



ARCHITECTURAL LIGHTING DESIGN

KTH School of Architecture

The Universal Synaesthesia: Approaching Light as a Multi-Sensory Experience

Master Thesis

AF270X

Abstract:

The purpose of this thesis is to investigate the effects of lighting on senses other than sight- the relationship between light and hearing, taste, smell, and touch will all be considered.

The medical condition of synaesthesia is investigated, as it is a phenomenon in which the stimulation of one sense produces a vivid effect from another sense. This will provide a groundwork towards understanding how all senses are at least partially connected in all people.

There is already a large body of evidence to suggest that lighting does affect all the senses in a significant way, with previous research providing interesting results. However, very few of these studies have conducted their research with the intent of discussing the potential implications to lighting design. This paper aims to provoke awareness and discussion within the lighting community of the potential effects this phenomenon could have in lighting design, working with the following research questions in mind:

- How does light affect senses other than vision?
- Are the effects significant enough to be applied to architectural lighting design?
- If so, *how* can they be applied?

Analysis of previous studies indicates that light can significantly affect various senses, including loudness perception, taste and smell perception, and perception of heat and pain . However, due to the lack of research that directly focuses on these effects within the scope of the profession of lighting design, further research and testing is required before these ideas could realistically be implemented. It would likely also be a challenge to stimulate the desired effect whilst maintaining lighting conditions that are suitable to the surroundings, but this would need to be judged on a case-by-case basis.

Order of Literature Review

Topics:

Synaesthesia



Universal Synaesthesia



Synaesthetic Expression
in Art



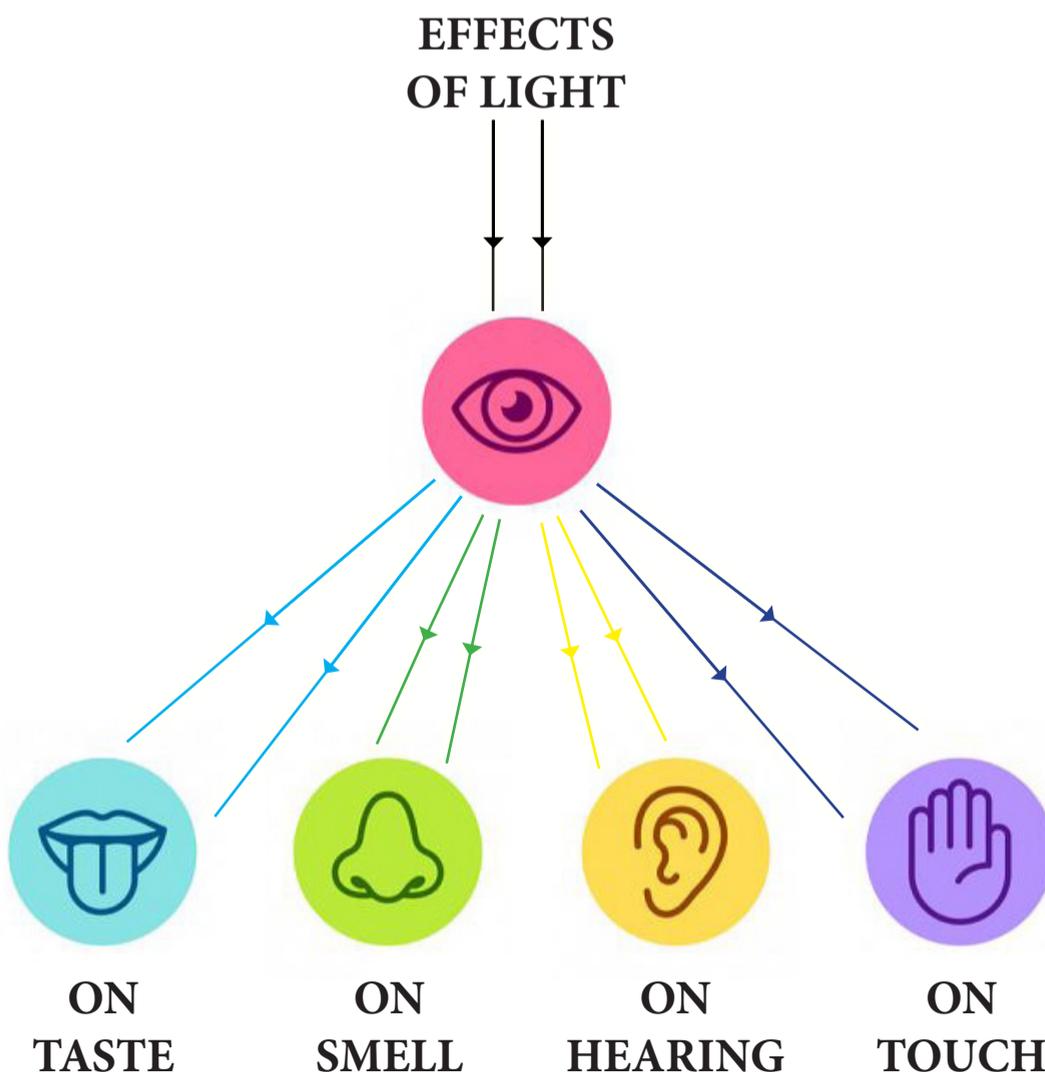
Synaesthetic Reading of
Architecture



How Can Light Create
Synaesthetic Experiences?



