone to frequent specific retail stores, therefore, the lighting could be tailored to meet their expectations. For example, utilitarian shoppers most commonly frequent discount stores and are fulfilling some need rather than engaging in an experience (Moye, 2000; Shim & Kotsiopoulos, 1993). Lighting needs to be direct and uncomplicated to reduce shopper anxiety from unrealized expectations (Kaltcheva & Weitz, 2006). Conversely, appearance conscious shoppers are more likely to shop at boutique stores (Shim & Kotsiopoulos, 1993), which typically have more arousing lighting and a clear and unified ambiance for the space. However, positively rendering personal appearance will also influence their experience. Frontal lighting is the most appropriate source, but combining frontal and overhead lighting offers the best conditions for evaluating personal appearance.

In addition to meeting specific shopper needs, lighting must meet general requirements for visual acuity, personal appearance, and create a positive mood. Even within each group, users may have different expectations and desires for lighting. The utilitarian shopper would still like to look good even if it is not her focus. The self-oriented shopper may prefer bright lighting in the afternoon but dim lighting in the morning hours. Considering the different expectations and conflicting comments, it appears that users cannot agree on one single lighting scenario.

Designers should consider providing both frontal and overhead lighting and even consider allowing shoppers to directly control the mix and brightness. One lighting installation can then serve multiple functions and preferences and meet varying requirements. This is especially important in high-end stores or boutiques. Discount stores, which do not wish consumers to linger and whose customers are utility focused, should provide only the most basic lighting. However, designers should consider switching over to fluorescent frontal lighting for the highest impact for the least amount of money rather than using traditional overhead fixtures. Retailers and designers must also consider that shoppers do not always stay in the dressing room. Designers should properly illuminate the space directly outside the dressing room to enhance the experience. If designers cannot give shoppers direct control, they may consider using this auxiliary space as an opportunity to offer shoppers a second lighting condition.

Further, people in each of these proposed shopper profiles may frequently change categories based on product type or may exhibit the characteristics of more than one category; this is indicated by some consumers focusing both on environment and self-evaluations. A utilitarian shopper looking to buy a pair of pants to replace her old ones might change into a self-oriented shopper when looking for an evening gown. A self-oriented shopper may also be an environmentally distracted shopper; if the environment interrupts their evaluations, they will not focus on their appearance. Women cannot easily be classified as only one type. The female consumer may not directly evaluate lighting quality but it is important and affects her when she tries something on. However, the questionnaire asked people what they thought of the lighting and what could be improved within the dressing rooms. This could have implications for their answers. Yet, the open-ended questions did not solicit impressions of personal appearance and these insights were common in answers. Therefore, since lighting has to meet the needs of many

different shopper profiles, designers should use both frontal and overhead lighting. Otherwise, frontal lighting is superior for self-evaluations and general appearance and should be the default lighting selection when a choice must be made between the two lighting directions.

### **Limitations**

There were some key limitations within this study related to sampling or environment. Sampling limitations may include testing in an actual retail store and the small sample size. Also, initial emotional states and expectations may have affected ratings. Further environmental limitations may include the exposed lighting sources, the intensity of the lighting, and the condition of the dressing rooms.

Field studies provide a glimpse into actual behavior and therefore have strong external validity but they can also have significant drawbacks; the effects of all variables cannot be entirely accounted for. However, environmental effects, like differences in day lighting, participant alertness, and crowding during busy times, were mitigated by the short data collection time frame and consistent testing times each day.

Another study limitation may have been the sample size. This was limited by the location and willingness of participants to take part in the study. A larger sample may reveal a much more significant effect between lighting direction and the variables measured in this study. For though there was no significant effect along any of the variables, the relationship was consistent and frontal lighting was rated more highly along each dimension. A larger sample may help reveal more significant trends. Further studies may also wish to examine the effects of lighting direction for other demographic groups. This study only examined the impressions of young female consumers and different results may be observed for older or male consumers.

Other limitations may include, the participants' own initial emotional state, self-esteem, and other personal variables that cannot easily be limited even within a controlled setting. Existing emotional states and perceptions brought into the store can also affect results. Though users may be affected by lighting in the same way, the degree of change may differ from person to person. These changes may not result in the same level of response based on how the participant felt at the beginning of the study. Future studies should assess change in emotional states rather than taking one measurement.

