Public summary of PhD-thesis of Mariska Stokkermans
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How to create the same atmosphere with light anytime anyplace

Electric light plays an important role in how an environment is experienced. From research we know that light is an important factor that determines the perceived quality and image of a store or a hotel lobby. Fortunately, it is relatively easy to create any light we want and, hence, any atmosphere we want since the introduction of LED lighting systems.

In order to attract the right customers, it is of utmost importance for chains of shops, hotels or restaurants to radiate a recognizable and consistent atmosphere in all their outlets. Think of McDonalds, which has the same appearance all over the world. However, the various locations of a particular chain usually have different environmental characteristics, such as the size of the space, the layout of the furniture, the type of luminaires and the amount of daylight entrance. As these aspects may also influence the impression of the space, simply replicating the lighting design of one location to another location will probably not yield the same atmosphere.

The current practice is that lighting designers adapt the lighting for each location according to its properties, such that the atmospheres of all locations are as similar as possible. It would however be much more efficient if a professional lighting designer creates the desired lighting for one of the locations and that the lighting design with the same atmosphere for another location is computed automatically by taking into account all relevant properties of that location.

In order to generate lighting designs with the same atmosphere, one should be able to quantify how light affects the atmosphere of a space. Literature has shown that the perceived atmosphere of a space can be quantified by asking people to evaluate the atmosphere on a set of items (such as 'relaxing' or 'formal'), which represent the four underlying dimensions of atmosphere, namely: *coziness, liveliness, tenseness* and *detachment.* These four dimensions accurately describe how the atmosphere of a space changes with light, but the relation between the physical measurements of the light in a room and how that light is perceived is not yet fully understood.

This dissertation aimed to get more insight into the effects of characteristics of light on the atmosphere of a space by studying several important relationships using high quality computer visualizations of luminous environments. We found that each of the four atmosphere dimensions can accurately be described by combining *brightness* and *perceived uniformity*, two known important perceptual characteristics of light. Another important result was that the impact of daylight on atmosphere was found to be smaller than expected, suggesting that those aspects of daylight that were controlled in the visualizations (e.g. the view outside a window or the natural fluctuations of daylight) may be important aspects shaping a space's atmosphere.

The existing measures are not accurate enough, so to know exactly how to deduce brightness and perceived uniformity from the actual physical measurements in a room more research is needed. Ultimately, this research will attribute in enabling light designers to copy a given atmosphere from one room to another once the brightness and perceived uniformity of the light is known.

Title of PhD-thesis: Atmosphere illuminated. The interplay of light characteristics, light perception and atmosphere*. Promotors: Ingrid Heynderickx, TU/e, Yvonne de Kort, TU/e, Ingrid Vogels, TU/e. Other main parties involved: Philips Lighting Research*