Application to Lighting
Design





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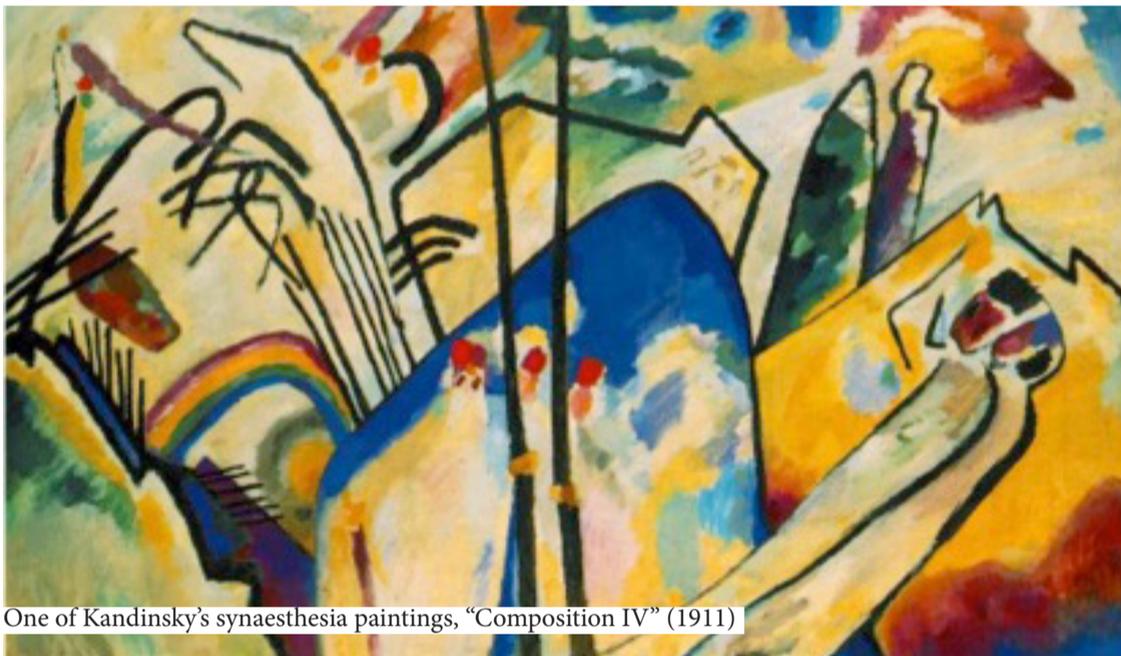
Literature Review:

It is easy to see the creative potential of synaesthesia itself. As stated in the first documented case (George Sachs)-

"I cannot express it better than to say that a coloured idea appears to (me)".

Experiments such as Karl Zietz's, where the colours of after-images became stronger and brighter when accompanied by a high-pitched sound, show evidence of a genuine cognitive connection between sensory domains for all people. This displays at least some evidence of synaesthesia-like qualities amongst the general population.

From Kandinsky and Munch, who reportedly had synaesthesia, to Oskar Fischinger and Norman McLaren who experimented with visual representation of sound on film, synaesthesia naturally lends itself to artistic expression. Similarly in architecture, structures can be described as appearing 'hard' or 'soft', 'heavy' or 'weightless', by their form but not necessarily by their materials, showing our innate capacity to use one sense to define, or at least better appreciate, another sense.



One of Kandinsky's synaesthesia paintings, "Composition IV" (1911)

The Effect of Light on the Senses:

Numerous studies have shown potential for the application of *Universal Synaesthesia* to lighting design. A number of selected studies also suggest specific applications:

Taste/Smell-

Oberfield et al (2009) concluded that white wine tastes better in red or blue ambient lighting, displaying how colour of light can alter a dining experience, which could have repercussions to lighting design in hospitality.

Hearing-

Landgrebe et al (2008) showed that green ambient lighting can decrease loudness perception. This could be of benefit in noisy urban environments.

Touch-

Studying the effects of light on the somatosensory system (sense of touch) has produced contrasting results. A number of studies have found that lower lux levels and warmer colour temperature increases the feeling of body warmth and even affects blood flow to the skin, but other studies have given contradictory findings. Further testing is therefore required to judge whether the effect is significant enough to warrant application to a lighting scheme, such as in indoor public spaces in colder climates.

Conclusion:

It is possible to affect senses other than vision with light, and to usefully apply the effects to urban environments, public spaces, hospitality, offices, and more.

However, further research and testing is required before these ideas could realistically be implemented whilst maintaining suitable lighting conditions to the surroundings.

