

Lighting design in hospital wards

Design parameters for a pleasurable light atmosphere

- Presentation
- Hospitals in Denmark
- Design parameters for a pleasurable light atmosphere in hospital environments
 - User
 - Environment
 - Light
 - Time
 - Atmosphere
- Future plans and documentation

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"Aesthetics and the physical environment affects the human body, mind and wellbeing. Patients, relatives and staff are affected directly and indirectly by the surroundings."

"The interior should be designed with attention to existing knowledge and experience on how light, art, colors, and outdoor and green areas affects patient health and wellbeing."

Danish Hospitals

- Ulrich, R. & Zimring, C. 2004, **The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity**, The Center for Health Design.
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- Veitch, J.A. & Newsham, G.R. 1998, **"Determinants of Lighting Quality I: State of science."**, .
- Dirckinck-Holmfeld, K., Hornung, P.M., Damgaard-Sørensen, H. & Heslet, L. 2007, **Sansernes Hospital**, Lars Heslet og Arkitektens Forlag, 2007.
- Glind, I.v.d., Roode, S.d. & Goossensen, A. 2007, **"Do patients in hospitals benefit from single rooms? A literature review"**, Healthy Policy, vol. 8, no. 84, pp. 153.
- Simpson, M. 2004, **"Modern Lighting for Today's Healthcare"**, Official journal of the Institution of Lighting Engineers, vol. 4, pp. 16.
- Dalke, H., Little, J., Niemann, E., Camgoz, N., Steadman, G., Hill, S. & Stott, L. 2006, **"Colour and lighting in hospital design"**, Optics & Laser Technology (343-365), , no. 38, pp. 343- 365.
- Foqué, R., Lammineur, M. & Foqué-Denkens-Adriaenssens, a.n. 1995, **"Designing for patients: a strategy for introducing human scale in hospital design"**, Design Studies, vol. 16, pp. 29.

Guidelines for hospital design

Domestic and attractive Lighting

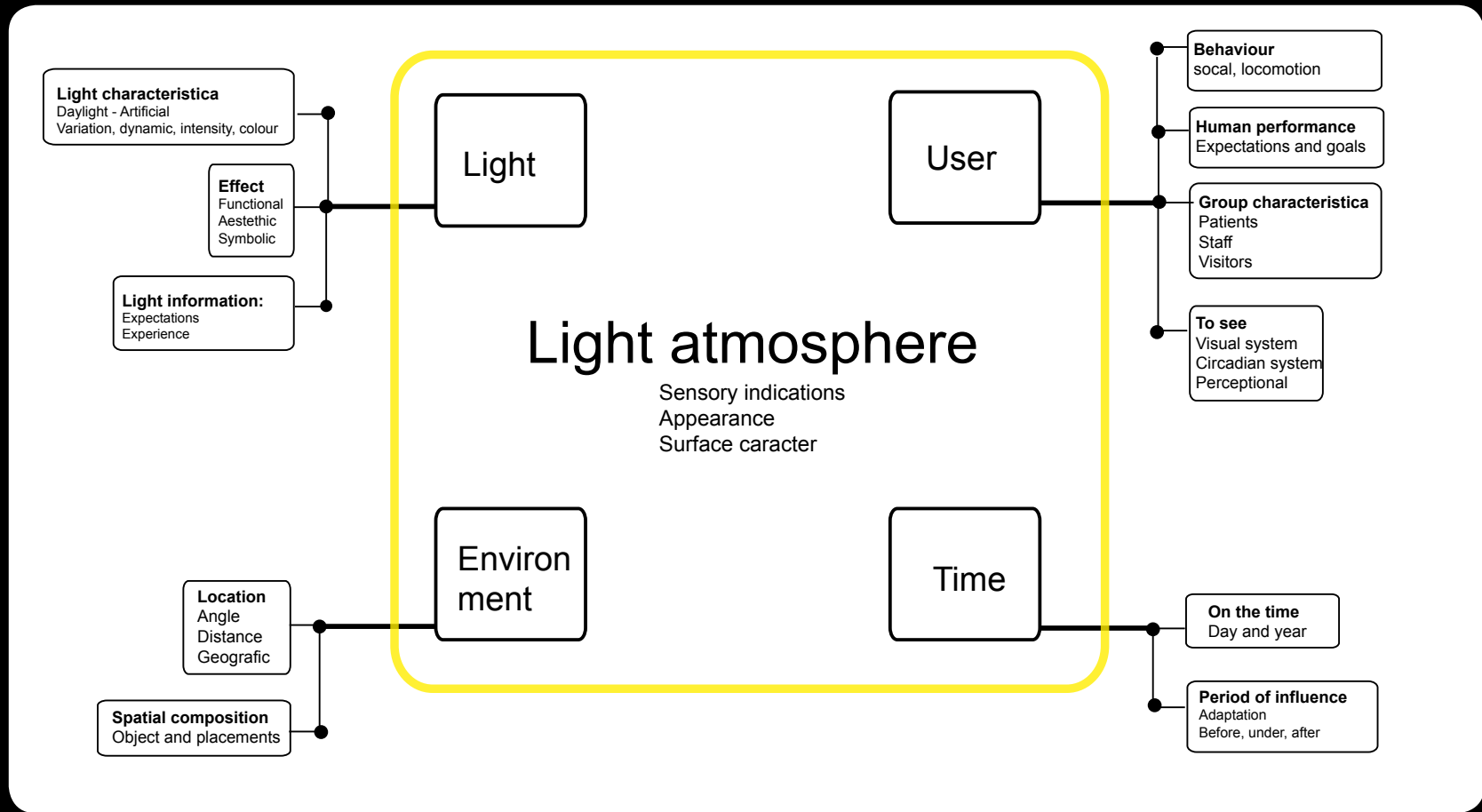
paragraph 2: General requirements for lighting.

