Design proposal for pleasurable light atmosphere in hospital wards

Lone STIDSEN
PhD. fellow *, Email: ls@civil.aau.dk
Poul Henning KIRKEGAARD
Associated professor, PhD*, Email: phk@civil.aau.dk
Anna Marie FISKER
Associated professor, PhD**, Email: fisker@create.dk
Jakob SABRA
Research assistant**, Email: jsabra07@student.aau.dk

*Aalborg University, Department of Civil Engineering, Sohngaardsholmvej 57, 9000 Aalborg, Denmark
**Aalborg University, Department of Architecture and design, Gammel Torv 6, 9000 Aalborg

ABSTRACT
When constructing and designing Danish hospitals for the future, patients, staff and guests are in focus. It is found important to have a starting point in healing architecture and create an environment with knowledge of users sensory and functionally needs and looks at how hospital wards can support patients’ experience or maybe even have a positive influence on the recovery process. Thus at a general level, it is a crucial task to investigate how aspects such as the design of the environment, arts, lights, sounds can support and improve the patients’ recovery rate and the satisfaction of staff and guests in the future hospital. This paper introduce the concept of atmosphere based on the theory of Gernot Böhmes and it is dealing with the effect of light in experiencing atmosphere, looking at the importance having a holistic approach to lighting design. The paper displays important design parameters for achieving pleasurable light atmosphere in hospital wards and outlines a specific design proposal for an experimental case study in a hospital ward.

Keywords: Light atmosphere, lighting design, lighting qualities,

1. INTRODUCTION
Although there is strong evidence based research on physical, biological impacts on humans in lighting design. Veitch [1], Knez [2], Foqué [3], Loe [4] and there are several architectural works incorporating pleasurable light atmosphere such as Zumthor [5] and Wright [6]. But there seems to be a gap between the architectural theory and architectural practice of lighting design. It is our hypothesis that architects and designers have a common knowledge of the knowing the importance of having inspiring surroundings and knows why environments should maintain sensory qualities and atmosphere. Architecture as Therme Vals by Peter Zumthor and “home and Studio" by Frank Lloyd Wright are among others architects who elaborated their architectural works with atmospheric theories and they are both empha-
sizing the importance of having a holistic approach to design and highlights lighting as an important factor. We know from the architectural practice in lighting design, stage lighting and from research, that light impacts on mood and behaviour, but it seems a more holistic approach in lighting research is needed.

This research supplements the existing research with holistic approach, in the way to define the aim of achieving a pleasurable light atmosphere at the ward. It combines the knowledge gained through evidence-based design and research and looks at “best practice” in architectural context of designing atmosphere.

Therefore this paper will present and discuss important research in the area light atmosphere and hospital environmental design, introduce a model containing important parameters for lighting design influencing the evaluation of light atmosphere in hospital wards and present a lighting design approach in hospital wards.

2. LIGHT ATMOSPHERE IN HOSPITAL WARDS

The hospital ward is a complex architectural space to design; it has a wide range of functions and a multitude of users with different needs and requirements. Dalke [7], Ulrich [8] studied the role of the physical environment and made guidelines for hospital design. They point out that literature and research in the field are full of contrasting theories, myths and is containing a lack of understanding. They agree about the importance of looking at the physical settings, acoustics, furnishing and lighting as essential parameters in evaluating the experience of an environment. Alfredsdottir [9], and Jørgensen [10] studied atmosphere at the ward and McClughan [11] studied the impact of lighting on mood. The presented studies have all interesting findings contributing to the challenge of understanding tomorrow’s hospitals and the impact of light. The concept of atmosphere is a momentary and difficult distinguishable concept to define. It is difficult to separate from other concepts as sensory design, emotional design, designs ability to affect mood, creating of ambience etc. Gernot Böhme [12] contributes to the concept of atmosphere by introducing: “bodily sphere” and a “bodily present” into an aesthetic theory of atmosphere. Dalsgaard [13] model [Fig. 1] display “others” and “technology” in addition to the theory of Böhme. He points out time factors as an essential parameter because atmosphere is a procedural phenomenon. We suggest a further expansion showing a “socio-cultural” factor, because the subjects have different cultural understandings of the surroundings and different geographical experiences and expectations.

Fig. 1: “The concept of Atmosphere”
Fig. 2: The different faces of atmosphere.
3. DESIGN APPROACH
To prevent a blurred image of atmosphere in the planning of lighting design in hospital ward, it is important to separate and define the different perspectives. Atmosphere has many faces (attractive, impressive, entertaining, repulsive, scary) and it is not an endorsement of good taste or the right choice. A more accurate approach to atmosphere is needed. Relating to lighting design practice Fig 2 display a model clarifying and dividing the meaning of atmosphere.

