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Individual differences in reactions towards color in simulated healthcare environments: The role of stimulus screening ability

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Abstract

The notion that the physical healthcare environment can affect our mood and behavior is well established. Despite this, individual differences in sensitivity to environmental stimuli have not received much attention. With the current research showing the importance of individual differences in sensitivity towards color, these may explain the contradictory effects found in color research. Two experiments focused on differences in environmental sensitivity, measured with stimulus screening ability. In both experiments, participants were presented with a scenario describing hospitalization with appendicitis and were exposed to a photo of a hospital room. The experiments tested the effects of environmental coloring of the hospital room (green and orange, both contrasted with white as a control condition), and the moderating role of stimulus screening ability (high-screeners vs. low-screeners) on stress (study 1) and arousal (study 2), and cognitive appraisals of the room (study 2). Stress-reducing effects of green and arousal-inducing effects of orange were both more pronounced for people scoring low on stimulus screening ability than for those who are able to effectively screen out complexity in the environment (high-screeners).

Keywords: Color; Stimulus screening ability; Healing environment; Environmental psychology; Stress

1. Introduction

Research in environmental psychology has demonstrated that different environmental stimuli can affect both mood (Knez, 2001; Leather, Beale, Santos, Watts, & Lee, 2003) and behavior (Gifford, 1988; Mattila & Wirtz, 2001). According to this research, in a variety of settings, the physical environment appears to be an important determinant in how people feel and act.

The effects of the physical environment may be of particular importance in healthcare settings, where people experience a relatively high degree of uncertainty, fear and stress. Possible effects of the physical healthcare environment on the healing process of patients have received some attention (Schweitzer, Gilpin, & Frampton, 2004; Sloan Devlin & Arneill, 2003; Ulrich, 1995). Environments showing such effects are also referred to as "healing environments". This idea suggests that the physical healthcare environment "can make a difference in how quickly the patient recovers from or adapts to specific acute and chronic conditions" (Stichler, 2001, p. 2). Research supports this idea of healing environments, where the physical healthcare environment affects the health and well-being of patients (see for reviews Dijkstra, Pieterse, & Pruyn, 2006: Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004). These reviews showed that environmental stimuli such as sunlight and scents appeared to have beneficial effects on, for example, perceived stress (Walch et al., 2005) and feelings of anxiety (Lehrner, Eckersberger, Walla, Pötsch, & Deecke, 2000). Although wall color is an environmental stimulus that can easily be changed and might fairly easily alter the atmosphere of an environment, the reviews also showed that the empirical evidence regarding the effects of environmental coloring (i.e., the use of color in an environment) in healthcare settings is still weak.

In the current studies, the effects of environmental coloring in a healthcare setting will therefore be studied.

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Although much fundamental research has been conducted on the effects of color on emotions, applied research on color as an environmental factor is limited, especially in healthcare settings. Previous research suggests a link between colors and emotions, with warm colors associated with aroused feelings and cool colors with calming ones (Kaya & Epps, 2004; Valdez & Mehrabian, 1994; Wexner, 1954). However, these results are not always consistent and sometimes they are even contradictory. A review report on color in healthcare settings concluded that the evidence regarding color effects is "conflicting, anecdotal, and loosely tested" (Tofle, Schwartz, Yoon, & Max-Royale, 2004, p.4). Tofle et al. (2004) also concluded that "emotional responses to colors are caused by culturally learned associations and by the physiological and psychological makeup of people" (p. 5). An explanation for these conflicting effects could be that individuals differ in how they deal with the environment, how they perceive different aspects of it, and in what ways they process this kind of information. Thus we argue that the inconsistencies in color research may partially be explained by individual differences, something that has been largely neglected in color research.

Samuelson and Lindauer (1976) already emphasized the importance of individual differences in the description and evaluation of environmental settings, when studying the effects of individual differences in sensation seeking on performance and perceptions of neat and messy rooms. Individual differences may explain why some studies do find effects of environmental coloring (Kwallek & Lewis, 1990), where other studies do not (Ainsworth, Simpson, & Cassell, 1993). One key variable that might explain why the environment has different effects on individuals is the way they process or perceive their surrounding environment. This could be referred to as the ability to screen out irrelevant stimuli within the environment (Mehrabian, 1977a). Some people have a natural tendency to effectively reduce the complexity of an environment (high-screeners), where others are not capable of this information reduction (low-screeners). Therefore, we expected that effects of environmental coloring would be moderated by people's stimulus screening ability.

In the next section, the literature investigating the relationship between colors and emotions will be reviewed and the importance of stimulus screening ability outlined. Next, two experiments will be reported that test the moderating role of stimulus screening ability on effects of environmental coloring.

1.1. Color

Color is an important variable in interior design as it is a relatively easy way to alter the atmosphere of an environment. First, a more pleasant atmosphere may have a beneficial effect on patients (i.e., a healing environment). Second, changing the wall colors in existing environments is fairly easy and inexpensive, making it an interesting variable for healthcare organizations to generate such a favorable effect. Previous research has claimed that certain colors are capable of arousing people, whereas others might give people a feeling of calmness (Stone & English, 1998). More specifically, warm colors (red and yellow hues) are believed to have more arousing properties on physiological and psychological outcomes than cool ones (blue and green hues), as opposites in the color spectrum (Jacob & Suess, 1975; Wilson, 1966).

1.1.1. Color and emotions

Testing the effects of color on anxiety state, Jacob and Suess (1975) exposed their subjects during 15 min to color slides and measured their anxiety state every 5 min. They found higher anxiety scores in the red and yellow groups than in the blue and green ones. These results may suggest more aroused feelings when people are exposed to warm as opposed to cool colors. Kaya and Epps (2004) asked participants to indicate their emotional responses to different colors and confirmed positive effects for the color green. Their results showed that green evoked mainly positive emotions such as relaxation and comfort. This effect was explained by the associations of the color green with nature and trees, creating a feeling of comfort and being emotionally soothing. Wexner (1954) also studied the associations between colors and certain moods by showing colored cards and asking participants to associate these with different moods. Participants were asked to match the colors with the mood they felt the color represented. The results showed that the color green is associated with moods such as comfortable, tender, calm and serene. Wexner (1954) further studied associations with among others the color orange. This color is associated with moods such as excitement, distress and upset. These results also suggest more relaxed feelings for a cool color and more aroused feelings for a warm color. Although this research was conducted by exposing participants to colored cards or to projections of colored slides, the effects on and associations with different moods are indicative of possible effects of such colors as an environmental stimulus in an applied setting.

1.1.2. Color and cognitive appraisals

Color may also affect the way in which people perceive and evaluate an environment. A study by Babin, Hardesty, and Suter (2003) showed that wall colors in a retail setting affect customers' evaluations of the store. Cooper, Mohide, and Gilbert (1989) studied the effects of environmental coloring in a long-term care setting. Their results showed that by changing the color scheme of the ward both staff and families perceived the new environment as less institutional and more cheerful. These studies suggest that wall color may change the way people perceive and evaluate an environment.

1.1.3. Effects of the "color" white

Most color research compares the effects of different "real" (i.e., non-white) colors, but Kwallek, Woodson,