Relation Between Preferences of Luminous Environments and Situations Experienced by Users. A Hotel Case Study.

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ABSTRACT

The impact of lighting on the comfort of a hotel room perceived by the user is a crucial issue. In general, scientific literature has shown that the perception of lighting quality depends on its parameters, the context in which lighting is perceived, and the users who are reacting to the environment. This study measures the relationship between the activity experienced in a hotel room and the user's preferences regarding a luminous environment.

A real hotel room has been altered for this project, 177 recruited customers in a hotel *** (France) expressed their preference among 4 lighting conditions in 3 different activities undertaken. This study highlights different assessments in terms of lighting, depending on the specific activity.

These results may be taken into account by architects, lighting designers, and hotel managers to redesign new hotel rooms in order to improve the users' comfort during their stay.

General Terms

Measurement, Design, Experimentation, Human Factors.

Keywords

Lighting, Illuminance, Correlated Color Temperature (CCT), User Assessment, Hotel Room

1. INTRODUCTION

The influence of lighting conditions on the individual is determined by a physiological [1-2], psychophysical [3-4], psychological, and cognitive point of view [5-6] in various contexts. Many studies have shown the influence of lighting on purchasing behavior [7-8], work performance [9] and more generally the well being of people [10]. Several situational contexts such as offices, classrooms, retail stores, etc., have already been well investigated. Even though hotel managers and architects have starting to recognize the importance of hotel design from both an architectural and an interior design perspective [11-12], very few studies investigate the relation between lighting and individual preference in hotel. This study aims at considering the influence of lighting conditions on the user assessment of a hotel room.

Psychologists and engineers are interested in describing the luminous environment by identifying relevant parameters to be considered for designing an environment in order to match the user's expectations [13-14]. Previous studies identified that the perception of the quality of light depends on the photometric parameters such as illuminance [15-16], Correlated Color Temperature (CCT) [17-18], and spatial light distribution [19], the user who experiences the light environment [20-21], the context in which lighting is perceived by the users [22-23].

Our study investigated the contribution of illuminance and CCT to the user's room assessment in the context of a hotel room. More specifically, this study aims at better understanding how the user's activities influence his/her perception of the lighting condition in a hotel room. To answer this question, we used a global and user centered approach.

2. MATERIAL & METHOD

In a room specifically equipped to implement the testing, in the Hotel Mercure Lyon Beaux Arts *** (France), the study involved 177 guests (Mean age=39.5yr; SD=12.5; 53% male). They were asked to evaluate the same four lighting conditions during three activities: watching a movie, typing a text on a computer, and looking at him/herself in a bathroom mirror [24]. These activities are respectively named situation of leisure, situation of work, and situation in the bathroom. Two parameters were considered: illuminance (30% (Dim); 100% (Bright) of luminous flux) and CCT (Warm White (WW): 2700 °K; Cool White (CW): 4200 °K). After seeing the four conditions for each situation, users had to choose the most preferred and the least preferred lighting conditions by answering a general question (e.g. *Among the four atmospheres for work time, which one do you like? Among the four atmospheres for work time, which one do you dislike?)* The raw data obtained was changed into ranking data (the higher the rank is, the better the appreciation). Statistical analyses were done on the mean rank of appreciation to identify differences among conditions according ranked for each activity. Mean ranks identified by the same letter are not significantly different (Friedman test, α <0.01).

3. RESULTS AND DISCUSSION

Statistical analysis revealed significant differences between lighting conditions preferences, according to the activity experienced.
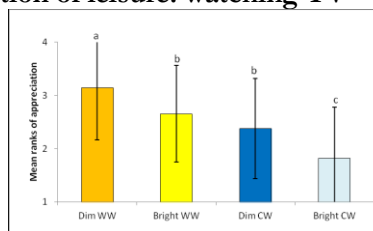
3.1 Situation of leisure: watching TV

Figure 1 Mean scores of appreciation of lighting conditions Dim WW, Bright WW, Dim CW and Bright CW for a situation of leisure.

