November 2018

The Relationship between Ambient Lighting Color and Hotel Bar Customer Purchase Behavior and Satisfaction

Kunal Shah
University of South Florida, kshah13@gmail.com

Follow this and additional works at: https://scholarcommons.usf.edu/etd

Part of the Business Administration, Management, and Operations Commons, and the Marketing Commons

Scholar Commons Citation
https://scholarcommons.usf.edu/etd/7569

This Dissertation is brought to you for free and open access by the Graduate School at Scholar Commons. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact scholarcommons@usf.edu.
The Relationship between Ambient Lighting Color and Hotel Bar Customer Purchase Behavior and Satisfaction

by

Kunal Shah

Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Business Administration College of Business University of South Florida

Co-Major Professor Dr. Richard Plank
Co-Major Professor Dr. Anand Kumar

Date of Approval:
November 09, 2018

Keywords: Sensory Market, Ambient Lighting

Copyright © 2018, Kunal A. Shah
Dedication

I dedicate my research and project to my father, Ashok Shah, a pioneer and visionary for our family. He is the reason many of our family members do what we do for a living. In 1973, my father came to America with empty pockets and a heart filled with dreams, leaving behind his family and village in India. He came to pursue his MBA in San Francisco; little did he know that he would end up spending the rest of his life in this country. I called a motel my first home for three years, and then growing up around them all my life, so I quickly learned the family business. I was lucky enough to see it evolve over time, along with the opportunity to be part of it professionally. Today our family’s motels may have become hotels, but our vision and ethics have remained.

When the time came to pick a topic for my dissertation, I knew that I wanted to incorporate hospitality and hotels into my project, but I did not know how. With the help of my committee and certain faculty members, I chose sensory marketing. This was an amazing opportunity to conduct a live study at one of my hotels for my dissertation. Coming from the industry side this seemed like a foreign concept. I was very wrong. These are the factors that make hospitality a very competitive industry today. I got to see it from a different angle, and possibly even incorporate the results into running my business moving forward. I got an amazing chance to build on what my father has been practicing for 45 years. It was a proud moment for me to come into a very familiar business from a completely different angle and make a difference.

During my interview for this program, I was asked why I wanted to pursue this degree. I
did not really know then, but over the course of three years, I have realized what I wanted from this program. My father left his parents and his home in India only for one thing: education. His plans were to get educated and then go back home. He had no idea that he would be staying and living the rest of his life here in America. He knew that everything else could be taken away from him at any time in his life, but his education would remain. His aspiration for an MBA led him to San Francisco, which led him to work hard and open a couple of small businesses there; the rest, as they say, is history. Over the course of these three years, I realized I had the same passion for education that my father had almost 50 years ago. Not only do I want to be educated, but I also want to educate. It is an area in which I can make a positive difference in many lives. Most importantly, one never knows where a new path can lead. For one man, my father, it led from his hometown in India to an extended family of over 40 in America.
Table of Contents

List of Tables......................................................................................................................... iii

Abstract ...................................................................................................................................... iv

Chapter 1: Introduction ............................................................................................................ 1
  Introduction............................................................................................................................ 1
  Background............................................................................................................................. 2
  Problem Statement................................................................................................................ 4
    Specific Problem.................................................................................................................. 4
  Purpose of the Study ............................................................................................................. 5
  Research Questions and Hypotheses ..................................................................................... 6
  Nature of the Study ............................................................................................................... 7
  Definitions ............................................................................................................................ 7
  Scope and Delimitations ....................................................................................................... 8
  Limitations ........................................................................................................................... 8
  Significance .......................................................................................................................... 9
  Summary ............................................................................................................................... 9

Chapter 2: Literature Review ................................................................................................ 11
  Literature Search Strategy .................................................................................................. 11
  Theoretical Foundation ....................................................................................................... 12
    Disconfirmation of Expectation Theory ............................................................................. 12
  Literature Review Related to Key Variables ....................................................................... 19
    Sensory Marketing ............................................................................................................. 19
    Visual ................................................................................................................................ 19
    Sensory Marketing Research ........................................................................................... 25
    Summary and Conclusions ............................................................................................... 27

Chapter 3: Methodology ........................................................................................................ 29
  Introduction .......................................................................................................................... 29
  Research Design and Rationale .......................................................................................... 30
  Methodology ....................................................................................................................... 31
    Population ......................................................................................................................... 31
    Sampling and Sampling Procedures ................................................................................ 31
List of Tables

Table 1: Variables, Scales of Measurement, Variable Type, and Operationalization ................. 34
Table 2: Bar Data for Customer Spend .................................................................................. 41
Table 3: Self-report Data for Customer Spending .................................................................. 42
Table 4: Self-report Data for Overall Satisfaction ................................................................... 43
Table 5: Customer Experiences by Light Color ...................................................................... 46
Abstract

Increasingly competitive markets lead brand managers to search for new methods to improve customer satisfaction, increase revenue, and promote customer loyalty. Sensory marketing has the potential to meet those objectives. Sensory marketing programs are designed to engage consumers’ senses and affect perceptions, judgments, and behaviors. Ambient light color is an environmental variable with the potential to influence the customer experience in lodging industry sensory marketing programs. Contrast theory and disconfirmation of expectations served as the theoretical framework for this study. The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. Four ambient light colors were examined: blue, green, red, and yellow. The sample included 374 individuals who made at least one purchase from a single hotel lobby bar over a one month data collection period. Data were collected for customer spending and customer perceptions using a server log and customer survey. There were three key findings. First, ambient color did not significantly affect customer spending. Second, ambient color did not significantly affect overall satisfaction. Third, customer spending was significantly correlated with stress level and negatively correlated with overall customer satisfaction, for all color groups combined. The use of alcohol to reduce stress complicates the analysis for ambient light color selection in a bar environment. Overall, the study findings are promising and form a foundation for practitioners to experiment with a multiplicity of sensory marketing programs.
Chapter 1: Introduction

Introduction

Marketing strategies have evolved over time in response to increased competition and business cycles to include sensory marketing (Leung, Fong, & Law, 2013; Singh, Dev, & Mandelbaum, 2014). Sensory marketing programs are designed to engage consumers' senses and affect perceptions, judgments, and behaviors (Krishna, Cian, & Sokolova, 2016). Sensory marketing techniques use ambient factors as sensory triggers to create an association between a product or service and specific emotions or perceptions. The goal of sensory triggers is for consumers to self-generate desirable brand attributes at the emotional rather than the cognitive level (Singh et al., 2014). Sensory marketing has the potential to expand into a new era of marketing, one that uses a more diverse approach and appeals to a wider range of the human experience. The implementation of sensory marketing has the potential to influence hotel design and operations and to affect how those establishments implement features such as visual cues and lighting.

Research suggests that sensory variables can be manipulated to elicit specific emotional responses during the buying process (Gursoy, 2017). The potential for sensory marketing in hotels remains relatively unexplored. Ladhari, Souiden, and Dufour (2017) found that ambient lighting and color influenced customer retail shopping experience. Shoppers were able to identify specific ambient factors, such as lighting position and color, that contributed to their emotional response. Positive emotional responses were associated with customer satisfaction, repeat
buying, and positive online reviews (Ladhari et al., 2017). The most influential ambient factors affecting customer perceptions were lighting, temperature, and music genre. Positive emotions were also associated with longer customer stays and increased intent to purchase (Ladhari et al., 2017).

This study’s aim was to examine the impact of ambient light color on consumer purchase, behavior, and satisfaction. This study was necessary to advance knowledge on sensory marketing in the lodging industry. Chapter 1 provides context for the study and includes a discussion of the study’s problem statement, research questions, theoretical framework, significance, delimitations, and limitations.

**Background**

Marketing in the hotel industry has undergone tremendous change (Carroll & Siguaw, 2003; Leung et al., 2013; Morrison, Taylor, Morrison, & Morrison, 1999). The first establishment to operate under the title of “hotel” was the Grand Hotel, established 250 years ago in London. Since then, the hotel has evolved into a collection of modern brands known throughout the world today, from prestige brands such as Hilton to more affordable chains such as Holiday Inn.

The role of the hotel has evolved over the course of the 20th century. Until the 1960s, most hotels offered temporary rooms for rent as well as suites for permanent residents who paid in monthly blocks. After the 1960s, the role of the hotel transitioned to that which most people are familiar with today: temporary residency or rental (Groth, 1994). The turn of the 20th century saw a shift in hotel marketing efforts toward integrating internet strategies. The internet provides an opportunity for smaller hotels to market themselves more widely and to compete against
larger hotel chains (Morrison et al., 1999). One of the big shifts over this period was that hotels were able to market to consumers more directly (Carroll & Siguaw, 2003). Rather than relying on travel agents or call centers, advertising could be performed online and orders taken over the internet. Hotels were not left to directly market on their own. Between 2000 and 2002, intermediaries shifted from physical locations to online hosting (Marcussen, 2003). By 2002, the largest travel websites in the world included Expedia, Travelocity, Orbitz, and Priceline. Other methods of online marketing evolved to exploit ubiquitous mobile access and social media applications such as Facebook (Hsu, 2012). The internet also expanded the reach of hotels to international audiences.