Certain environmental factors may affect the ratings. These include the lighting sources and the dressing room décor and condition. Lighting sources were exposed rather than shielded by fixtures. This was partly dictated by the existing source in the dressing room and also helped to control lighting color temperature and the effects of differences in lighting fixture appearance. However, some users were put off by the ability to see the source of the light. Furthermore, dressing room conditions were a common focus in written comments. These included the level of wear on the dressing room walls and floors and the lack of sufficient hooks in the dressing rooms, as noted by a preponderance of study participants.

Though the majority of extraneous lighting variables were controlled and there was no external effect registered along perception dimensions, other dimensions may have affected results. It is unclear to what level, if at all, they altered the perception of variables measured in this study. However, future studies may want to consider their effects.

### **Conclusions and Implications**

Lighting quality is important to retailers as they try to represent their brand and their product in the best light possible (Hegde, 1996). Although many studies have taken a look at understanding what constitutes lighting quality, questions and confusion still abound. The design

and retail industries are well aware of the power of lighting in changing emotional state or affecting product interaction (Areni & Kim, 1994; Babin et al., 2003; Baker et al., 1992; Bitner, 1992; Park & Farr, 2007; Roush, 1994; Summers & Hebert, 2001) but are still investigating its effects. Within the dressing room it is commonly assumed that lighting direction is important and can greatly affect the shopping experience (All Dressed Up, 2006; Osborne, 2000; Wilson, 2007), and facial rendering (All Dressed Up, 2006; Rea, 2000; Wilson, 2007).

Yet, despite the industry's strong belief in the superiority of frontal lighting, this study's quantitative results indicate that there was little if any statistical relationship between lighting direction and the variables measured in dressing rooms. If these findings hold true in future studies, it may be that consumers are far less aware of or affected by lighting direction than designers and lighting professionals or authorities would assume. Other lighting dimensions or other variables may have a more significant effect on the dressing room experience and experience sub-variables. Shoppers do not appear to be sensitive to differences in lighting direction along the majority of dimensions measured unless comparing lighting directions side-by-side.

However, qualitative data reveal a much stronger preference for frontal lighting with the majority of comments on frontal lighting being positive and the majority of comments on overhead lighting being negative both in general and along assessments of environment and self-evaluations. It is clear that frontal lighting is preferred despite lack of a statistical connection with any of the variables measured in this study but its general effects are less clear. Instead, very specific effects were measured in the quantitative data. It seems that the effects of lighting direction are subtler and though these effects were detected within the qualitative comments they were not measured by the quantitative methods.

The complexity of the dressing room experience may be of such a degree as to limit the ability of researchers to summarily quantify specific variables' effects. First, lighting direction does not affect the state of arousal and pleasure in the dressing room and these scales do not appear to be suitable measures of emotional reactions occurring in the dressing room. Second, though quantitative data did not reveal a preference for one lighting direction, comments indicate a strong preference for frontal lighting despite inconsistencies. Third, most dimensions of lighting perception are not affected by lighting direction. Yet, though people may be capable of judging the size of the space in different lighting conditions, lighting direction seems to affect the experience of spaciousness as measured by cramped/roomy. Fourth, lighting direction did not affect differences in facial or body appraisals but increased shadowing was strongly related to lighting direction and was supported by participant's written comments. Shadowing seemed to have an independent effect and did not influence other variables. Yet, self-focused shoppers comments indicated preference for frontal lighting. Finally, the dressing room experience is not affected by lighting direction but may be more affected by other experience variables or assessed holistically.

It appears that lighting direction affects the dressing room experience less than expected. There are five main reasons this might be true. First, this may be due to designers having a higher sensitivity to environmental variables than other professions. Second, though people can tell the difference when comparing lighting directions side-by-side or asking them which they prefer, they are generally incapable of noticing the effect when immersed in the experience and asked to rate variables without reference to the lighting type or source. Third, lighting direction is indeed important but it is only as important as other variables; it is registered as a part of the entire experience rather than as an individual factor. Fourth, the effects of lighting direction,

though important, are not universal. Individuals rated lighting as important but there is no one collective definition of lighting quality that can satisfy the very different requirements of lighting among all individuals. Additionally, due to the nature of the dressing room, lighting may be a part of the atmospheric background that is secondary to the main foci in the dressing room environment: the clothing and the self.

