



## Research paper

## Effects of spatial colors on guests' perceptions of a hotel room

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## ABSTRACT

Color is one of the key visual dimensions of the environment that has an impact on behavior and emotions. The emotional effect of color is particularly important in the hospitality industry because emotions comprise a powerful affective component of customer satisfaction. However, to date, no empirical research on the role of color in shaping hotel guests' perceptions has been conducted. The purpose of the current study was to understand the relationship between color attributes and the perception of a hotel room. The differences between two contrast hues (blue and red) with two levels for saturation and brightness were examined in an experimental study. The study adopts virtual reality techniques to provide a deep emersion of the participants in the manipulated hotel room's design settings. The results indicated red hotel rooms were associated with the highest arousal levels among participants. However, participants enjoyed staying in blue hotel rooms more than in the red ones.

## 1. Introduction

Color is one of the key visual dimensions of the environment (Kotler, 1973). The importance of the environment and its visual components in shaping customers' perception of space has been researched in various settings such as stores, malls, restaurants, offices and hospitals (Chebat and Morrin, 2007; Dijkstra et al., 2008; Kuller et al., 2008; Kwallek et al., 1996; Yildirim et al., 2007).

According to the color-in-context theory, the psychological influence of color on emotions and behavior is non-conscious and is both biological and culturally learned (Elliot and Maier, 2007). The psychological effect of color depends on the three major components of color: hue, lightness, and chroma (Elliot and Maier, 2007). Valdez and Mehrabian (1994) found a strong relation between combinations of hue, saturation, lightness, arousal, pleasure, and dominance. Donovan and Rossiter (1982) showed colors affected customers' emotional state of pleasure, thus influencing customers' time spent in stores as well as retail sales (Bellizzi and Hite, 1992). Additionally, colors were found to influence task performance (Yildirim et al., 2007). The choice of color also influences visual search performance and can help distinguish targets from distractors, which can be important in multiple settings, i.e. retail, hospitality, etc. (Fortier-Gaithier et al., 2013). For example, according to Kuniecki et al. (2015) red color may guide attention, specifically in emotionally-valenced circumstances.

So far, little empirical research on the influence of color on hotel

guests' perceptions has been done (Countryman and Jang, 2006). Nevertheless, color has been shown to have the most significant impact on the perception of ambience in a hotel lobby (Countryman and Jang, 2006; Jani and Han, 2014). Furthermore, hotel ambience and interior color in particular had impact on customer satisfaction in restaurants, hotel bars, satisfaction with hotel stays, and future loyalty (Jani and Han, 2014; Ryu and Jang, 2007; Lin, 2009). However, in spite of the evidence that color impacts ambience and satisfaction, Ryu and Jang (2007) state that it is yet to be determined how specific colors impact various hospitality environments. It should be noted that previous color-related research in hospitality was limited to the analysis of color hue and did not control for other color attributes such as brightness and saturation, which have been previously shown to have significant effect on emotions (Countryman and Jang, 2006; Lin, 2009; Valdez and Mehrabian, 1994).

The purpose of the current study was to address the gap left by previous research and to examine the relationship among the three attributes of spatial colors (saturation, lightness (brightness), and hue (chroma)), and guests' emotional responses to and perceptions of a hotel room. The major research question was: which combination of color attributes will produce the most favorable emotional response and perceptions of a hotel room?

The significance of this study is two-fold. First, from a theoretical perspective, the study provides new insights on the impact of hue, brightness and saturation on emotional response and perceptions of a

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hotel room. Second, from a practical perspective, an understanding of the effects of color attributes will help hotel managers and designers to enhance hotel guests' experiences, emotional response, and satisfaction.

### 1.1. Color and its attributes

Color is a critical component of the visual dimension of a spatial environment (Kotler, 1973). However, color-related research was only recently systematized within one unifying color-in-context theory, thus providing a broad model to explain color perception and its influence on behavior and the physical state of a person (Elliot and Maier, 2007). The theory is based on the premise that each color is associated with some meaning and that people obtain color associations in two major ways: by learning or as a part of the biological "heritage" (Elliot and Maier, 2012). According to the color-context theory, the response to color is always non-conscious and a person cannot control the emotional and physiological responses to color. At the same time, several authors recognize the emotional state and previous experiences a person had prior to being exposed to a color has an impact on how the person perceives the color, thus pointing to the existence of reciprocal relations between color perceptions, behavior, and cognition (Elliot and Maier, 2012; Kaya and Epps, 2004).

The theory also places an important role on the context in which the color is being observed (Elliot and Maier, 2007). A new environment can change the effect of color and prompt a different association with it. To illustrate, Meier et al. (2012) showed the color red had a different effect on subjects' behaviors in romantic settings in comparison to the "achievement-related context". At the same time Buechner and Maier (2016) showed that the context is not the only factor with regard to the effects of color. Their study combined the color-in-context theory with the arousal theory and the findings showed that red color was arousing regardless of neutral or negative stimuli, however with regard to valence, the color intensified the negativity of aversive stimuli. Kuniecki et al. (2015) similarly report that red tends to guide attention, specifically in emotionally-valenced circumstances, showing that an emotional context can alter color's impact both on attention and motor behavior.