The advent of the internet, regardless of how people access it, has been among the most important changes in hotel marketing (Law, Leung, Lo, Leung, & Fong, 2015; (Park & Huang, 2017). The internet has become increasingly important to disseminating tourism information and products, including hotels. Within that same time, consumer habits in shopping for hotels have changed and hotel revenues have fluctuated. Hotel revenues have acted in cycles. The U.S. lodging industry experienced increased demand in the 1940s when soldiers were returning home (Woodworth & Mandelbaum, 2009). Postwar inflation offset revenues, but growth continued into the 1950s, bolstered by an industry-wide boom.

The 1960s was a period when hotel chains began to grow, marking another period of the industry’s expansion (Woodworth & Mandelbaum, 2009). However, the 1970s were a tumultuous time when fuel shortages and inflation stymied the industry. The 1980s saw both growth and decline due to a mix of financial prosperity followed by a real estate bust. However, the 1990s again saw the national economy recover and grow, leading to the industry expanding
yet again (Woodworth & Mandelbaum, 2009). Finally, despite the growth of the internet in the 2000s, the hotel industry did not experience significant prosperity in that decade. The first decade of the 21st century was marked by recession and war that led to a sharp decline in hotel demand.

**Problem Statement**

Sensory marketing involves an appeal to the five human senses to influence consumer behavior (Hulten, Broweus, & Dijk, 2009). This process of appealing to consumers occurs through the visual, auditory, olfactory, gustative, and tactile senses. There is a gap in the literature regarding the potential for sensory marketing to influence customer behavior in the hotel industry (Gursoy, 2017). Hotels appeal primarily to the visual sense (Gursoy, 2017). Visual marketing can be used to establish a brand through cues created inside a hotel, such as employee uniforms, decorative elements, and consistently branded souvenir materials. Some hotels attempt to brand through the sense of smell by creating specific scents used throughout their chains.

In other cases, hotels appeal to customers’ sense of touch by providing free items such as scented soap or bathrobes (Gursoy, 2017). The sense of taste is typically limited to food advertising, while ambient music is commonly used to appeal to guests’ sense of hearing. The appropriate combination of factors can help to create a relaxing environment where consumers feel comfortable and have a desire to return. However, despite some research into the use of sensory marketing in hotels, much remains unknown about the impact of ambient factors on the guest experience.

**Specific Problem**

Little is known about the impact of ambient factors on the hotel guest experience. Lighting, scent, and music can all influence the customer experience. In hotel public spaces, for
instance, ambient lighting can help to encourage socializing and create a pleasant customer experience. Hotels also use specific forms of ambient lighting to help establish their own brand, similar to how some hotels use scents to establish their brands. Color is often used to help set moods and encourage specific behaviors; restaurants often attempt to encourage shorter or longer stays depending on the colors they use within their establishments (Chandrasekaran & Chandrasekar, 2016). There is a gap in the literature regarding the choice of ambient color, consumer behavior and satisfaction, and purchase behavior in hotel settings.

From the advent of the Internet (Marcussen, 2003) to the use of social media and mobile websites (Hsu, 2012; Park & Huang, 2017), hotels have continually looked for new ways to influence consumer behavior. Sensory marketing has the potential to affect consumer behavior once guests are within the hotel given the impact that the senses can have on branding and consumer actions (Gursoy, 2017; Hulten et al., 2009). However, despite the sensory marketing’s potential to enhance the consumer experience and customer behavior, it remains unknown how ambient lighting can influence consumers within a hotel.

**Purpose of the Study**

The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. The study was conducted in two phases. The first phase included data collection on the number of drinks purchased and amount spent in each of four ambient light settings. The second phase of the study included customer feedback ratings regarding how consumers felt at the time of their purchases.

The study relied on data drawn from a single hotel during four 30-day data collection periods for each of blue, green, yellow and red hotel bar lighting (see Appendix B) to examine
how ambient light color influenced consumer purchase behavior and consumer perceptions. Mean customer spending and customer survey responses were compared between each of four ambient colors to identify significant differences. The independent variable of the study was ambient light color and the dependent variables were customer spending and customer perceptions.

Research Questions and Hypotheses

In order to guide the study, research questions and hypothesis were developed and formulated as follows:

**RQ1:** What is the effect of ambient light color on customer spending behavior?

- **H1\(_0\):** Ambient lighting color has no significant effect on customer spending.
- **H1\(_a\):** Ambient lighting color has a significant effect on customer spending.

**RQ2:** What is the effect of ambient light color on customer perceptions?

- **H2\(_0\):** Ambient lighting color has no significant effect on customer perceptions.
- **H2\(_a\):** Ambient lighting color has a significant effect on customer perceptions.

Theoretical Framework

Contrast theory and disconfirmation of expectations provided the theoretical framework to develop and address the research questions. Originally proposed in the 1960s, contrast theorists posited that people expect a product to have a certain value, and that expectation forms the basis for evaluating the actual experience (Oliver, 1977, 1980; Yuksel & Yuksel, 2008). Contrast theory emphasizes that disparities in expectations can affect how people rate and review their experiences with both products and services. The primary assumption is that consumers have expectations of a product prior to purchase (Yuksel & Yuksel, 2008). Oliver coined the phrase zone of tolerance, which refers to the area between desired service and adequate service
and represents the range of service performance that customers will tolerate. Therefore, in the context of customer satisfaction in a hotel environment, contrast theory suggests that customers will rate their experience at extremes of the experience: the best or worst they have ever had. If disparities exist between expectation and delivery arise, people tend to exaggerate their experience.

**Nature of the Study**

The study used a quantitative comparative research design to address the research questions. A quantitative study draws upon quantitative data to determine whether to accept or reject hypotheses based upon observations. The benefit of a quantitative approach is that independent and dependent variables can be clearly outlined (Leedy & Ormrod, 2015). The study variables in this case include ambient factors as an independent variable and consumer purchase patterns and perceptions as dependent variables.

**Definitions**

**Ambient lighting and color.** Ambient light color is one element of visual atmospherics that include color, brightness, size, shape, location, and angle manipulated to influence a consumers’ emotional state (Spence, Puccinelli, Grewal, & Roggeveen, 2014).

**Customer spending.** Customer spending is the total amount purchased by an individual buyer in a single visit (Spence et al., 2014).

**Customer perception.** Customer perception refers to consumer emotions including alertness, excitement, mood, and satisfaction regarding their buying experience (Spence et al., 2014).
Scope and Delimitations

This study involved the relationship between ambient light color and both consumer purchase behavior and consumer perceptions such as alertness, mood, and satisfaction. Consumer purchase behavior data were drawn from logs of the number of individuals making drink purchases and the amount they spent. Consumer perception data were drawn from survey responses. The scope of this study was limited to data drawn from a single hotel during June 11, 2018-July 8, 2018. The number or days, day parts, and days of the week were identical across the four sampling periods, one for each of blue, green, red, and yellow. Bartenders recorded customer purchase behavior on a tally sheet. Data regarding customer perceptions were drawn from a survey using a seven-point Likert-type scale to evaluate perceptions. This study’s findings may not be generalizable to other age groups, cultures, geographic locations, or populations given the limited scope of the study.

Limitations

One of the limitations of this study was the geographic limitations of the sample. The data collected were drawn from a single hotel location. The nature of this geographic limitation made it difficult to extrapolate the findings and apply them widely among the larger population. Geographic differences across the country included differences that make responses to sensory marketing different, since geographical context may mold personal responses due to local influences. The study had a limited geographic generalizability. Since the study collected data following customer experiences, it was based on a convenience sample. The resulting sample collected from hotel consumers may not be reflective of hotel consumers that rent rooms every year.
There was an additional risk for participant bias. Individuals can respond in ways that they believe the researchers want them to respond. The likelihood of this can be reduced through assurances of anonymity. However, there is no guarantee that internal pressures pushing individuals to respond as they believe they should can be eliminated.

**Significance**

The study was significant because this research could add to existing research on the methods hotels employ to influence customer behavior and how sensory marketing influences consumer actions. Additionally, research for the study was significant because it can inform layout choices for future hotel designers. This provided an additional avenue by which hotel designers might appeal to consumers.

**Summary**

The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. Hotel marketing efforts have evolved over the years. Recent changes in hotels’ marketing efforts have included shifts toward internet and mobile marketing. However, what remains unexplored is the impact of sensory marketing on consumer behavior in hotels. Sensory marketing has been studied in various contexts, including retail shopping (Nghiem-Phu, 2017) and restaurants (Chandrasekaran & Chandrasekar, 2016). The research into how sensory marketing impacts consumer behavior in hotels remains relatively unexplored. Various forms of sensory marketing can influence consumer behavior. According to contrast theory, if the experience is positive and exceeds expectations sufficiently, consumers will rate the experience as among their most
enjoyed. Similarly, if the experience is negative and below expectations, customers will rate the experience as extremely negative.
Chapter 2: Literature Review

Literature Search Strategy

The following scholarly journal article databases were searched to identify relevant research: EBSCOhost, ERIC, Google Scholar, JSTOR, and ProQuest. The following sensorymarketing-related websites were also searched: American Marketing Association, Experience Marketing Association, National Institute of Health, and PEW Research. Searches were conducted using the Google search engine except where proprietary online scholarly journal sites required the use of an internal search engine. Keyword and key search term development was an iterative process that started with combinations of the following search terms: ambient lighting, contrast theory, discontinuity of expectations theory, sensory marketing, hotel marketing, location-based marketing, lodging industry trends. Additional keywords and key search terms developed over time from the original search.