If true, the findings have strong implications for interior designers and retailers. Qualitative data support the assumption that frontal lighting is superior and that consumers prefer frontal lighting. However, in this study, when people rated lighting without being asked to compare directions, quantitative data revealed only a weak preference for frontal lighting, which had a specific effect on shadowing and spaciousness. This means that when designers are working with small dressing rooms, they should consider using frontal lighting in order to reduce the feeling of being cramped.

Dressing room lighting should also be versatile enough to satisfy a wide range of preferences and retailers may try giving consumers a choice by providing both and allowing shoppers to control the experience. This is especially important for retailers servicing many age and demographic groups who may have different preferences for lighting direction and illumination level; further research should assess these differences. However, if designers must choose one lighting direction, they would do well to choose fluorescent frontal lighting for the highest impact for the least amount of money. As retailers are under greater pressure to engage shoppers and capture market share, the designer's role becomes increasingly important. The dressing room offers the most room for improvement and designers should consider the impact their lighting choices have on shoppers.

APPENDIX A  
IRB APPROVAL



PO Box 112250  
Gainesville, FL 32611-2250  
352-392-0433 (Phone)  
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DATE: April 10, 2008

TO: Anne Baumstarck  
3502 NW 18<sup>th</sup> Avenue  
Gainesville, FL 32605

FROM: Ira S. Fischler, PhD, Chair *ISF*  
University of Florida  
Institutional Review Board

SUBJECT: Approval of Protocol #2008-U-0381

TITLE: Testing the Effects of Dressing Room Lighting On the Shopping Experience

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, and based on 45 CFR 46.117(c), authorizes you to administer the informed consent process as specified in the protocol.

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.

If you have not completed this protocol by **April 8, 2009**, 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 Perceptions of Retail Dressing Room Lighting**

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

Thank you in advance for your participation.

**Purpose of the research study:**

The following survey is part of a study that seeks to determine the effects of dressing room lighting on personal perceptions and mood. 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:**

First you will be given a short demographic survey that will be used to determine your overall perceptions, expectations, and demographics. Then, please take ten or fifteen minutes to find a couple outfits to try on. Perhaps two tops, two bottoms, or a dress. You will be asked to try the clothes on in one dressing room and to take another five-minute survey. This survey is used to determine how the lighting scenario affects your perception of the dressing room and yourself and will be completed in the dressing room.

Answers will be used to determine consumer perceptions of lighting.

**Time required:** 30 Minutes

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

**Compensation:** You will be given a \$10 gift certificate for the store for participating in the study.

**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:**

Participation is 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:**

Anne Baumstarck, Graduate Student, Department of Interior Design  
313 Architecture Building, 703-915-3402.

Nam-Kyu Park, Assistant Professor, Department of Interior Design, Graduate Thesis Chair  
444 Architecture Building

**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.

APPENDIX C  
SURVEY INSTRUMENT 1

**INSTRUCTIONS: Before going into the dressing room please answer the following general questions about your perceptions and beliefs.**

**1. Please rate your present feeling between the following words.**

|              |   |   |   |   |   |   |   |            |
|--------------|---|---|---|---|---|---|---|------------|
| Aroused      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unaroused  |
| Relaxed      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Stimulated |
| Excited      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Calm       |
| Unhappy      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Happy      |
| Dissatisfied | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Satisfied  |
| Pleasant     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unpleasant |

**2. Please think about dressing rooms in general and rate each of the following based on how important they are to you in the dressing room.**

|                  | Very Not<br>Important |    |    |   |    |    |    | Very<br>Important |
|------------------|-----------------------|----|----|---|----|----|----|-------------------|
| Seating          | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Lighting         | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Clean Floor      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Mirror type      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Mirror size      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Room size        | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Hangers/shelves  | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Privacy          | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Comfort          | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Safety/Security  | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Air Quality      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Temperature      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Music            | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Cleanliness      | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |
| Customer Service | -3                    | -2 | -1 | 0 | +1 | +2 | +3 |                   |

**3. Now, think about how you perceive things in a room and the design of a room in general. Then, please rate the following statements based on how much you agree or disagree.**

|   | Strongly Disagree |    |    |   |    | Strongly Agree |    |
|---|-------------------|----|----|---|----|----------------|----|
| I prefer to shop in stores with a nice atmosphere.                      | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| Store design is NOT important to my shopping experience.                | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| I do NOT notice the design of a space.                                  | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| The quality of lighting influences my store choice.                     | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| As long as I can see well, I do NOT care about the lighting in a space. | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| Lighting in a space affects my mood.                                    | -3                | -2 | -1 | 0 | +1 | +2             | +3 |