In the situation of leisure, users prefered the warmer and dimmer condition (Dim WW) and discarded the colder and brighter condition (Bright CW).

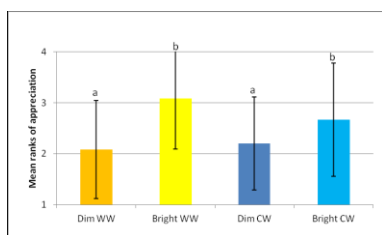## 3.2 Situation of work: using a computer

Figure 2 Mean scores of appreciation of lighting conditions Dim WW, Bright WW, Dim CW and Bright CW for a situation of work.

In the situation of work, users preferred the warmer and brighter condition (Bright WW) and discarded dimmer conditions (Dim WW and Dim CW).

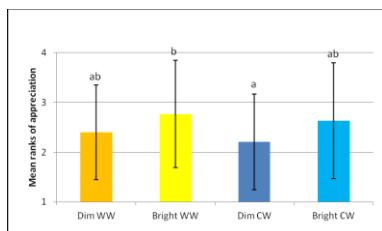## 3.3 Situation in the bathroom: looking him/herself

Figure 3 Mean scores of appreciation of lighting conditions Dim WW, Bright WW, Dim CW and Bright CW for a situation in the bathroom

In the situation in the bathroom, the warmer and brighter condition was preferred (Bright WW) and the colder and dimmer condition was discarded (Dim CW).

In conclusion, this study showed differences of preference between the same four lighting scenarios depending on the user's activity. In the situation of leisure, people preferred a subdued atmosphere. In comparison to the other situations (when the user is working or looking at him/herself in a mirror), he/she expressed a preference for the brighter lighting, that provided more visual comfort. Semantic scales were used to evaluate the lighting conditons in the same experimental device. The same pattern of responses was obtained using statiscal analyses on parametric data (data not shown).

One limitation that was found in the narrow scope of this research was that we only used one type of hotel room. It would be interesting for further works to consider research in different hotel classifications (i.e. budget, luxury) to study the impact of luminous environment on guests' expectations. Moreover, the people interviewed in this study were, for the most part, businessmen from Northern France. Past studies have highlighted the influence of geographical origin and culture on preference in terms of luminous environments (Park, et al., 2010). Our results might have been different and less consensual if the culture and place of residence of the interviewed guests were more heterogeneous.

This study is part of a larger research project that aims at to provide scientifically validated cues as guidelines for lighting design in more suitable hotel rooms in terms of users' needs and expectations. The methodology used is transposable to other contexts (food, transport, urban context...).

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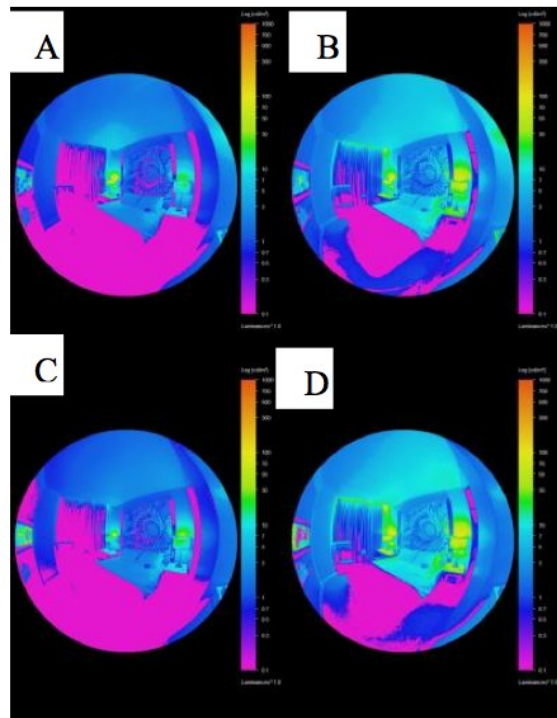
**Photometric diagnosis. Representation of the lighting conditions with the Photolux software (Dumortier, 2008) .
A. Dim WW, B. Bright WW, C. Dim CW and D. Bright CW**