The literature review included peer-reviewed journal articles, books, dissertations, and related commercial and university-based research. The literature review period included material published from 1990 to 2018, but it did draw on some earlier works in government regulatory history, nutrition history, and nutrition theory. One hundred and twenty-one separate works were reviewed, of which 76 were specifically referenced and 17 provided context. Approximately 67% of the studies were quantitative and the remaining 33% were qualitative or theoretical. The research articles chosen for reference addressed childhood obesity, obesity intervention studies,
history of government nutrition regulation, nutrition theory, and USDA regulation of school nutrition policy.

**Theoretical Foundation**

**Disconfirmation of Expectation Theory**

Disconfirmation of expectation has been a construct for understanding consumer purchase behavior and satisfaction for decades (Oliver, 1977, 1980). The theoretical assumption is that consumers have expectations of a product prior to their purchase of a good or service (Oliver, 1977, 1980). This expectation of performance becomes the baseline against which the performance of a product or service is compared. Essentially, performance is compared to the pre-purchase expectation to decide whether the performance confirmed their expectation or disconfirmed it. Assuming that ambient light color has the potential to influence customer satisfaction, light color can contribute to feelings of satisfaction through confirmed expectations.

Disconfirmation of expectation is operationalized in three ways, though the first two methods are variations of one another (Prakash & Lounsbury, 1983). The first way that disconfirmation of expectation is operationalized is by the discrepancy between what a consumer expects versus how that purchase performs after the transaction. In testing, expectations are measured and set on a spectrum; performance is placed on that spectrum. The difference in expectation and evaluation is considered the disconfirmation construct.

The construction of disconfirmation is also arrived at by creating expectations among lab participants who then are exposed to the product (Prakash & Lounsbury, 1983). Afterward, an evaluation is made. The expectation is considered a pre-exposure phase and the evaluation is
considered a post-exposure phase. The difference between the two defines the disconfirmation construct (Prakash & Lounsbury, 1983).

The disconfirmation construct can also be arrived at by using summary judgment scales to rate performance on a scale from worse than expected to better than expected (Prakash & Lounsbury, 1983). Unlike the first two methods, this process does not involve calculating difference scores between expectations versus evaluations.

The process by which disconfirmation of expectations occurs begins with the conceptualization of expectations (Szymanski & Henard, 2001). This creates the standard that an item is measured against. Outcomes that exceed those expectations create satisfaction while outcomes that fall beneath expectations create dissatisfaction. There is also a null state in which expectations are met and the item neither exceeds nor falls below expectations. There are consequences for organizations that overpromise and underdeliver (Szymanski & Henard, 2001). Marketing efforts should not attempt to oversell a product or experience, since disconfirmation of expectations would lead to dissatisfaction. Marketing and products or services should be relatively matched to avoid dissatisfaction.

In a study of independent retailers, researchers compared expectations and performance to assess customer satisfaction (Lee, Johnson, & Gahring, 2008). Large retailers set expectations for large product offerings and including unique items that were much greater than smaller retailers could deliver (Lee et al., 2008). As a result, small retailers created a disparity between expectations and outcomes, resulting in lowered satisfaction levels for independent retailers.

Price, performance, and expectations all play a role in determining customer satisfaction; however, price is not independent of performance in making an evaluation (Voss, Parasuraman,
& Grewal, 1998). Services, specifically, may benefit from pricing as a means of evaluation. It is often difficult for consumers to determine what level of performance to expect from a service. In light of this, consumers look to pricing to clarify their expectations, using it as a cue from which to guide their evaluations. Unfortunately, pricing is not always consistent with services provided. Therefore, consumers are more often left with price-to-performance inconsistencies when comparing services than when purchasing products. Consequently, expectations may be more difficult to set with regard to services (Voss et al., 1998). The researchers concluded that price-to-performance consistency was an important part of pre-purchase expectations and postpurchase evaluations.

Swan and Martin (1981) found support for the disconfirmation of expectations model in which satisfaction was related to disconfirmation of a comparison level that was set by perceived product performance and contextualized by past performance. A disconfirmation of expectations that occurred when performance exceeded that of similar products in the past was a predictor of satisfaction. However, disconfirmation of expectations regarding a product’s performance without the context of past performance of similar products was not related to satisfaction. People with high expectations had the lowest disconfirmation scores. However, the researchers warned that there were problems with their study’s construction. Those who rated the highest expectations on the scale had no room in which to have their expectations disconfirmed or to find areas for improvement, while those who rated lower on the scale had room for disconfirmation or finding ways to improve on a product (Swan & Martin, 1981).

Researchers have questioned the disconfirmation of satisfaction paradigm’s ability to explain outcomes among consumers (Spreng, MacKenzie, & Olshavsky, 1996). Researchers built
on the existing paradigm to create a new model that took marketing into consideration. Specifically, the researchers suggested that satisfaction includes not only a product or service but also the marketing on which expectations are based. The researchers also noted that desires and expectations, which are sometimes conflated in the disconfirmation of expectations paradigm, are distinct. Desires may affect the pre-purchase expectation but also influence that postpurchase evaluation. Desires are set by the choice criteria that cause a person to make a purchase. The new model illustrated how desire affects evaluation both pre and post-purchase while also showing that disconfirmation could affect feelings toward marketing and communications (Spreng et al., 1996).

**Contrast Theory**

Contrast theory states that people expect a product to have a specific value, and when a product does not meet expectations there is a disparity between expectation and postperformance evaluation (Oliver, 1980). After exceeding a certain threshold, consumers begin to magnify the difference, whether the evaluation is positive or negative. Therefore, underperformance leads to lower ratings for a product or service than its real performance might merit.

Contrast theory is rooted in Helson’s adaptation-level theory (LaTour & Peat, 1979). Helson’s I theory was based on the concept that people judge a stimulus based on two factors: a) prior experience, and b) memories of how they perceived a similar stimulus previously. People respond differently depending on how these two factors shape their response. This can be applied to a variety of stimuli, including light and sound. Contrast theory involves a similar comparison process that shapes the individual’s response (Yuksel & Yuksel, 2008).

Contrast theory has several implications for marketers and organizations selling a service.
Customers will inflate poor performance beyond reality in some cases (Yuksel & Yuksel, 2008). In contrast, consumers can also react favorably if the product or service exceeds expectations beyond a specific threshold. Consumers shift their evaluations if those expectations are inconsistent with reality (Anderson & Hair, 1972). Because consumers tend to magnify the disparity between expectation and reality, it may be occasionally favorable not to set expectations too high if the product cannot live up to expectations. In other cases, organizations may want to set slightly lower expectations so that the product will actually exceed them when experienced. This may create cause people to magnify their favorable rating of that product (Anderson & Hair, 1972). For marketers, the implication is that expectations are not set so high as to provoke disappointment but also not set too low such that individuals bypass the product for a competing product.

Effort may play a role in how a consumer evaluates a product and whether a contrast effect arises from their experience (Cardozo, 1965). A low level of purchase effort may help to set lower expectations. Cardozo noted that customers sometimes evaluated a product compared to better products and magnified the difference between their experience and the expectation set by other products. Cardozo also pointed to effort as a means by which to reconcile contrast theory against dissonance theory, which suggests that customers raise their evaluation to meet their expectations. This reconciliation of the two conflicting theories used effort expended in a situation to suggest that outcomes become more important when effort is increased (Cardozo, 1965). Purchasing dinner may take on more importance when the dinner requires advanced planning, long travel, higher prices, and so forth. The additional effort expended in order to make the dinner succeed raises the level of expectation. Cardozo (1965) indicated that people are more
likely to raise their evaluation to justify their experience when this much effort is expended, since dissonance is more likely to occur with increased effort, while a contrast effect is more likely when little effort has been expended.

Contrast theory indicates that differences in expectations versus reality are likely to be assimilated while prices are low (Oliver, 1980). Consumers set a range of acceptable pricing for a product and, when a product falls within that price range, it is more likely that assimilation will occur. If prices are shifted for a promotion, for instance, and those promotional prices fall within an acceptable range, the customer will give significant weight to the price as part of their evaluation (Diamond & Campbell, 1989). More broadly, attempts to use persuasive communication have to fall within a latitude of acceptance. Attempts to persuade in the direction of the communication that are highly dissonant with an initial attitude are rejected, while more moderate attempts to persuade may cause a person to shift toward the marketer’s message.