**4. Now think about yourself and how pleased you are with your body image. Please rate the following statements based on how much you agree or disagree.**

|   | Strongly Disagree |    |    |   |    | Strongly Agree |    |
|---|-------------------|----|----|---|----|----------------|----|
| In general, I feel good about my physical appearance. | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| As a whole, I am Not satisfied with myself.           | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| I have a Negative attitude about my body shape.       | -3                | -2 | -1 | 0 | +1 | +2             | +3 |
| When I look in the mirror I like what I see.          | -3                | -2 | -1 | 0 | +1 | +2             | +3 |

**5. Year you were born: \_\_\_\_\_**

APPENDIX D  
SURVEY INSTRUMENT 2

**INSTRUCTIONS:** The following questions are used to learn your opinion about dressing room lighting. After you try on your clothes, please answer the following questions about the lighting and your appearance in the lighting, along the following dimensions between the pairs of descriptors given below. Please complete both sides in the dressing room.

**1. Please rate your reaction to the lighting between the following words.**

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

**2. Please rate your perception of the lighting condition in this dressing room.**

|         |   |   |   |   |   |   |   |             |
|---------|---|---|---|---|---|---|---|-------------|
| Cool    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Warm        |
| Bright  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Dim         |
| Like    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Dislike     |
| Glaring | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Not Glaring |
| Bad     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Good        |
| Hazy    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Clear       |

**3. As you look in the mirror, how would you describe Your Facial Appearance in this lighting?**

|                       |   |   |   |   |   |   |   |                         |
|-----------------------|---|---|---|---|---|---|---|-------------------------|
| Bad                   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Good                    |
| Young                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Old                     |
| Healthy               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unhealthy               |
| Harsh shadows         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | No shadows              |
| Flattering skin tones | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unflattering skin tones |

**4. As you look in the mirror, how would you describe Your Overall Body Appearance in this lighting?**

|              |   |   |   |   |   |   |   |            |
|--------------|---|---|---|---|---|---|---|------------|
| Positive     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Negative   |
| Unattractive | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Attractive |
| Slender      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Heavy      |

**5. Please indicate how easy or difficult it is for you to read the printed tag at the left.**

|  |              |   |   |   |   |   |   |   |                   |
|--|--------------|---|---|---|---|---|---|---|-------------------|
| Machine wash warm, gentle cycle, with like colors. Non chlorine bleach only. Tumble dry low. Warm iron as needed.<br><br>70% Cotton<br>25% Polyester<br>5% Spandex | Very         |   |   |   |   |   |   |   | Very              |
|  | Easy to Read | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Difficult to Read |

**6. Please pick one item you tried on. Evaluate the item along the following dimensions as they are affected by the lighting.**

|                    | Very Bad |    |    | Very Good |    |    |    |
|--------------------|----------|----|----|-----------|----|----|----|
| Fabric Texture     | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Fabric Color       | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Overall appearance | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Size of Clothes    | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Construction       | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Fits my image      | -3       | -2 | -1 | 0         | +1 | +2 | +3 |
| Just feels right   | -3       | -2 | -1 | 0         | +1 | +2 | +3 |

**7. Please evaluate your perception of the Overall Dressing Room Conditions along the following scales.**

|                  |   |   |   |   |   |   |   |                 |
|------------------|---|---|---|---|---|---|---|-----------------|
| Inconvenient     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Convenient      |
| Roomy            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Cramped         |
| Dirty            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Clean           |
| Adequate privacy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Lack of privacy |
| Small            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Large           |
| Well kept        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unkempt         |
| Low quality      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | High quality    |
| Impressive       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unimpressive    |
| Bad              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Good            |

**8. Please rate the following statements based on how much you agree or disagree.**

|  | Strongly Disagree |    |    | Strongly Agree |    |    |    |
|--|-------------------|----|----|----------------|----|----|----|
| The dressing room met my expectations.                     | -3                | -2 | -1 | 0              | +1 | +2 | +3 |
| The dressing room does NOT fit in the store.               | -3                | -2 | -1 | 0              | +1 | +2 | +3 |
| The dressing room encouraged me to stay and try things on. | -3                | -2 | -1 | 0              | +1 | +2 | +3 |
| My overall dressing room experience was NOT satisfying.    | -3                | -2 | -1 | 0              | +1 | +2 | +3 |