The most challenging aspects in the research related to color are methodological differences in defining the color included in the experiment (Elliot and Maier, 2007). The two most popular color models are the RGB (Red Green Blue) and the LHS (Lightness Hue Saturation) models (Levkowitz and Herman, 1993). According to the RGB model, all colors can be derived by combining the three basic hues: blue, green, and red. While the RGB model is more technical and is commonly used in computer graphics, the LHS model is more intuitive for humans. The LHS model looks at color in terms of its lightness (brightness), hue, and saturation. Hue refers to the wavelength of color and is what people usually refer to as color. Saturation, also known as chroma, refers to the intensity of the hue in terms of how different it is from gray and can be defined as "the ratio of the projected color vector to the length of the longest color vector in the same direction" (Levkowitz and Herman, 1993, p. 274). Lightness is similar to brightness and refers to the "white-to-black quality of a color" (Elliot and Maier, 2007, p. 66). Lightness is also sometimes referred to as a value that is defined as the relative darkness or lightness of a hue.

### 1.2. Physiological and psychological effects of color

Colors have been found to have a significant effect on heart rate, pulse, blood pressure, and brain wave activity (Shimagami and Hihara, 1991, 1992; Ueda et al., 2004; Yoto et al., 2007). According to the classical view proposed by Goldstein (1942), warm (long-wave) colors lead to increased activity while cool (short-wave) colors lead to the opposite effect. However, several modern studies indicated opposite results (Shimagami and Hihara, 1992; Yoto et al., 2007). Additionally, colors have been found to affect other bodily functions, such as hunger

and appetite. Caan (2007) reported subjects tended to consume more food in red rooms and felt more hungry in a yellow environment. Furthermore, exposure to high temperature color (warm colors) prior to sleep has been found to result in increased autonomic nerve activity in the sympathetic nervous system at night and may indirectly influence quality of sleep (Tsutsumi et al., 2002), and Johnson (2013) identified increased activation of the sympathetic nervous system and the variability of heart rate as the major reasons for poor sleep.

A number of independent experiments have shown certain colors were consistently associated with particular mood-tones (Chebat and Morrin, 2007; Countryman and Jang, 2006; Dijkstra et al., 2008; Kuller et al., 2008; Yildirim et al., 2007). More importantly, these studies indicated mood could be manipulated by color and that might be effectively used in the hospitality field. For example, green was proven to have soothing and stress-reducing properties (Dijkstra et al., 2008). On the other hand, exposure to red wall colors in offices caused increased feelings of dysphoria among workers (Yildirim et al., 2007). Camgöz et al. (2002,2004) noted colors with highest levels of saturation and brightness such as yellow, yellow-green, cyan, red, and magenta produced the highest attention levels in students.

While many researchers examined intuitional color-emotion associations of responders, Valdez and Mehrabian (1994) attempted to create a comprehensive system of measures to assess color-emotion relations. In particular, the authors explored the effect of color hue, its saturation, and brightness on emotional response using the Pleasure-Arousal-Dominance model.

Pleasure can be defined as the "positive versus negative evaluation of affective states" (Mehrabian, 1996, p. 262). Valdez and Mehrabian (1994) concluded colors with higher levels of brightness and saturation lead to higher pleasure levels in subjects, with brightness having a greater effect on the feeling of pleasure than saturation. Beach et al. (1988) similarly stated that colors with high levels of lightness and low levels of saturation were considered most pleasant.

Arousal refers to the "level of mental alertness and physical activity" (Mehrabian, 1996, p. 262). High saturation levels and low brightness levels of a color were associated with higher arousal levels (Valdez and Mehrabian, 1994). Blue was found to have a calming effect while red was associated with an arousing effect (Stone, 2003).

Dominance is defined as "a feeling of control and influence over one's surroundings and others versus feeling controlled or influenced by situations and others" (Mehrabian, 1996, p. 263). Colors with low levels of brightness and high levels of saturation were found to affect the feeling of dominance (Valdez and Mehrabian, 1994). In particular, red color is strongly associated with dominance. For example, Feltman and Elliot (2011) report that red influenced perceptions of relative dominance in an imagined sport context. Moreover, red seemed to produce an automatic influence with minimal participants' awareness of its effects, which points in conscious and unconscious impact (Elliot and Maier, 2007).

Pleasure and arousal have been consistently associated with satisfaction, which is a critical outcome for any hospitality product (Oliver, 1997). In turn, by providing a sense of control, dominance is associated with safety and security, which are highly thought after attributes of hospitality products (Slevitch & Sharma, 2007).

Based on the above discussion, it can be assumed that colors with higher levels of saturation and brightness will result in higher levels of pleasure, arousal, and dominance in subjects experiencing hotel room settings. Consequently, the following hypotheses can be derived:

**H1a.** A hotel room with high levels of color saturation will result in higher levels of pleasure when compared to other color treatments.

**H1b.** A hotel room with high levels of color brightness will result in higher levels of pleasure when compared to other color treatments.

**H1c.** A hotel room with high levels of color saturation will result in higher levels of arousal when compared to other color treatments.

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