Researchers have suggested that assimilation and contrast effects occur following a process by which people integrate products into an associated category and make an evaluation within the context of other items in that category (Yuksel & Yuksel, 2008). At other times, they contrast the object against the category itself. In either case, an evaluation is contextualized by comparison against other like items. Finally, comparison sometimes arises on the simple basis of likability – whether a customer likes a specific item more than other items in the category. These are all different forms of contextualization and evaluative modes through which assimilation and contrast effects may emerge. Testing of these theories has typically been done in tightly controlled environments (Yuksel & Yuksel, 2008). Their application in the field has been
limited. However, consumer researchers have investigated how contrast theory predicts customer satisfaction when using products like pens or brands of coffee.

Questions have also been brought up regarding the level of engagement required of consumers in order for contrast and assimilation effects to be observed (Chandrashekaran & Grewal, 2003). The theory requires that customers are engaged with marketing materials. The underlying assumption is that consumers take deliberate steps to scrutinize the information they are provided. In this context, prior to making an evaluation, they determine how true a claim about a product might be and whether they believe what they are told. The researchers suggested that assimilation-contrast theory applied specifically when individuals were highly involved with marketing efforts and marketing messages. Among uninvolved consumers who do not scrutinize marketing messages, they use simpler methods to arrive at whether to believe the message or not. Scrutiny plays a greater role among highly involved consumers in determining whether a message is accepted, while simple heuristics play the greater role in lesser-involved individuals (Chandrashekaran & Grewal, 2003). Instances when heuristics are important to satisfaction are particularly fertile ground for using sensory cues to influence perceptions of a hotel service.

In the end, a decision is made on whether to be satisfied can be paired with an ambient light color to condition customers to expect a certain level of service with that setting. Whether assimilation or a contrast effect occurs varies between both groups as less involved individuals’ expectations are more likely to be set by immediately contextual clues.
Literature Review Related to Key Variables

Sensory Marketing

Sensory marketing refers to marketing that appeals to the human senses. In traditional marketing, the human senses are largely ignored (Hulten et al., 2009). The American Marketing Association defines sensory marketing as any form of marketing that attracts consumers by attempting to influence a consumer’s feelings or behaviors through their senses (Kumar, 2016). The five senses included with sensory marketing are visual, auditory, olfactory, gustative, and tactile.

Textual or auditory ads are common, but marketing that integrates all five senses that comprise the human experience are rare (Kumar, 2016). This has been to the detriment of marketing, given that it is through the human senses that people integrate the purpose of a marketing effort. The sense of sight is the primary means used by marketers to the neglect of the other human senses (Porcherot, Delplanque, Gaudreau, & Cayeux, 2013).

In the past decade, interest in marketing that integrates more of the human senses has increased (Hulten et al., 2009). As with traditional marketing, sensory marketing can be used to raise awareness of a product or brand in order to increase sales. However, it also serves the purpose of establishing or increasing brand awareness. Increasingly, marketing firms have been broadening appeals to the senses in order to influence customers in new ways.

Visual

The study of sensory marketing has revealed that visuals enhance advertising effectiveness by increasing the level of mental stimulation and imagery in a viewer (Krishna et al., 2016). When using a multi-sensory approach to advertisement, elements such as taste...
perceptions and customer evaluation of a service, can change. People are particularly influenced by tactile sensations, and the feeling of touch in an advertisement influences how people evaluate a product.

The importance of touch is clear at all stages of the human experience (Ifeanyichukwu & Peter, 2018). From the earliest ages when babies desire to be touched to the reassuring feeling of having someone make physical contact, touch plays an important role in the human experience. It is also an important aspect of marketing and plays a large part in the sale of physical goods. The importance of touch poses a slight problem with services that by their nature cannot be touched (Ifeanyichukwu & Peter, 2018). However, people providing a service can use light touch. For instance, servers earn higher tips when they make brief contact with a customer.

**Ambient lighting and lighting colors.** Ambient lighting and varying lighting colors are visual elements manipulated to affect customer perceptions. Ariffin, Bibon, and Abdullah (2017) found that customer perceptions of ambience, environment, and satisfaction can be affected by lighting in combination with other atmospheric elements. Lighting configurations and color play a role in stimulating a consumer’s reactions and evoking emotional responses. Lighting levels play a role in increasing how highly a customer rates an experience in a given environment. Researchers suggested that appropriate lighting could influence revisiting intentions (Ariffin et al., 2017).

In retail environments, lighting can be used to draw consumer attention and highlight specific areas of a store or particular products (Sharma & Agarwal, 2017). Appropriate use of lighting can help to divert consumer attention to desired areas. However, researchers also found that lighting was not predictive of increased sales. The use of appropriate lighting may not
improve same-day sales but may instead encourage attention toward the sale of specific products. In combination with the improved levels of revisiting intention found by Ariffin et al. (2017), lighting could play a positive role in encouraging certain consumer behaviors.

When applied to a given environment, lighting combined with color can affect a consumer’s perception of space and the identity of a retailer (Tantanatewin & Inkarojrit, 2016). In this context, identity refers to perceptions regarding a retailer and its brand. Retail identity is related to the entire customer experience and can be immersive and either memorable or forgettable. How lighting is arranged in a retail area can influence how consumers perceive a seller’s retail identity. Appropriately done, lighting arrangements can increase positive reactions and improve retail identity (Tantanatewin & Inkarojrit, 2016). Positive impressions are enhanced when warm tones are used, suggesting that lighting should improve warm color perceptions in a retail space.

Lighting is considered an ambient factor, and it can affect several aspects of the customer experience (Mishra, Sinha, & Koul, 2014). Lighting can make customers feel more comfortable. It can increase the attractiveness of merchandise, and it can influence a consumer’s evaluation of the quality of merchandise. The impact of lighting on the consumer experience is therefore complex. Evidence from Mishra et al. (2014) suggests that organizations can alter evaluations of a store and its products simply by altering their lighting to make customers feel more at ease within an establishment.

Lighting and color can influence a person’s mood and emotions, and researchers noted that lighting is often one of the details most thought about during store design (Spence et al., 2014). Stores spend millions of dollars to improve lighting, which can influence consumers to
become more engaged and spend more time inspecting displays. Kumar (2016) also noted the role of lighting in encouraging interaction with merchandise, which tended to increase in brightly lit stores. The researchers also noted that a failure to match lighting with the expectations of consumers could lead to negative opinions about the store. For instance, most customers may expect bright lighting accompanied with upbeat music in some stores. Failure to provide the right type of ambient cues may create a negative impression.

Just as Kumar (2016) suggested that lighting influenced engagement, Sachdeva & Goel (2015) also indicated that lighting improved task performance. With increased visibility, individuals were more easily able to find what they wanted in stores and to make choices between competing products. The researchers also hypothesized that more brightly lit products may be more attractive to customers. Lighting was implicated as a driver of consumer interest and information seeking behavior, suggesting that it could encourage customers to look more deeply into purchasing a product (Sachdeva & Goel, 2015).

Lighting can also influence a customer’s perception regarding how much a product should cost, with different colors of lighting influencing price perceptions (Spence et al., 2014). Restaurants have used diminished lighting to improve repeat customer attendance at their locations. In other cases, coffee drinkers reported enjoying strong coffee more when lighting was bright, while those enjoying weaker coffee consume more in low-lighting conditions (Spence et al., 2014).

Few studies exist on the effect of ambient lighting on consumer behavior, and those that exist showed mixed results (Gancarz, Elgala, & Little, 2013). In a study of casinos, physical environment factors ranging from temperature to lighting were not found to be significant
determinants of atmosphere. The findings suggested that lighting does not always play a role in consumer perceptions, at least within certain contexts (Mayer & Johnson, 2003). Ambient factors that included lighting color were linked to customers spending longer periods in a given location, increasing customer satisfaction in the process. The researchers suggested that tailoring such factors to appeal to consumers could give hotels a competitive advantage within their industry.

Ambient lighting was one of a number of environmental factors that could positively influence the consumer experience (Randhawa & Saluja, 2017). Ambient lighting significantly influenced consumer satisfaction while shopping, and specific types and colors of light were associated with specific desirable traits. Bright light was associated with honesty, for example, which stores may want to encourage. Lighting was also capable of highlighting specific parts of the store in order to promote the purchase of certain products (Randhawa & Saluja, 2017). The researchers warned that dim lighting might at times discourage purchases. Skottman (2015) also noted the importance of lighting for highlighting specific parts of a store. Customers indicated that ambient lighting could encourage desirable consumer behavior. Ambient lighting could help to draw attention to products and encourage sales. Herath (2014) also noted the importance of lighting. Alongside other elements such as music, layout, and color, lighting could help encourage customers to buy more impulsively than they would otherwise.