**9. How many items did you try on? (Please circle the number)**

**1 2 3 4 5 6 7 8 9 10**

**9. How many of these items did you decide to buy? (Please circle the number)**

**0 1 2 3 4 5 6 7 8 9 10**

**9. Please make any additional comments on this dressing room's lighting.**

**10. What should be changed or added to make this dressing room ideal?**

APPENDIX E  
DESCRIPTIVE STATISTICS AND T-TEST RESULTS

| Emotional states           | Condition | N  | Mean | SD    | p     |
|----------------------------|-----------|----|------|-------|-------|
| Unaroused/ Aroused         | Front     | 30 | 4.33 | 1.446 | 0.393 |
|                            | Overhead  | 30 | 4    | 1.554 |       |
| Relaxed/ Stimulated        | Front     | 30 | 4.63 | 1.377 | 0.063 |
|                            | Overhead  | 30 | 3.93 | 1.484 |       |
| Sleepy/ Wide Awake         | Front     | 30 | 4.87 | 1.224 | 0.59  |
|                            | Overhead  | 30 | 5.03 | 1.159 |       |
| Calm/ Excited              | Front     | 30 | 4.43 | 1.305 | 0.222 |
|                            | Overhead  | 30 | 3.97 | 1.608 |       |
| Unhappy/ Happy             | Front     | 30 | 5.37 | 1.245 | 0.746 |
|                            | Overhead  | 30 | 5.47 | 1.137 |       |
| Dissatisfied/ Satisfied    | Front     | 30 | 5.37 | 1.402 | 0.753 |
|                            | Overhead  | 30 | 5.27 | 1.015 |       |
| Unpleasant/ Pleasant       | Front     | 30 | 4.83 | 1.663 | 0.489 |
|                            | Overhead  | 30 | 4.53 | 1.676 |       |
| Uncomfortable/ Comfortable | Front     | 30 | 5.5  | 1.306 | 0.175 |
|                            | Overhead  | 30 | 5.03 | 1.326 |       |

Two-tailed test of significance: \*p<.05, \*\*p<.01

| Lighting quality      | Condition | N  | Mean | SD    | p     |
|-----------------------|-----------|----|------|-------|-------|
| Cool / Warm           | Front     | 30 | 4.4  | 1.522 | 0.243 |
|                       | Overhead  | 30 | 4.83 | 1.315 |       |
| Dim / Bright          | Front     | 30 | 5.27 | 1.413 | 0.377 |
|                       | Overhead  | 30 | 4.93 | 1.484 |       |
| Hazy / Clear          | Front     | 30 | 5.83 | 1.085 | 0.157 |
|                       | Overhead  | 30 | 5.4  | 1.248 |       |
| Glaring / Not Glaring | Front     | 30 | 4.73 | 1.701 | 0.588 |
|                       | Overhead  | 30 | 4.5  | 1.614 |       |
| Bad / Good            | Front     | 30 | 5.3  | 1.291 | 0.455 |
|                       | Overhead  | 30 | 5.03 | 1.45  |       |
| Dislike / Like        | Front     | 30 | 5.17 | 1.683 | 0.18  |
|                       | Overhead  | 30 | 4.6  | 1.545 |       |

Two-tailed test of significance: \*p<.05, \*\*p<.01

Table E-3. Self-evaluations descriptive statistics and t-test results

| Self-evaluations                                | Condition | N  | Mean | SD    | p       |
|---|-----------|----|------|-------|---------|
| Bad / Good                                      | Front     | 30 | 5    | 1.619 | 0.524   |
|   | Overhead  | 30 | 5.23 | 1.165 |         |
| Old / Young                                     | Front     | 30 | 5.3  | 1.236 | 0.451   |
|   | Overhead  | 30 | 5.07 | 1.143 |         |
| Unhealthy / Healthy                             | Front     | 30 | 5.17 | 1.464 | 0.532   |
|   | Overhead  | 30 | 4.93 | 1.413 |         |
| Harsh Shadows / No Shadows                      | Front     | 30 | 5.37 | 1.326 | 0.003** |
|   | Overhead  | 30 | 4.33 | 1.269 |         |
| Unflattering Skin Tones / Flattering Skin Tones | Front     | 30 | 4.63 | 1.608 | 0.928   |
|   | Overhead  | 30 | 4.67 | 1.213 |         |
| Negative / Positive                             | Front     | 30 | 4.93 | 1.53  | 1.000   |
|   | Overhead  | 30 | 4.93 | 1.23  |         |
| Unattractive / Attractive                       | Front     | 30 | 4.9  | 1.47  | 0.548   |
|   | Overhead  | 30 | 5.1  | 1.062 |         |
| Heavy / Slender                                 | Front     | 30 | 4.73 | 1.596 | 0.629   |
|   | Overhead  | 30 | 4.53 | 1.592 |         |

