

# Attention Equivalent: A Study on the Effectiveness of Individual Lighting Parameters on the Perception and Preference of Customers in a Shop

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## Problem

For many years we assumed that an increase in the brightness of a shop window or a shop goes along with an increase in the attention of passers-by. A direct relationship between light intensity and attractiveness could be detected. /1/,/2/ But this requirement is nowadays highly inconsistent with the energy efficiency requirements. New ways must be found now that also mean an impact on the attention of potential customers.

The aim of the presented study is to find an attention equivalent to the brightness in the retail lighting and to analyse which factors in retail lighting are critical that customers stay there longer, more customers come into the shop and finally decide it for a purchase of goods.

## State of science

Many studies concerning perception psychology justify the arrangement of goods and analyse general viewing behaviour during a purchase process. /2/,/3/,/4/,/5/

Another aspect which can be found in the literature is the emotional effect of the retail environment, where also light plays an important role./6/ Quartier saith that often it is a unique environment which becomes necessary for customer binding and lighting has an emotional and psychological effect through the perceptual system. /7/

Only a very few studies show the effect of individual lighting parameters on the purchase behaviour and length of stay of customers. One study from Freyssonier should be mentioned./8/ He analysed the potential for energy savings in retail display

windows by using coloured light in the background and reducing the power used for accent light. The result of that study allow the consequence that there is a possibility next to increasing only the illuminance level to find an equivalent of attention using other lighting parameters, such as a coloured background lighting.

The study explained below leads to new findings in the area of retail application research.

## Research hypotheses

The study is intended to demonstrate that not only the brightness of a shop window or a shop is decisive for its level of attraction. Less is sometimes more. As such, precisely implemented accent lighting can create focal perception points and attract the attention of observers. In addition to attractiveness, however, two further important factors for turnover and customers' length of stay in a shop are well-being and simple orientation. Both can be achieved by horizontal lighting in addition to vertical accent lighting.

- What influence does the lighting have to achieve this effect?
- Which factors and combinations of factors create the effect?
- Is there a difference between preference and attention with the various factors?
- Are there different preferences for different target groups (type of customers / lifestyle)?
- Is the preference / attention different for different objects / materials / interior design?

- Is there a difference for preferences with different perspectives or zones in a shop (distances)?

## Research methods

Due to the very broad field of investigation questions the research follows an explorative approach. Target of this explorative approach is to find out first aspects, which show an effect and which are worth to investigate more in detail.

Therefore the research project was split into several sub-sections and various methods were applied.

First an online questionnaire was drawn up to initially gain the preferences or subjective judgement of customers (see Fig.1). The benefit of this questionnaire was that a large number of test subjects could be reached internationally and flexibly. The results could be simply exported. The online questionnaire is based on the subjective comparison of various lighting solutions, and these solutions could be interactively optimised or evaluated. Visualisations were used for evaluating the various light situations. The visualizations are done for the three main decision zones within a retail space. First, for the retail display window, where the customer decides to enter a shop or not. Secondly, the spatial perspective, which you have just after entering a shop and where the orientation plays the most important role. Thirdly the shelf perspective, where the actual purchasing decision is made.

Simple lighting parameters such as brightness, colour temperature and light distribution were varied or visualised within the lighting solutions. With that variety first ideas of which type of light is preferred and gets the highest attention could be analysed. The following types of questions or scales were used:

- Selection question (e.g. “Which of the three lighting solutions do you like the most?”)
- Rating scale (e.g. “How satisfied are you with the lighting solution?”)
- Setting (e.g. by selecting optimum light distribution via manual adaptation)