Also supporting the idea that lighting could positively affect emotions was research by Ladhari et al., (2017) who found that lighting can create a positive shopping experience for customers. The study suggested that lighting and other atmospheric factors could all help create positive emotional responses from shoppers. Often, these affects were imperceptible to customers, who reacted positively nonetheless. The researchers felt this was important because
creating a positive shopping experience was important to encouraging repeat businesses, since individuals attempt to avoid unpleasant environments (Ladhari et al., 2017). The researchers found that the most influential factors on customer perceptions were ambient factors that included music, temperature, and lighting. These influences influence customers in ways that are often imperceptible, even if these factors create pleasant experiences for the customer. Retailers hoping to create a positive experience for customers can manipulate such ambient variables. One benefit of increasing positive customer experiences is that they are more likely to remain in a store longer and purchase more. Negative experiences lead to the opposite behavior (Ladhari et al., 2017).

Study of various factors revealed that lighting does play a role in supporting customer satisfaction in a retail environment (Kumar, Garg, & Rahman, 2010). However, it did not play as significant a role as olfactory and tactile elements. Ambient scent, room temperature, store layout, window dressing, and room arrangements all had an impact on satisfaction. Lighting, along with music and colors used, play a lesser role in satisfaction. Given that the researchers felt satisfaction played a role in encouraging repeat business and word of mouth advertising, the findings made lighting important, but not as important as other environmental factors in encouraging business (Kumar et al., 2010).

Separately, research did indicate that lighting, alongside facility aesthetics, social factors, and layout, could all have an impact on disconfirmation of expectations (Ryu & Han, 2010) in restaurants. Although facility aesthetics was the factor that had the most influence on disconfirmation, lighting also played a strong contributing role. These factors help to distinguish fine dining restaurants from one another. However, these factors can also serve to surprise
customers and exceed their expectation of the dining experience, demonstrating positive
disconfirmation. Such findings served to inform how dining establishments could benefit from
gauging customer perceptions and adjusting in-restaurant conditions to exceed expectations of
(Ryu & Han, 2010).

**Sensory Marketing Research**

Sensory marketing is sometimes focused on a specific industry, as in the case marketing
research in the context of food advertising (Lichters, Möslein, Sarstedt, & Scharf, 2017).
However, such research has raised questions that are applicable across various industries.
Lichters et al. (2017) brought up the question of whether or not sensory research results from a
laboratory environment were mirrored in real settings.

To address whether testing environments produced similar results in real world settings,
researchers compared sensory lab, virtual consumption environment, and field setting results
(Lichters et al., 2017). Researchers concluded that virtual consumption environments more
closely mirrored real settings than did sensory lab results. This suggested that sensory marketing
research with more applicable results could be derived from research conducted in a virtual
setting (Lichters et al., 2017). However, only *in situ* research can prove that sensory marketing
changes perceptions.

When selling specific products, marketers attempt to bring together several different
elements that appeal to a person’s different senses. The most common appeals combine lighting,
product color, logo design, and music in the form of brand jingles and atmospheric themes
(Ifeanyichukwu & Peter, 2018). One part of sensory marketing is based on using these elements
to differentiate a brand from its competition.
The future of sensory marketing seems to involve a number of industries (Kumar, 2016). Virtual reality is anticipated to add sensory experiences that include taste and smell. This trend will enable enhanced shopping experiences in which store users can describe products as they browse. Cinemas are anticipated to become 4-D theaters that include moving seating, sensations of wind and water, and smells that are tied to the plot of the film.

Sensory marketing has been studied in the context of outdoor shopping environments (Ngøiem-Phu, 2017). The study combined an examination of the existing literature and an observational study that examined deployed sensory marketing in an outdoor shopping environment. The researchers noted during their observations that the use of sensory cues was a valuable part of the customer experience.

In an outdoor environment, visual cues were the most dominant form of marketing (Ngøiem-Phu, 2017). However, the experience was enhanced by integrating audio and tactile cues. These popular forms of sensory marketing helped to attract customer attention and created experiential marketing (Ngøiem-Phu, 2017).

**Sensory marketing in the hotel industry.** Sensory marketing has been studied in the context of hotels (Gursoy, 2017). Visual cues are widely used. Hotels use visual cues to create specific styles convey the hotel’s specific identity. This can be done with decorative elements as well as staff clothing. Hotels that market merchandise take those same standards to paper, pens, and souvenir materials as a way of extending their branding (Gursoy, 2017). In bar areas, lighting acts to create ambience and a relaxing environment.

The sense of smell is rarely addressed in hotel marketing, although it is used at times (Gursoy, 2017). Some hotels create universal scents that are present at all their properties as a
way of branding themselves. At these hotels, people know not only what they will see but also how things will smell. Hotels also use ambient music in areas like lobbies and lounges to create a relaxing atmosphere. In rooms, everything from the bathrobes to the beds can be designed to elicit sensations that guests associate with that brand (Gursoy, 2017).

**Summary and Conclusions**

There are multiple theories that deal with customer satisfaction, and they examine multiple aspects of how satisfaction operates. Some of the theories reviewed here deal with how dissatisfaction arises, while other theories deal with how to resolve that dissatisfaction. At times, these multiple theories can be reconciled with another. Disconfirmation theory, for instance, is consistent with other theories stating that people compare evaluations against expectations. Some theories take this idea a step further to elaborate on how expectations and evaluations are constructed. Customer evaluations are influenced by a variety of factors dependent upon level of involvement. When customers are highly involved, decisions are made deliberately, and thought is given to numerous factors important to their experience. However, most customers in a low involvement context who have not had a strong negative experience use heuristics such as sensory cues to form product/service evaluations and judgments.

Research has been conducted into how various sensory elements affect customer satisfaction and behaviors. Hotels integrate elements from visual to olfactory in order to influence the customer experience. Visual elements tend to be the strongest elements used in marketing, but marketers have increasingly attempted to broaden their scope. Which elements have the most impact may depend on the nature of the industry in question. A sensory factor as noticeable as ambient lighting has the potential to have a significant and measurable influence on
customer behavior and perceptions. Marketers and developers attempting to integrate various sensory elements into their establishments may need to examine the nature of their industry in addition to various theories of how customers evaluate products and services.
Chapter 3: Methodology

**Introduction**

The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. The study was significant because it added to the body of research on the potential for sensory experiences to influence consumer perceptions, specifically the impact of ambient lighting on customer behavior in a lodging environment. The study therefore generated insights that contribute to the body of research, the methods that hotels use to influence customer behavior, and the role that sensory marketing, specifically ambient lighting, can play.

Previously, ambient factors were overlooked in hotel design, partly because of rapid changes in the hotel industry. However, members of Generation X and the Millennial age groups welcome the shift to a focus on ambient factors as a means of increasing their satisfaction with the hotel experience. Such factors have the potential to influence their decision-making. Consequently, the data uncovered in the study may affect the performance of hotels by influencing consumer behaviors. The data discovered in the study may affect hotel business decisions.

This chapter presents a review of the study design and justification for its use, as well as a description of the population, sample size and sampling technique, and the data analysis plan. Following that, the chapter includes a discussion of the data collection procedures and a review
of the operationalization of variables. Finally, the study’s research questions are reviewed and threats to validity are discussed. The chapter ends with a conclusion.

**Research Design and Rationale**

The two dependent variables for the study were consumer purchase behavior and consumer perceptions. The independent variable for the study was ambient light color: cool blue, menthol green, hot red, and warm yellow. This study’s aim was to correlate both sales numbers and consumer perceptions of service with one of the four color themes used over the course of the month. A causal research design was used as the basis for this study.

Comparative research designs are appropriate when investigating whether making changes in an independent variable influences a dependent variable (Leedy & Ormrod, 2015). The color of ambient lighting was changed to determine shifts in consumer purchase behavior and consumer perceptions. Causal research can determine an association between variables that occur within a set amount of time. Such an approach helps to generate reliable results that suggest a relationship between variables. In this study, attempts were made to affect the behavior of consumers through the manipulation of ambient lighting in the hotel lounge.

Causal research includes using quantitative methods to generate new data that can extend the existing literature on a topic (Leedy & Ormrod, 2015). When using a causal research design, hypotheses are formulated and accepted or rejected based on the statistical data generated. This approach is appropriate because it includes clearly identifying both independent and dependent variables; it also provides for clearly formulated research problems and testable hypotheses.
Methodology

Population

On any given day in the U.S., 4.8 million individuals stay in a hotel, for a total of 33.6 million per week. For those stays, the industry makes a distinction between business and consumer travel. The population for the Best Western Plus Atrium Inn & Suites property that was the site for this study was typically 20% business and 80% consumer. The target population for this study included both business and consumer guests who visited the lobby bar of the Best Western Plus Atrium Inn & Suites between the hours of 5:00 PM and 10:00 PM.

Sampling and Sampling Procedures

A convenience sample of 378 individuals who purchased at least one beverage at the hotel bar area and completed a consumer satisfaction survey were included in the study. As part of the recruitment process, a nominal financial incentive was provided to motivate participation in the study. Survey responses were collected anonymously to encourage truthful responses. Within the context of this study, the influx made it difficult to capture a sample that adequately reflected the larger population that visits a hotel. The minimum sample size for Kruskal-Wallis tests and assuming $\alpha = .05$, p-value $\leq 0.05$, effect size $= 0.3$ (Faul, Erdfelder, Lang, & Buchner, 2007) was calculated using G*Power 3.1 software. Based on those assumptions the minimum sample size was 74 for each of four ambient color schemes for a total minimum sample of 296 at 95% using two-tailed tests.