Two-tailed test of significance: \*p<.05, \*\*p<.01

Table E-4. Dressing room evaluations descriptive statistics and t-test results

| Dressing room evaluations          | Condition | N  | Mean | SD    | p       |
|------------------------------------|-----------|----|------|-------|---------|
| Inconvenient / Convenient          | Front     | 30 | 5.6  | 1.429 | 0.862   |
|                                    | Overhead  | 29 | 5.66 | 0.936 |         |
| Cramped / Roomy                    | Front     | 30 | 5.3  | 1.208 | 0.002** |
|                                    | Overhead  | 30 | 4.23 | 1.382 |         |
| Dirty / Clean                      | Front     | 30 | 5.17 | 1.341 | 0.856   |
|                                    | Overhead  | 30 | 5.1  | 1.494 |         |
| Lack of Privacy / Adequate Privacy | Front     | 30 | 5.43 | 1.569 | 0.173   |
|                                    | Overhead  | 30 | 4.9  | 1.423 |         |
| Small / Large                      | Front     | 30 | 4.57 | 1.135 | 0.802   |
|                                    | Overhead  | 30 | 4.5  | 0.9   |         |
| Unkempt / Well Kept                | Front     | 30 | 5.2  | 1.448 | 0.469   |
|                                    | Overhead  | 29 | 4.9  | 1.739 |         |
| Low Quality / High Quality         | Front     | 30 | 4.83 | 0.95  | 0.812   |
|                                    | Overhead  | 30 | 4.77 | 1.194 |         |
| Unimpressive / Impressive          | Front     | 30 | 4.3  | 1.418 | 0.254   |
|                                    | Overhead  | 30 | 3.9  | 1.269 |         |
| Bad / Good                         | Front     | 30 | 5.2  | 1.157 | 0.217   |
|                                    | Overhead  | 30 | 4.83 | 1.117 |         |

Two-tailed test of significance: \*p<.05, \*\*p<.01

Table E-5. Dressing room experience descriptive statistics and t-test results

| Dressing room experience                                   | Condition | N  | Mean | SD    | p     |
|--|-----------|----|------|-------|-------|
| The dressing room met my expectations.                     | Front     | 29 | 5.34 | 1.317 | 0.262 |
|  | Overhead  | 30 | 4.97 | 1.245 |       |
| The dressing room fit in the store.                        | Front     | 30 | 5.6  | 1.567 | 0.86  |
|  | Overhead  | 30 | 5.53 | 1.332 |       |
| The dressing room encouraged me to stay and try things on. | Front     | 30 | 4.67 | 1.626 | 0.238 |
|  | Overhead  | 30 | 4.17 | 1.621 |       |
| My overall dressing room experience was satisfying.        | Front     | 30 | 5.63 | 1.474 | 0.853 |
|  | Overhead  | 30 | 5.57 | 1.305 |       |

Two-tailed test of significance: \*p<.05, \*\*p<.01

APPENDIX F  
COMBINED RESPONSE VARIABLE T-TEST RESULTS

Table F-1. Combined response variable t-test results

| Variable                  | t      | df | p-value | Mean difference | SE difference |
|---------------------------|--------|----|---------|-----------------|---------------|
| Arousal                   | -0.825 | 58 | 0.413   | -0.2            | 0.2425        |
| Pleasure                  | 0.51   | 58 | 0.612   | 0.1417          | 0.2781        |
| Arousal and pleasure      | -0.541 | 58 | 0.591   | -0.1222         | 0.2259        |
| Lighting preference       | 0.397  | 58 | 0.693   | 0.15            | 0.378         |
| Lighting perception       | -1.343 | 58 | 0.184   | -0.2583         | 0.1923        |
| Facial appearance         | 1.185  | 58 | 0.241   | 0.327           | 0.276         |
| Body appearance           | -0.069 | 58 | 0.945   | -0.0222         | 0.3206        |
| Overall Dr.Rm. conditions | 0.817  | 58 | 0.417   | 0.1815          | 0.2222        |
| Dr. Rm. experience        | -0.026 | 58 | 0.979   | -0.008          | 0.319         |

