



# New Method for Testing Perceived Brightness

K. Samu PhD, Gy. Ábrahám PhD, B. V. Nagy PhD, Zs. Ludas  
Budapest University of Technology and Economics

## Abstract

To achieve the several subjective and objective parameters of the fluorescent tubes measurements are necessary. By instrumental measurements we can define the luminous efficiency, color reproduction, color temperature and other (photometric and radiometric) features. There is much greater diversity in the area of the subjective measurements, because these tests try to measure the lighting from the aspects of the human perception. In the course of our research we developed new subjective investigating method.



Fig.1. & 2. - Light booth for perceived brightness testing

## Introduction

About methods for perceived brightness testing the scientific literature shows quite a controversial picture. In general when light sources are compared the so called light booths are involved with specific tests placed inside them. However these comparisons can only rely on either dual view experiments with equal viewing angles for both illuminants or visual memory effects.

In our test we have designed and a self-built novel light booth (Fig. 1. & 2.) where a reference source is used to have a value when comparing the different illuminations. Several white and colored patches were shown for the subjects to compare under the examined and the reference illuminants.

## Methods

Perceived brightness is still a novel perception parameter in modern visual tests. No classical method has been developed for such however several research groups develop their own. In our research we have applied the so called reference method where a custom built light booth was constructed to compare similar surfaces under the test and a reference light source. Zaidi and Robilotto (2004, 2006) were used as references in the scientific literature who also used light booths to compare several samples.

## References

- B. V. Nagy, L. Balázs, K. Tóth, Gy. Ábrahám (2010) *The effect of fluorescent emission spectrum on lighting quality, Proceedings of CIE 2010*
- K. Tóth, L. Balázs, Gy. Ábrahám, K. Wenzel, B. V. Nagy (2010) *How to improve visual clarity?, Light and Lighting CIE Conference 2010*
- Zaidi, Q., Robilotto, R. (2004) *Limits of lightness identification for real objects under natural viewing conditions, Journal of Vision*
- Zaidi, Q., Robilotto, R. (2006) *Lightness identification of patterned three-dimensional, real objects, Journal of Vision*

Light booths used in other researches are usually closed thus do not give the opportunity to give judgment on ambient lighting condition. In our research we built a booth half open for the ambient lighting and half closed for the reference lighting. The reference light was a incandescent 20W bulb with adjustable intensity.

Similar patterns were placed in both the open and closed part of the booth and the reference light intensity was adjusted by the subject to set equal brightness.

Each pattern was glued on a grey background providing the same background in the whole test. Altogether nine patterns were used with different shades of white, colors and surface textures. The location of the booth were set in each illuminated area so that the illumination on the pattern in the open booth half was the same. The reference light sources voltage and photometric parameters were checked and kept constant. The luminance values were measure with a Konica Minolta CS-1000 spectroradiometer for all patterns.

## Conclusions

Different light sources with similar efficiency were measured by our test. During the measurements we tested Reveal light sources, developed by GE, which ones specially designed for increasing the effect of perceived brightness. Our goal was to develop a method and an instrument which give us the opportunity to compare the effective sense of brightness of these sources with the sense of usual (Polylux) ones.

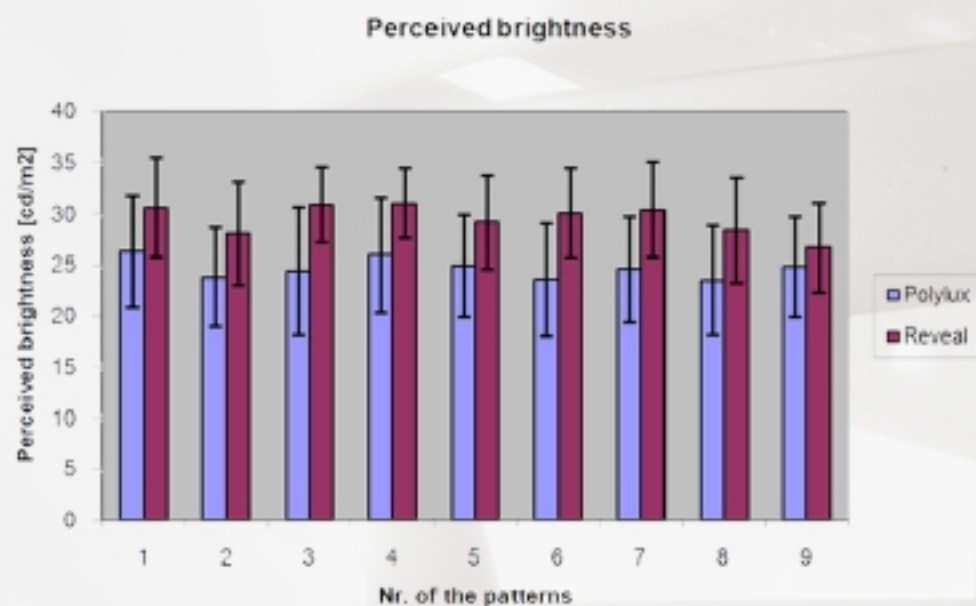


Fig. 3. - Perceived brightness

By the conclusion of our measures, we pronounce that the Reveal sources were proven induced the expected effect (Fig.3.). So we can tell, that our method is appropriate for the objective and processable description of a subjective sense