Procedures for Data Collection

Data were collected for customer spending and customer satisfaction. Data for customer spending were collected using the following two methods: (a) total spending was recorded by service staff on a log sheet (Bar Data), and (b) participants’ self-reported spending (Self-report
Participants’ perceptions were collected using a self-reported survey (Appendix A). Participants were allowed to complete surveys independently and without observation to eliminate any response bias.

Data for each color scheme were collected on seven consecutive days from 5:00 PM to 10:00 PM starting on Monday of each week for a total of 35 hours from Monday through Sunday for each color. Each color scheme dataset collected was assumed to be honest and accurate since the participants were allowed to complete the questionnaire without an observer present. No method was available to pair Bar Data with self-reported consumer satisfaction data.

Operationalization of Variables

**Ambient light color.** The ambient light colors were blue, green, red, and yellow (Appendix B).

**Customer spending – bar (Bar Data).** Customer-spending – bar data were collected by bartenders using paper tally sheets.

**Customer spending – self-report (Self-report Data).** Customer-spending – self-report data were collected from participants completing the customer satisfaction survey.

**Customer perceptions.** Customer perceptions were the experience that consumers have regarding their buying experience.
Table 1

<table>
<thead>
<tr>
<th>Variables, Scales of Measurement, Variable Type, and Operationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Ambient light color</td>
</tr>
<tr>
<td>Customer spending - bar data</td>
</tr>
<tr>
<td>Customer spending – self-report data</td>
</tr>
<tr>
<td>Customer perceptions</td>
</tr>
</tbody>
</table>

Ambient light colors were changed in the lobby bar in both the domed ceiling and the enclosed water fountain. Customer spending bar data were collected using a log sheet completed by on-duty bartenders, and customer spending self-report data were collected from the consumer survey. Hotel guests were recruited and consumer perceptions were gauged using guest surveys. Guests were asked to provide their ratings of service along a seven-point scale. Customer survey data were collected and coded for ambient color. For example, if blue ambient lighting was used on a specific day, that day’s bar customer spending data, self-report customer spending, and customer perceptions were recorded as blue data.

Customer spending in Bar Data involved several potential sources for variance with customer spending in Self-Report Data. First, Bar Data spending amounts excluded taxes or tips. Second, Bar-Data included all customers, not just survey participants, and could not be correlated to the survey data. Third, no effort was made to reconcile Bar Data with actual sales data recorded by the point of sale system.
Data Analysis Plan

Customer spending-bar data tally sheets and customer spending self-reported data were recorded and transferred to an Excel spreadsheet. Survey responses were also transferred to an Excel spreadsheet and merged with the ambient light color (cool blue, menthol green, hot red, or warm yellow lighting). A Shapiro-Wilk test of normality and a Kruskal-Wallis test were used to test hypotheses.

Research Questions and Hypotheses

In order to guide the study, the following research questions and hypothesis were developed and formulated. The goal was to capture whether there was an association between ambient factors and either consumer purchase behavior, consumer perceptions, or both.

RQ1: What is the effect of ambient light color on customer spending behavior?

H₀₁: Ambient lighting color has no significant effect on customer spending.

H₁₁: Ambient lighting color has a significant effect on customer spending.

RQ2: What is the effect of ambient light color on customer perceptions?

H₀₂: Ambient lighting color has no significant effect on customer perceptions.

H₁₂: Ambient lighting color has a significant effect on customer perceptions.

Threats to Validity

The external validity of a study the generalizability of a study’s results to other settings and populations (Creswell & Creswell, 2017). When drawing upon a single geographic location and a convenience sample, threats to external validity arise that can limit the relevance of the findings to various age groups, cultures, and ethnicities (Leedy & Ormrod, 2015). The current study focused solely on one specific hotel rather than several, limiting the study to one specific
geographical area. In this case, the findings may not be applicable to other parts of the country. Consumer purchase behaviors and perceptions may be affected by regional variables that influence consumers.

A hotel located in a difficult to reach area of a city may be disposed to customers who are not generally satisfied and who reflect that in their in-hotel behaviors. That is one example of how a specific geographic context could negatively affect consumer behaviors and perceptions. Ideally, research draws from a broad geographic source so that local geographic factors cannot be a source of variation in behavior outcomes. There is also the problem of using a convenience sample. The resulting sample may not be reflective of the larger population. For instance, the sample may skew too old or young versus the larger population, or the sample may not reflect the ethnic composition of the larger population. Under these circumstances, the findings of a study may not be generalizable because they tend to apply to particular age group or ethnicity. Convenience samples accept participants at earliest convenience and do not attempt to create a sample that reflects the larger population.

In addition to threats to external validity, there are also threats to internal validity. Internal validity refers to the rigor with which a study has been designed. Internal validity is determined by controlling for extraneous variables and confounding variables. There are multiple ways that internal validity can be threatened. History can be an issue if too much time passes between two phenomena, but the current study collected data relatively soon after consumers attended the lounge. Maturation refers to significant biological changes in an individual between the time of a phenomenon and data collection. These changes were not anticipated to occur in the current study given the short time frame in which the study was conducted.
One potential threat to internal validity may have been due to differential selection, which occurs when subjects cannot be assigned to groups for testing (Creswell & Creswell, 2017). In the current study, “groups” arose on a convenience basis according to who used the lounge during any given week, without any attempt to ensure that groups were equal in terms of demographic variables. To avoid differential selection, researchers must attempt to make different groups undergoing different treatments equal in as many respects as possible. Because this experiment relied on individuals choosing to attend the lounge in a real-world setting, there was no opportunity to ensure that groups of attendees during one week were similar to groups of attendees in a different week.

**Summary**

This quantitative study used a comparative research design. The research design allowed the researcher to look for relationships between ambient light color, consumer spending behavior, and consumer perceptions. A convenience sample of 378 individuals who purchased at least one beverage at the hotel bar and completed a customer satisfaction survey over a 28-day period were included in the study. Ambient light colors were changed within the lobby bar in both the domed ceiling and the enclosed water fountain in four consecutive seven-day periods. Customer spending bar data were collected using a log sheet completed by on-duty bartenders, and self-reported customer spending and customer satisfaction data were collected from the consumer survey. Kruskal-Wallis tests were used to test hypotheses, and Spearman’s rho statistics were used to identify specific relationships between self-reported spending data and consumer survey results. Internal validity was threatened by the researcher’s inability to assign attendees into groups. This may have led to visitors to the hotel lounge being quite dissimilar.
from one week to another. These limitations limited the generalizability of the research findings
and weakened the rigor of the study. Chapter 4 contains a presentation of the study’s findings, a
characterization of the study sample, and a further review of methodological issues that arose
during the course of the study.
Chapter 4: Results

Introduction

Little is known about the effect of ambient lighting on the hotel bar guest experience. In hotels, lighting in public spaces has been shown to encourage socializing and a pleasant customer experience. Hotels also use ambient lighting color to support brand identity. Color is often used to help set moods and encourage specific behaviors, such as when restaurants attempt to encourage shorter or longer stays depending on the colors they use within their establishments (Chandrasekaran & Chandrasekar, 2016). The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. Chapter 4 includes descriptive statistics to characterize the study sample and results of inferential statistics to test hypotheses.

The population for the Best Western Plus Atrium Inn & Suites property participating in this study was typically 20% business and 80% family/consumer. The total sample included 374 customers made up of 216 (58%) men and 155 (42%) women (three missing gender). The mean age was 37.9 (SD=11.7). Data were collected in 7 consecutive day periods beginning on Monday for each of blue, green, red, and yellow lighting schemes (Appendix B). The hotel bar color remained the same throughout the 7 consecutive day period, then changed to the next color on Monday. The lobby bar was open from 5:00 PM to 10:00 PM every day for each 7 day data consecutive period, creating a 35 hour data collection period for each ambient color scheme.
**Results**

**Findings by Research Question**

**RQ1:** What is the effect of ambient light color on customer spending behavior?

**H_{0}:** Ambient lighting color has no significant effect on customer spending.

**H_{1}:** Ambient lighting color has a significant effect on customer spending.

Hypothesis 1 was tested using two datasets: 1) customer spending data collected by service personnel (Bar Data), and 2) self-reported customer spending data collected by survey (Self-report Data). Descriptive statistics were reported for both data sets and the Shapiro-Wilk test of normality was used to select the appropriate statistical test for mean differences between light colors. The Shapiro-Wilk test of normality revealed that both datasets exhibited non-normal distributions and non-parametric tests were employed to test hypotheses. Results are reported separately for Bar Data and Self-report Data.

**Bar Data.** Table 2 reports Bar Data on customer spending by light color for mean, median, and standard deviation. The total sample customer spending mean was $4.30 (SD=$4.00). The green group reported the highest mean customer spending (mean=$5.24, SD=$6.26) and the red group had the lowest (mean=$3.68, SD=$2.15).