APPENDIX G  
PARTICIPANT WRITTEN COMMENTS

Table G-1. Participant written comments

| Condition | Side | Lighting  | Dressing Room   |
|-----------|------|---|---|
| Front     | L    | N/C   | Although the dressing room was somewhat plain, the lighting really worked well. Also, the white walls and black curtain are a good contrast. Maybe you could add a picture on the wall or something with color. |
| Front     | R    | I tried on a black dress so the black curtain made a little hard to see how well the dress fit me.  | N/C   |
| Front     | L    | N/C   | Cleaner, nicer chairs (More comfortable looking). Cleaner walls/floor.  |
| Front     | R    | I like the idea of the lighting behind the mirror, but not how you can see the actual structure that holds the light bulb.  | Add color & wall art, carpet.   |
| Over      | L    | N/C   | The lighting in this room is uneven and causes there to be shadows when I stood close to the mirror.  |
| Over      | R    | N/C   | More hooks.   |
| Over      | L    | Hot! Good light but it was considerably warmer than the store. Good for skin tone. Shadows not too bad on cellulite. : ( Clean crisp lighting, but shows all the rooms flaws. | Clean walls. Lint, dirt on floor. Chair is awkward - maybe a bench instead. Asymmetrical mirror and walls could be enhanced with paint or décor (ie. Frame, poster). Lighting is the best part except for heat. |
| Over      | R    | I like the lighting the way it is.  | The curtain was semi-transparent and the dressing room seemed a little too opened to the store - not quite enough privacy. The floor was a little dirty.  |
| Over      | L    | The lighting was good, it was not too dim or too bright.  | The angle of the mirror, it makes the bottom of your body look awkward because the mirror is resting against the wall and is uneven.  |
| Over      | R    | N/C   | No  |
| Over      | R    | N/C   | N/C   |
| Front     | R    | N/C   | N/C   |
| Front     | L    | I loved the lighting. It made me look like my skin had a healthy glow. Also, my eyes looked amazing. The light was very flattering.   | N/C   |
| Front     | R    | N/C   | Make it cleaner. Add extra hooks for hanging clothes.   |
| Front     | L    | I love it!  | Shields over the bulbs.   |
| Over      | L    | The lighting is too dim. Needs more lights overall.   | More hooks for clothing/better lighting.  |
| Front     | L    | I really liked the lighting. I wish more dressing rooms were done like this.  | I'm not sure ... maybe just some type of decoration.  |

Note. N/C indicates no comment.

Table G-1. Continued

| Condition | Side | Lighting   | Dressing Room  |
|-----------|------|--|--|
| Front     | R    | N/C  | Cooler AC temp   |
| Over      | L    | N/C  | Not a thing.   |
| Over      | R    | Was flattering while trying on clothes!  | A little warm – temperature.   |
| Over      | L    | Perfect lighting to stand back and look at the overall image, but when you get really close to the mirror, the lighting is much brighter. However, as a consumer, I don't think it's that important if it gets brighter as I get closer. | More hangers. A/C – I felt like there was no air circulated in here.                                       |
| Front     | L    | I've never seen lighting on the sides of the mirror and I really liked it a lot.   | One more hook next to the other one so items to be tried on and items already tried on can be separated.   |
| Over      | R    | The light makes me skinny, but it is kind of dark ... so if you put more lights, it will be better. Combination with yellow and white light (the light is too yellowish).  | Need more hangers, exciting musics, shelf (can put purses, car keys, other stuff).                         |
| Front     | L    | Too bright. I can't stay long time and I don't want to try much.   | I'd like dress room needs door. I'm little afraid someone come in dress room during I put on dress.        |
| Front     | R    | N/C  | Temperature needs to be cooler and extra clothes hanging hooks – there's only one – but I like the mirror. |
| Front     | R    | I would buy one of these dresses if I had the money but it was perfect dress.  | Floor is a little dirty.   |
| Over      | L    | Maybe less overhead; they bring out any circles you have under your eyes.  | More hooks.  |
| Over      | R    | N/C  | N/C  |
| Over      | R    | N/C  | A little too hot.  |
| Over      | L    | N/C  | N/C  |
| Over      | L    | N/C  | N/C  |
| Front     | L    | Softer lighting might be better and more flattering.   | More hooks.  |
| Front     | L    | It initially creates a cool effect but it is not ideal for trying on clothes.  | Overhead lighting. Maybe more room or hanger space.  |
| Front     | L    | Didn't really make me look my best.  | Lighting should be a little less harsh.  |
| Front     | R    | N/C  | N/C  |
| Front     | L    | I like how the lighting is in front, along with the ceiling lighting. With this it gives you light from every angle.   | Extra hangers, mirror has some dust. Rug on floor would be great for more ease on taking off shoes.        |
| Front     | R    | N/C  | N/C  |
| Front     | R    | I love the lighting! I feel like it is flattering, slimming, and exciting. It looks modern.  | Maybe another light across the top of the mirror.  |
| Over      | R    | Could be in the back rather than right in your face.   | Color!   |