Fig. 2 displays at least 5 different faces of atmosphere that can be clarified and evaluated: “Spatial Relations” as; different kinds of objects in the space, the size, the location, and distances between objects. “Functional Descriptions”: A specification the boundaries of the space describing the functions of the space and the objects in the space. “Functions Ecstasies” a description of the appearance of the objects in the space, and the relation between room purpose and the actual experiences of space. “Sensory Descriptions” are subjective or inter-subjective registration of our experience of being present at the ward. Thoughts about the various experience of everyday situations such as communicating with a doctor, the way you feel when you are going to sleep, watching television, eating your dinner or using the bathroom, etc. The atmospheres “Between people” are a registration of the communication between staffs, and staff, patients and guests.

To achieve a pleasant experience being hospitalized and to obtain a pleasurable light atmosphere at the wards, it is important to identify the parameters influencing the experience of light and to define the functional and sensory preferences for light depending on users experiences and expectations for a pleasurable atmosphere in hospital wards? Fig 3 provides an overview of important parameters in obtaining a pleasurable light atmosphere in hospital wards. The
shortly described here, but earlier elaborated Stidsen [14]. The model is the background for the design proposal and displays the 4 categories: “Users”, “Light source”, “Space” and “Time”.

The category “Users” of the ward can be divided in to three groups: The patients (even more accurate separated in two groups adults and children), the staff (doctors, nurses, cleaning staff), and the guests (family, friends). Looking at the “Light Source”, it can mainly be divided in two groups; daylight and artificial light where the artificial substitutes and support daylight. The category “Space” deals with spatial composition in the room, the thermal environment, materials, and acoustic experience. The “Time” we experience the environment and the impact light has on our perception. Light is showing the time of the day (morning-evening) or season (summer, autumn, winter or spring).

4. Results and discussion:
The holistic approach of lighting design, looking at psychological, behavioural, physical, biological and technical aspects of light are complex and obviously at risk of having bias. We find it interesting to elaborate on the hypotheses that a familiar understanding of light could provide a healthy environment supporting recovery process of patients. Information about the “user” perspective is gained through an ongoing anthropological parallel study of patients light preferences in a hospital ward. A study of patients everyday use of light in their private settings and their expectations for light atmosphere in the ward. The ward is the patient’s private space used as a room for reading, dining, sleeping, and watching television, sometimes even bathroom or gym. The lighting design should support the users needs in the different situations and support the feeling of privacy. The ward is also a space for doctor’s consultation with the patient, and the light has to support the staff’s tasks. The guests have the intention to keep the patient company or they are waiting for insecure and perhaps unpleasant, therefore the light has to support conversation and create a calm and cosy environment. The lighting should be easy to control and suitable for the different functions of the ward and present light where it is needed.

Information about the Space is gained through an architectural evaluation of the existing atmosphere and needs for atmosphere [Fig 2]. The evaluation is specified as: measuring the space, describing impressions from being present at the ward, and by interviewing users about functions and atmosphere between people.

The information on Time Information from the user interview contributes with the knowledge of who should control the use of light in the ward and when. The time factor is essential for splitting the design concept in 3 parts. So the lighting design can supports the different users in different situations.

The information on Light source is documented by analyzing existing light situation. It is evaluated and analyzed in 3D simulations as finding the daylight factor, analyzing energy use in artificial light, diagrams of light distribution, light zones and placements of light source. The gained knowledge of the time factor and the daylight situation creates the need for artificial light and how the artificial light can supplement the daylight.

The suggested lighting proposal is based on the gained knowledge from Fig 3. The design concept supports the needs and expectations for light in the everyday use of light at the ward. “Patients private space” (reading, dining, sleeping, and watching television, visits of relatives), “Patients active space” (training area, physiotherapy, walking area), “Patients public space” (doctors and physiotherapists examinations). The scenarios are split up in horizontal
levels High light scenario, a Centre light scenario and a Low light scenario.

The High light scenario [Fig 4] is mostly supporting scenarios as “Patients public space” and “Patients active space” or maybe giving patients an energy boost when feeling tired. A roof-mounted light provides a uniform distribution, which gives an active light atmosphere as we now it from a lot of public buildings. The colour temperature and intensity should be easily controllable for both patients and staff. The Centre light scenario [Fig 5] is mostly supporting the “Patients private space”. The varied light setting should be easily controllable by the patients from the bedside. By having control of the light settings, and the opportunity to vary the light atmosphere, the design can support the
complexity of the ward. The *Low light scenario* [Fig 6] is mostly supporting “Patients private space” and when the nurse inspect patients at night. The light is floating horizontal at the floor level providing long shadows will provide a silent atmosphere. The light level should be sufficient enough to navigate in the room without disturbing the patients’ circadian rhythm.

5. Conclusions
The holistic approach to the lighting concept above, based on user preferences, theoretical knowledge, field research and best practice seem to have potentials for giving patients a pleasurable experience of the light atmosphere in the displayed situations. But the concept needs to be evaluated in both qualitative and quantitative ways. To approve the hypothesis, the design proposal is going to be elaborated and tested in a 3D representation setting and afterwards in a mock-up 1:1 at the Department of orthopedically surgery, Odense University Hospital, Denmark. The test will be supported by qualitative data gained in the anthropological study and evaluated with quantitative statistical methods in the autumn 2010 and spring 2011.

6. References