

The influence of lighting in the build environment: a study to analyse human behaviour and perception as measured by mood and observation

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Abstract

My research involves understanding human movement through lighting. For ages people have been attracted by light, either by fire, candles or more recently lamp bulbs. Out of this point of view the question arose whether humans are influenceable in the way they move in the build environment, retail environments in this case, guided through lighting. Hence, the first focus of the study lies on how humans behave (move) under certain lighting conditions: way-finding as well as their walking speed are included. The second focus of this study lies more in how humans perceive that space under certain lighting conditions, on a more emotional based approach. The experiments are currently and in the next few months held in a controlled environment, which is a simulation of a supermarket. In a next stage the results will be validated in real settings. Together with the theoretical background, already developed, the results of these experiments will give a clear view on the how humans move through space and how they perceive space, by the manipulation of lighting.

Introduction

The goal of this research is the development of guidelines for designing lighting in the build environment. Two statements lie on the bases of this topic. Firstly, lighting can be designed to guide people's movement through space. Secondly, lighting can be designed in such a way it has a positive influence on the appreciation of a space, via the perception of that space. To back these statements up, a theoretical framework has been developed. This framework is based on research in commercial spaces and workspaces since lighting has a huge impact on humans in both cases. The choice to undertake this research in commercial spaces is bilateral: a thorough research indicated that commercial spaces are ideal environments to experiment in with lighting, humans, their behaviour and emotions; furthermore, since most research has been done in office settings and there is a gap in research for retail settings, it is only logic to develop hypotheses -for retail settings- based on what is already been studied -in office settings.

Regarding retail environments, the following has been studied. Research showed that shop environments create a 'retail experience' that strongly influences consumers' purchase behaviour [1-2]. Moreover, keeping shoppers longer in stores is likely to result in increased browsing behaviour, which in turn is likely to cause increased impulse purchasing [3]. And even two third of purchase decisions are made in store [4]. Consequently, shop interiors are extremely important and through their interior variables have an individual effect on the consumer. Kotler [5] therefore, coined the term '*atmospheries*' to describe "*the effort to design buying environments to produce specific emotional effects in the buyer that enhance his (her) purchase probability*". Many design elements in combination or separately exert this influence on behaviour in general. In this paper we want to limit our research to the factors 'light', the perception of space and movement through that space. How is light influencing behaviour (movement and perception), and what kind of behaviour precisely are we

talking about? Bitner [6] analysed how consumers respond to a retail environment and noted that consumers can react to a retail store in a cognitive, emotional and biological way. Our research aims at two of these aspects: on one hand, the emotional factor, this is the effect of lighting conditions through our perceptual system. The physiological factor, on the other hand, is also included as lighting also has a purely biological influence on people. Discussed here are the short term biological effects of lighting on people – the way people behave under certain light conditions, which route they take and with which speed- not the long term biological effects - which imply the shift of the body's circadian rhythms. Both the emotional and physiological factors are hard to separate and they will influence one another.

There are three parts in this study and presently the second part is being undertaken. The first part included a survey of the literature, replenished with in depth interviews with selected experts. As a result of this part, certain hypotheses were developed (point 3). The second part is the experiment in a controlled environment –supermarket- and subsequently, the third part will be the development of guidelines for lighting design in (commercial) spaces, based on the results of experiments in real settings. The linkage between research and design will be taken to the highest possible level in this last phase. The experiments in the lab environment are firm intern valid, so the results of the real retail environment will make it also external valid. Therefore both experiments enhance each other and they will provide results that form a translation of how research can be implemented and translated in the design process. As a designer, extended with research skills (due to the PhD I'm currently undertaking), I put myself in the position to take count of both the users' point of view (customers journey) and designers' point of view. This results in a balance between the rational (designer) and emotional (user) values of the design process.

Short overview of the theoretical framework

When reviewing the literature regarding the influence of lighting within retail environments, several aspects have been studied. A first aspect is concentrated on consumer behaviour on a very basic level: Taylor and Socov's research [7] showed that light influences the route consumers take through the store. This study indicates that people are drawn to light and that they, therefore, will choose the more illuminated path when passing an obstacle.

A second aspect handles on a more product-based level, which in turn also influences peoples' behaviour. In this context LaGuisa and Perney [8] stated that light could draw attention to products. Areni and Kim [9] added to this knowledge by doing experiments with wine bottles in a store. Under 'bright lighting' conditions bottles were more often examined and touched than under 'dim lighting' conditions. Magnum [10] took this one step further and showed that lighting influences the attractiveness of products in a store. Along the same line, Summers and Hebert [11] showed that more belts were touched and picked up with the addition of display lighting.

Subsequently, they constituted consumers spent significantly more time at the display with the additional accent lighting.

A third aspect regarding light in retail environments comes from an environmental psychology based emotional model. Mehrabian and Russell [12] developed this model to study environmental stimuli within retail environments and their influence on the consumer. They proved that emotions, evoked by shop environments, are related to consumer behaviour, and one step further, to buying behaviour [13-14]. But each of them only make assumptions about the lighting specifically, and remain very vague about its possible influence on consumer behaviour. What we do know is that lighting has an influence on the perceived price level of a store (Luomala, 2003) [15]. What most of us already assumed is scientifically proven: bright lighting conditions, in combination with orange coloured walls induce the feeling of low price perceptions. Soft lighting conditions on the contrary appear to increase the height of the price perception.

The biological influence in retail environments has not received any attention yet. However, the biological influence of lighting in working environments received a great deal of attention. So far, a precise analysis of what exactly light does to the human body remains incomplete. What is pronounced is that the influence of lighting is not unambiguous. Studies in psychology have found that individual personality traits can influence reactions to environments [16]. Furthermore, Knez and Kers [17] found that age and gender interacted with the illuminance and the colour temperature of the lighting, causing different kinds of mood shifts, in working environments. Kuller [18] showed differences in reactions to lighting, based on cultural backgrounds. Also, the spectrum of the lighting plays an important role as well. Studies about this give controversial results [19-23]. These aspects are taken into account in the development of this study.

Hypothesis development

The hypotheses developed are based on the theoretical framework and they are currently tested in a controlled lab environment.

Hypotheses in general spaces are:

Lighting has an influence on the mood and hence the behaviour of humans in (retail) environments.

Lighting has an influence on how spaces are perceived; even in a matter it can arouse positive or negative feelings in the perception of that space.

Lighting has an influence on way-finding as well as ones walking speed in a (retail) environment.

Hypotheses specifically retail orientated are:

Positive effect, induced by lighting in retail environments, will encourage humans to stay longer in that retail environment.

Positive affect, induced by lighting in a retail environment, will increase the sales numbers of that retail environment.

Note here that the persistency of lighting and its effects might be relative to all the other factors that can change behaviour, perception and movement. Lighting is considered as just one of the many interacting factors that determine the outcome. This is taken into account.

To situate this particular research, regarding the influence of lighting on mood and behaviour, it is necessary to mention that it is a part of a bigger research project –that will start in October- that accents more the analysis of lighting in the build

environment through cognitive mapping. The environmental psychology based analyses will be translated in appreciation models and colour perception indexes. Colour rendering, colour discrimination and colour harmony under certain lighting conditions are several topics that will be looked into.

Finally, without lighting, there is no space, there is no build environment and even humans are kept in the dark. Let this be a statement to show the importance and the influence of light and lighting design on human behaviour and perception.

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