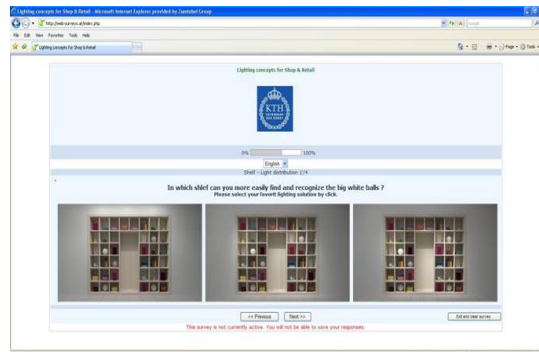


Fig. 1: Questionnaire to compare different lighting scenarios

In order to eliminate as many influence parameters as possible, the analyses were carried out using relatively abstract objects. This means the brand effect is disregarded to the greatest possible extent. The objects, the materials and the saturation of colours were varied as well, to find out the relation between lighting parameters and object properties. Shiny, transparent or matt surfaces allow evaluation with a focus on the lighting effect.

97 people from all over the world took part in the survey. Around half of the test subjects were female, the other half of the participants were male.

After the online survey, perception via an eye-tracking process was evaluated. Here the project was once again split into two sub-sections: laboratory analysis and field trial./9/

The lighting factors that were to be investigated included light colour, light distribution, lighting intensity and dynamic changes in brightness or colour. Laboratory tests using test charts produced generally valid statements regarding visual effects such as contrast and colour perception. Test charts were created that reflected the fundamental principles of perception. The test charts were created as graphics and flash animations and embedded in an overall PowerPoint presentation. The test stimuli were always shown on a black background. Only the “first glance” of the specific test subject was considered for all test charts with static contents. For evaluation of this first glance, the coordinates on the slide were determined where the test subject first looked immediately after a new slide appeared.



Fig. 2: Eye-tracking (Douglas store)

With the dynamic modifications, it was determined which change was recognised first and how much time this recognition took from the beginning of the slide.

In the second phase, measurements in realised projects were implemented in order to transfer the findings gained from the laboratory study into practice.

The measurements carried out in the Douglas and SPAR shops primarily referred to a localisation of the “points of attraction” (see Fig. 2).

The test subjects were given a short introduction of the intended test and were informed about how to behave during the test. Then the eye-tracking system was set up for the specific person. The test was started after calibration of the system. The test subjects were given the task of choosing a pair of glasses for themselves, if possible with frame arms of wood. The task was intended to increase the subjects’ attention while viewing. The test subjects were not given any other instructions, and the duration was also not limited.

Evaluation was carried out graphically. The “gaze positions” of the test subjects were transferred point-for-point into a graph of the room observed. The single points in the sequence of their observation were connected with lines so that the sequence of the observation could be recognised in the evaluation.

## Results

Previous findings claiming that maximum possible brightness in a shop increases attractiveness could be refuted.

Instead, the study demonstrated that the most difficult visual task, i.e. the largest contrast concerning the visual task, influences its detection and attention. Perception of

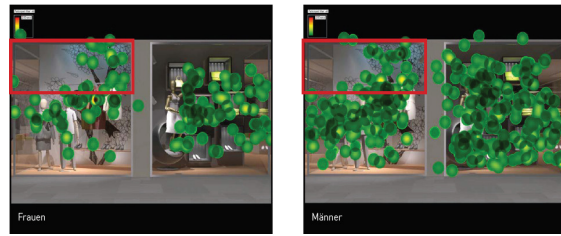


Fig. 3: Heatmap of Shop window evaluation /10/

contrast depends here on the ambient brightness. The brighter the surroundings, the more marked the contrast must be. Even small differences in luminance levels are effective in dark environments.

It was also shown that vertical illuminance levels support orientation in the space and that simple orientation supports the decision to enter a shop. Here considerable differences in the evaluation of men and women became apparent. While men view a retail space more extensively in its entirety, women look at a retail space more intensely and in greater detail (see Fig 3).

Supplementary horizontal illuminance increases the preference and well-being of the user. The light distribution depends on the lighting’s character. Goods have a more attractive and exclusive effect when light is focused on them more precisely and in more detail. Stimulation via accent lighting, but also by backlighting the lower third of a shelf, leads to higher perception of this area, resulting in an extension of the amount of time customers stay there and in higher turnover.

The results specified here are only excerpts from the complete documentation.

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