

New light on indoor environments: Development of sensory methods for lighting

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The project aims at applying sensory methods to lighting to complement physical measurements. The results will promote more desirable lit environments and increased knowhow with regards to user perception and comfort. The long-term goal is to reinforce both development and use of attractive and energy efficient lighting.

Background

Sensory assessment of lighting is new. As a multi-sensory laboratory was inaugurated at SP Technical Research Institute of Sweden in 2014, the possibilities to apply methods for analytical assessment to lighting were explored in a pilot study.

Methodology and pilot tests

- » Method development based on Quantitative Descriptive Analysis (QDA).
- » First draft of selection criteria was defined

First draft for selection criteria

- » Full vision on each of the eyes (after possible correction by glasses or lenses)
- » No diagnosed eye diseases (e.g. not over-sensitive to light)
- » Full colour vision
- » Two fully functioning eyes



- » Pilot tests with seven trained panel members
- » Two test booths, equipped with four different downlight fixtures

Test booths



- » Assessment in two replicates
- » Full assessment procedure, while some steps were simplified.

Lighting parameters assessed during pilot test

Parameter	Definition
Glare	Level of glare viewing the x marked in the ceiling
Yellowness of light source	Level of yellowness when viewing the x marked in the ceiling
Heat	Level of heat on the back of the hand having held the hand 5 seconds 1 cm from the light source
Non-uniformity	Level of non-uniformity on the whole back wall. To a small extent = even, to a large extent = uneven
Sharpness of shadow	Sharpness of shadow of mirror on the edge closest to the back wall
Blueness	Brightness of blue colour on Fanta can. To a small extent = light blue, to a large extent = dark blue
Orangeness	Brightness of orange colour on Fanta can. To a small extent = light orange, to a large extent = dark orange

Lessons learnt from pilot tests

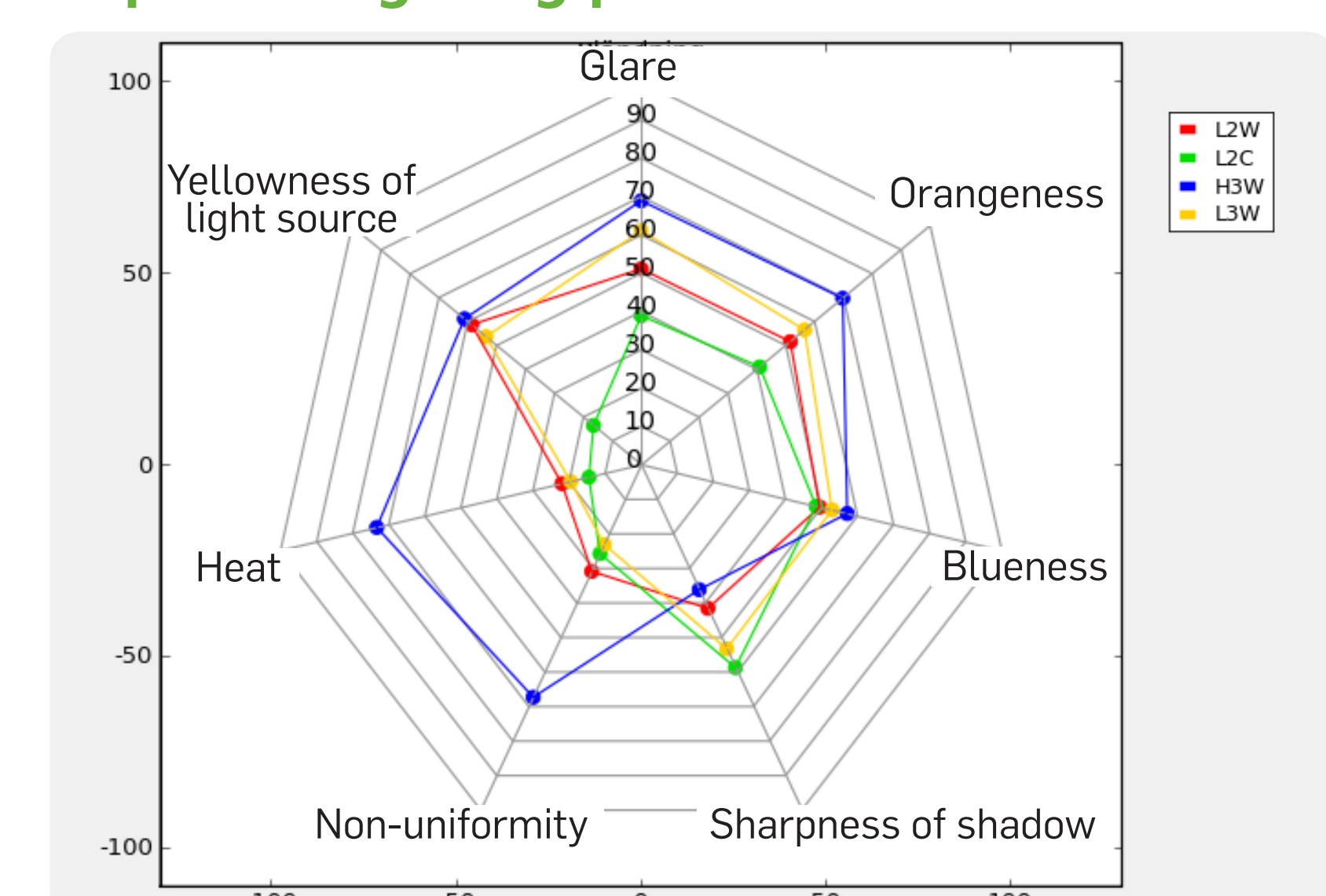
The methodology will be further refined, in particular regarding:

- » Definitions of parameters: what to measure and how
- » Light adaptation of the eye; time-limit for assessment need to be specified
- » Objects for viewing; e.g. emotionally neutral objects and dull colours

Preliminary results

- » Sensory assessment of lighting show great potential
- » Colour is important but challenging: both blueness and yellowness were perceived similarly between samples, while their physical light spectra differ considerably

Spider plot of lighting parameter



Outlook

- » A full assessment procedure will be performed during autumn 2015
- » The project continues until 2016 and will be followed by consumer preference tests.

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