<table>
<thead>
<tr>
<th>Light color</th>
<th>Mean Spend</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Median Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>$4.48</td>
<td>90</td>
<td>$4.00</td>
<td>$3.00</td>
</tr>
<tr>
<td>Green</td>
<td>$5.24</td>
<td>87</td>
<td>$6.26</td>
<td>$4.00</td>
</tr>
<tr>
<td>On Red</td>
<td>$3.68</td>
<td>107</td>
<td>$2.15</td>
<td>$3.00</td>
</tr>
<tr>
<td>Warm Yellow</td>
<td>$3.93</td>
<td>90</td>
<td>$2.75</td>
<td>$3.50</td>
</tr>
<tr>
<td>Total</td>
<td>$4.30</td>
<td>374</td>
<td>$4.04</td>
<td>$3.00</td>
</tr>
</tbody>
</table>
A Shapiro-Wilk test of normality revealed that Bar Data customer spending was significantly non-normal ($W = 0.556, p < 0.001$). Figure 1 depicts a frequency histogram of Bar Data customer spending demonstrating a significant skew to lower customer spending. Due to this non-normality, a non-parametric Kruskal-Wallis test procedure was used to test Hypothesis 1.

A Kruskal-Wallis test revealed that spending did not significantly differ based on lighting color ($X^2(3) = 2.9, p = 0.407$). Based on Bar Data customer spending, we the null hypothesis, that ambient light color had no significant effect on customer spending, could not be rejected. Due to the data collection method used for Bar Data, no mechanism existed to associate Bar Data with customer perception data from the customer survey. Only the Self-report customer spending data were used for Hypothesis 2.

**Self-reported data.** Table 3 reports the Self-report Data for customer spending by light color for mean, median and standard deviation. The total sample included 357 customers with 208 males and 149 females (23 participants missing spending data). The total sample Self-report Data customer spending mean was $5.39 (SD=$4.00). The green group reported the highest mean customer spending (mean=$7.16, SD=$8.48) and the red group had the lowest (mean=$3.75, SD=$2.16).
Table 3

*Self-report Data for Customer Spending*

<table>
<thead>
<tr>
<th>Light color</th>
<th>Mean Spend</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Median Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>$5.38</td>
<td>85</td>
<td>$4.56</td>
<td>$3.00</td>
</tr>
<tr>
<td>Green</td>
<td>$7.16</td>
<td>82</td>
<td>$8.48</td>
<td>$4.00</td>
</tr>
<tr>
<td>Red</td>
<td>$3.75</td>
<td>105</td>
<td>$2.16</td>
<td>$3.00</td>
</tr>
<tr>
<td>Warm Yellow</td>
<td>$5.73</td>
<td>85</td>
<td>$6.04</td>
<td>$4.00</td>
</tr>
<tr>
<td>Total</td>
<td>$5.39</td>
<td>357</td>
<td>$5.73</td>
<td>$3.00</td>
</tr>
</tbody>
</table>

A Shapiro-Wilk test of normality revealed that the Self-report Data for customer spending was significantly non-normal ($W(359) = 0.594, p < 0.001$). A Kruskal-Wallis test revealed that Self-report Data showed no significant difference by lighting color ($X^2(3) = 8.572, p > 0.008$).

RQ2: What is the effect of ambient light color on customer perceptions?

H2ₐ: Ambient lighting color has no significant effect on customer perceptions.

H2ₐ: Ambient lighting color has a significant effect on customer perceptions.

Hypothesis 2 was tested with Self-report Data and responses to both overall satisfaction and individual survey items. A Shapiro-Wilk test of normality revealed that Self-report for overall satisfaction responses were significantly non-normal ($W = 0.756, p < 0.001$), resulting in the use of the non-parametric Kruskal-Wallis test statistic for Hypothesis 2.

Table 4 summarizes Self-reported Data for overall satisfaction by light color for mean, median and standard deviation. The total sample included 378 customers with 228 men and 150 women (three participants missing overall satisfaction data). The total sample overall satisfaction mean was 4.92 ($SD= .65$) using a Likert-type scale from 1 = very dissatisfied to 7 = very satisfied. The blue group reported the highest overall satisfaction (mean=5.04, $SD= .58$) and the green
group had the lowest (mean=4.77, SD=.90). A Kruskal-Wallis test revealed that overall satisfaction did not differ significantly by lighting color ($X^2(3) = 7.62, p > 0.008$). The null hypothesis was accepted.

Table 4

*Self-report Data for Overall Satisfaction*

<table>
<thead>
<tr>
<th>Light color</th>
<th>Mean Satisfaction Score</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Median Satisfaction Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>5.04</td>
<td>93</td>
<td>.58</td>
<td>5.10</td>
</tr>
<tr>
<td>Green</td>
<td>4.77</td>
<td>86</td>
<td>.90</td>
<td>4.90</td>
</tr>
<tr>
<td>Red</td>
<td>4.97</td>
<td>106</td>
<td>.44</td>
<td>5.00</td>
</tr>
<tr>
<td>Yellow</td>
<td>4.89</td>
<td>93</td>
<td>.62</td>
<td>4.88</td>
</tr>
<tr>
<td>Total</td>
<td>4.92</td>
<td>378</td>
<td>.65</td>
<td>4.90</td>
</tr>
</tbody>
</table>

In addition, a series of six pairwise Kruskal-Wallis tests were conducted for each customer perception item in the self-report survey. The results are reported below. Item responses used a Likert scale from 1 = *not at all,* or *low* to 7 = *very,* or *high.*

**Alertness.** Participants responded to the following question: “How would you rate your current mental alertness level?” Six pairwise alertness ratings did not differ significantly by lighting group ($p > 0.008$).

**Ambience.** Participants responded to the following question: “How would you rate the ambience in the hotel bar?” Six pairwise ambience ratings did not differ significantly by lighting group ($p > 0.008$).

**Atmospherics.** Participants responded to the following question: “How would you rate the overall atmospherics in the hotel bar?” Six pairwise atmospherics ratings did not differ significantly by lighting group ($p > 0.008$).
Boredom. Participants responded to the following question: “How bored do you feel right now?” Six pairwise boredom ratings did not significantly differ by lighting group ($p > 0.008$).

Energy. Participants responded to the following question: “How energetic do you feel right now?” Six pairwise energy ratings did not significantly differ by lighting group ($p > 0.008$).

Excitement. Participants responded to the following question: “How excited do you feel right now?” Six pairwise excitement ratings did not significantly differ by lighting group ($p > 0.008$).

Inhibition. Participants responded to the following question: “How would you rate your inhibition level?” Six pairwise inhibition ratings did not significantly differ by lighting group ($p > 0.008$).

Intoxication. Participants responded to the following question: “How intoxicated do you feel right now?” Six pairwise intoxication ratings did not significantly differ by lighting group ($p > 0.008$).

Mood. Participants responded to the following question: “How would you rate your current mood?” Six pairwise mood ratings did not significantly differ by lighting group ($p > 0.008$).

Relaxation. Participants responded to the following question: “How relaxed do you feel right now?” Six pairwise relaxation ratings did not significantly differ by lighting group ($p > 0.008$).

Service level. Participants responded to the following question: “How satisfied are you with the service level in the bar?” Six pairwise service level ratings did not significantly differ by lighting group ($p > 0.008$).
Stress. Participants responded to the following question: How would you rate your current stress level? Six pairwise stress ratings did not significantly differ by lighting group ($p > 0.008$).

Temperature. Participants responded to the following question: “How would you rate the temperature in the hotel bar?” Six pairwise temperature ratings did not significantly differ by lighting group ($p > 0.008$).

Discussion

In Table 5, ambience, atmospherics excitement, and mood are combined into a single construct of customer experience. The red group experienced the highest score for emotional experience (Mean=5.93; $SD=.35$) and the lowest stress level (Mean=2.24; $SD=.28$). Interestingly, the red group had the lowest self-reported customer spending of $3.75. There was a significant correlation ($r=.92, p < .008$) between stress level and mean customer experience. There was a significant negative correlation ($r=-.72, p<.008$) between stress level and customer spending. There was no significant relationship between mean customer experience and service level nor intoxication level.

Table 5

<table>
<thead>
<tr>
<th></th>
<th>Blue</th>
<th>Green</th>
<th>Red</th>
<th>Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambience</td>
<td>6.29</td>
<td>6.85</td>
<td>6.19</td>
<td>6.51</td>
</tr>
<tr>
<td>Atmospherics</td>
<td>6.54</td>
<td>6.19</td>
<td>6.82</td>
<td>6.46</td>
</tr>
<tr>
<td>Excitement</td>
<td>5.00</td>
<td>4.80</td>
<td>5.13</td>
<td>5.10</td>
</tr>
<tr>
<td>Mood</td>
<td>5.47</td>
<td>5.26</td>
<td>5.57</td>
<td>4.68</td>
</tr>
<tr>
<td>Mean</td>
<td>5.83</td>
<td>5.78</td>
<td>5.93</td>
<td>5.69</td>
</tr>
<tr>
<td>Self-report customer spend</td>
<td>$5.38$</td>
<td>$7.16$</td>
<td>$3.75$</td>
<td>$5.73$</td>
</tr>
<tr>
<td>Intoxication</td>
<td>2.00</td>
<td>2.36</td>
<td>1.78</td>
<td>1.80</td>
</tr>
<tr>
<td>Service level</td>
<td>6.85</td>
<td>6.35</td>
<td>6.90</td>
<td>6.96</td>
</tr>
<tr>
<td>Stress</td>
<td>3.24</td>
<td>3.16</td>
<td>2.24</td>
<td>3.52</td>
</tr>
</tbody>
</table>
No other pairwise Kruskal-Wallis comparison produced significant results at $p < .008$.