Note. N/C indicates no comment.

Table G-1. Continued

| Condition | Side | Lighting  | Dressing Room   |
|-----------|------|---|---|
| Over      | L    | Fine but shadowy.   | Light near entrance.  |
| Over      | R    | The lighting was very good on the facial and body appearance.   | If there were more space, a mirror could possibly be added on the sides.  |
| Over      | L    | It was way too bright and the lights caused my head to make a shadow on my face.  | More clothing hooks, down lights, add color or pictures to walls.   |
| Over      | L    | Too bright.   | Clean mirrors, light space between dressing rooms.  |
| Over      | R    | N/C   | N/C   |
| Over      | R    | N/C   | N/C   |
| Over      | L    | It's just right.  | Nothing I can think of.   |
| Over      | R    | N/C   | N/C   |
| Front     | R    | N/C   | N/C   |
| Front     | L    | I like it. It's calming and seems like a bar or restaurant in the evening.  | Nothing, good!  |
| Front     | R    | The lighting is good b/c it isn't direct light and it seems to be reflected due to the white walls which isn't as harsh on the customer.        | N/C   |
| Front     | L    | A little intimidating.  | Cooler temp.  |
| Front     | R    | I really try to avoid stores with this type of music because I get very annoyed and don't want to try things on. The light gives me a headache. | Make either more elegant or more cozy. Right now it's very dull. Change the music! Maybe carpet? The light is too white for me. |
| Front     | L    | N/C   | Paint walls - scuff marks. Temperature - cooler.  |
| Front     | R    | Very bright, but flattering.  | Painted a warmer color. Repaint the floor. Hang mirror on the wall. Pictures/decorations!                                       |
| Over      | L    | The lights right above make me a little warm.   | A 3-way mirror and move the lighting.   |
| Over      | L    | I prefer the lighting when I step back, but the chair is in the way.  | Remove chair.   |
| Front     | L    | N/C   | I like it overall.  |
| Front     | R    | Too bright neon light.  | Smaller mirror.   |
| Over      | R    | The lighting is focused toward the mirror so when you step back you get harsh shadows.  | More even, less intense lighting.   |
| Over      | R    | N/C   | N/C   |

Note. N/C indicates no comment.

APPENDIX H  
 POSITIVE AND NEGATIVE WRITTEN COMMENTS BY LIGHTING DIRECTION

Table H-1. Positive and negative written comments by lighting direction

| <u>Frontal Lighting Comments</u>   |  |
|--|--|
| Positive   | Negative   |
| I loved the lighting. It made me look like my skin had a healthy glow. Also, my eyes looked amazing. | It initially creates a cool effect but it is not ideal for trying on clothes.                        |
| I like how the lighting is in front ...  | Didn't really make me look my best.  |
| I love the lighting! I feel like it is flattering, slimming, and exciting. It looks modern.          |  |
| I like it. It's calming and seems like a bar or restaurant in the evening.                           |  |
| <u>Overhead Lighting Comments</u>  |  |
| Positive   | Negative   |
| Good for skin tone. Shadows not too bad on cellulite.  | The lighting in this room is uneven and causes there to be shadows when I stood close to the mirror. |
| Was flattering while trying on clothes!  | Maybe less overhead; they bring out any circles you have under your eyes.                            |
| The light makes me skinny ...  | Fine but shadowy.  |
| The lighting was very good on the facial and body appearance.  | It was way too bright and the lights caused my head to make a shadow on my face.                     |

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## BIOGRAPHICAL SKETCH

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