**Summary**

The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. Individual survey constructs such as atmospheric ratings were selected based on sensory marketing theory, which suggests a relationship between sensory experience and customer satisfaction and brand loyalty. Customer spending and perception data were collected for a sample of 387 individuals over a four-month period. Two data sets were used to test study hypotheses: bar data collected by service personnel, and self-reported customer spending data collected by survey. Both datasets were significantly skewed and required the use of non-parametric statistical analyses. No significant pairwise Kruskal-Wallis tests were found for Self-report Data nor Bar Data for customer spending between color groups.

Null hypothesis one, that there was no significant relationship between ambient light color and self-reported spending was accepted, therefore ambient light did not significantly affect customer spending. None of the pairwise between-group color lighting group comparisons using Kruskal-Wallis tests were significant for any of the 11 individual customer perception survey items. For the entire sample, there were significant correlations between stress and self-reported customer spending and a negative correlation between stress and overall customer satisfaction.
Chapter 5: Discussion

The purpose of this quantitative comparative study was to examine the relationships between ambient light color, consumer spending, and perceptions in a hotel lobby bar. This study advanced knowledge on sensory marketing as a follow-up to the study by Chandrasekaran and Chandrasekar (2016). The two dependent variables were customer spending behavior and customer perceptions, and the independent variable was ambient lighting color: cool blue, menthol green, hot red, and warm yellow. Data were collected from a single Best Western Plus Atrium Inn & Suites lobby bar over the course of one month from two sources: Bar Data recorded by bar service employees for customer spending, and Self-report Data collected by surveys for customer perceptions and spending. The study sample included 380 individuals that made at least one purchase and agreed to participate by completing a 15-item survey.

In accordance with the two research questions and hypotheses addressed in this study, there were no significant findings, with two exceptions. First, there was a significant positive sample-wide correlation (all ambient color groups combined) between stress and self-reported customer spending ($r = .92, p < .008$). Second, there was a significant negative correlation between stress and overall customer satisfaction ($r = -.72, p < .008$). Findings are interpreted, recommendations for practice are reviewed, and suggestions for future research are discussed below.
Interpretation of Findings

**Ambient Light Color Did Not Significantly Affect Customer Spending**

The finding that ambient light color did not significantly affect self-reported customerspending behavior contradicted earlier research on the potential effect of lighting on customer behavior (Ariffin et al., 2017). Earlier studies suggested that ambient lighting in combination with other atmospheric elements evoked positive emotional responses, increased customer satisfaction, and enhanced purchase intent (Ariffin et al., 2017). While the difference between the highest mean self-reported customer spending of $7.16 for the green color group was 91% higher than the red group, which had the lowest color group with self-reported mean spending of $3.75, the findings were not significant at $p < .008$.

Interestingly, the green group had the lowest overall customer satisfaction, highest stress level, and highest self-reported customer spending. The magnitude of the differences in customer spending suggest the need for a larger sample to examine whether the difference is significant. The process of conducting the study raised an interesting question: if a particular ambient color scheme was associated with higher spending but also higher stress and lower customer satisfaction, which variable should a hotel owner maximize? In the short run, the study indicated that the green color would maximize revenue, while either red or blue led to higher satisfaction but lower customer spending. Expectation theory indicates that long-term customer value is maximized by exceeding expectations for experience; it implies that the long-term metric of overall customer satisfaction should be the driver.

There was one major data concern. Customer-spending Bar Data and the Self-report Data were sufficiently different to reach different conclusions for Hypothesis 1. The Bar Data mean...
for the green group customer spending of $5.24 compared to self-reported customer spending of $7.18, a difference of $1.92, which was enough to change the hypothesis result. There are three potential sources for the difference. First, the Bar Data were collected manually by servers, which may have resulted in data collection errors. Second, the Bar Data did not include an estimate for taxes and tip, which represent a larger gap as the value of the check increases. Finally, the Self-report Data were drawn from customer surveys, which have shown a variety of biases in past research (Leedy & Ormrod, 2015). One potential method for addressing this data issue is to collect survey responses using a tablet that can connect actual survey data with the point of sale data to improve reliability and validity.

**Ambient Light Color Significantly Affected Overall Customer Satisfaction**

The finding that ambient light color significantly affected overall customer satisfaction confirms earlier research on the potential effect of ambient lighting to enhance the customer experience (Chandrasekaran & Chandrasekar, 2016). Earlier research found that ambient colors could create a sense of excitement and influence the length of time a customer remains at a restaurant. The difference in overall customer satisfaction was small but significant, and surprisingly there were differences in 10 of 11 survey items. None of alertness, ambience, atmospherics, boredom, energy, excitement, inhibition, intoxication, mood, service level, and stress all indicated significant differences in between-group comparisons.

The Spearman’s rho statistic relating customer satisfaction and stress of $r = -.72$ indicated a strong negative relationship between overall satisfaction and stress. In addition, the correlation between stress and customer spending was strongly positive ($r = .92, p > .008$). Additional research is needed to separate lighting color from stress and customer spending. A larger study
using point of sale data for purchases and a validated stress instrument would advance knowledge on these relationships.

Based on existing data regarding ambient light color and customer perceptions, there were no preconceived notions regarding which color might produce the highest overall customer satisfaction or customer spending. The results that customer spend was strongly correlated with stress, and negatively correlated with overall customer satisfaction, requires additional thought and study. The normal use of alcohol to relax and reduce stress complicates analysis for ambient light color in a bar atmosphere.

**Recommendations for Future Research and Practice**

The current study added to the existing body of knowledge regarding the potential for sensory marketing to make a difference in revenue and customer satisfaction. Based on the findings, some general recommendations for future research and practices can be made. The categories of future research and practice are combined here for a specific reason: mass marketers conduct multiple lines of research to improve outcomes as a core competency. Research in marketing is likely substantially larger in the business sector than in academia. First, the data inconsistency issue for customer spending can be addressed in future research by combining the survey with point of sale data collection to solidify the connection between survey data and spending behavior. Second, the study can be replicated on a much larger scale to improve its reliability. Multi-location hotel chains provide the perfect opportunity to experiment while reducing the potential for covariates to confound results. Ambient colors, either alone or in combination with other sensory marketing factors such as smell, can be conducted simultaneously at different hotel properties. Finally, day part segments can be tested to examine
the potential for using different ambient colors at different times of the day to enhance the customer experience. As with any mass-marketing variable, the number of permutations and combinations amenable to testing is enormous.

**Conclusion**

In an increasingly competitive hotel market, the need to maximize revenue per square foot has created the need for research into sensory marketing. This study adds to the relatively sparse academic research on the manipulation of ambient lighting to affect customer outcomes. The 91% difference in self-reported customer spending between the best and worst performing ambient light color is substantial in light of the challenges hotels face in generating incremental revenue from existing properties.
References


Appendix A: Customer Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How relaxed do you feel right now?</td>
<td>Not at all</td>
</tr>
<tr>
<td>2. How excited do you feel right now?</td>
<td>Very</td>
</tr>
<tr>
<td>3. How satisfied are you with the service level in the bar?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>4. How energetic do you feel right now?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>5. How stimulated do you feel right now?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>6. How bored do you feel right now?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>7. How intoxicated do you feel right now?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>8. How would you rate your current mood?</td>
<td>Low</td>
</tr>
<tr>
<td>9. How would you rate your current mental alertness level?</td>
<td>High</td>
</tr>
<tr>
<td>10. How would you rate your current stress level?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>11. How would you rate your inhibition level?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>12. How would you rate the ambience in the hotel bar?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>13. How would you rate the overall atmospherics in the hotel bar?</td>
<td>Very Unpleasant</td>
</tr>
<tr>
<td>14. How would you rate the temperature in the hotel bar?</td>
<td>Pleasant</td>
</tr>
<tr>
<td>15. Approximate how much did you spend on drinks at the bar tonight?</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>16. What is your gender?</td>
<td></td>
</tr>
<tr>
<td>17. What is your age?</td>
<td></td>
</tr>
<tr>
<td>18. How difficult/easy was it to answer the questions in this survey?</td>
<td>Difficult</td>
</tr>
<tr>
<td></td>
<td>Easy</td>
</tr>
</tbody>
</table>

1 2 3 4 5 6 7
Appendix B: Ambient Light in Lobby Bar