For the remaining lighting, the colour temperature must be selected according to patient needs for an attractive "domestic" lighting, which in most cases is color temperatur no higher than 3000 K and a reasonably good color rendering of $R_a > 80$ th

Danish Standard 703



The Standards



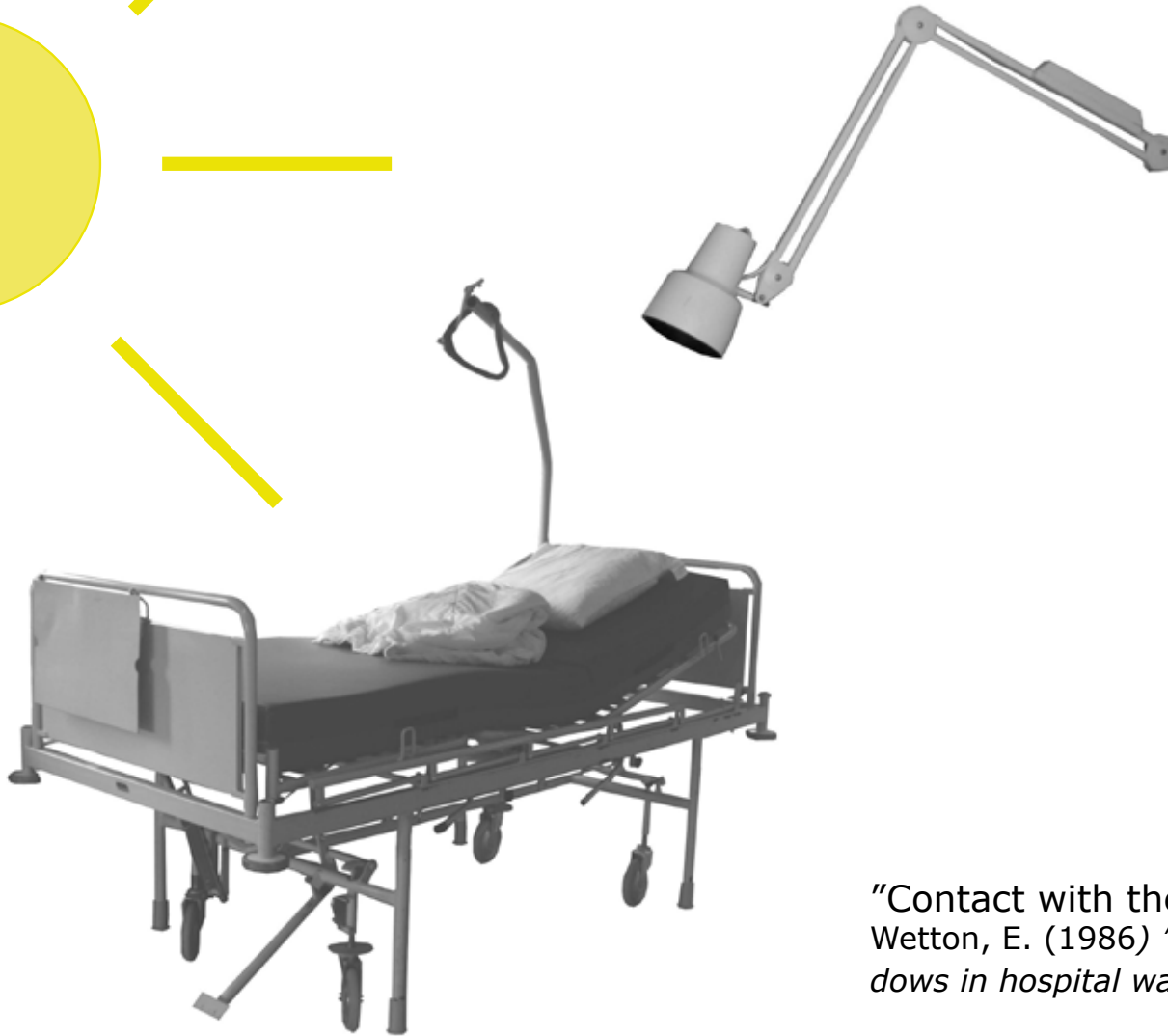
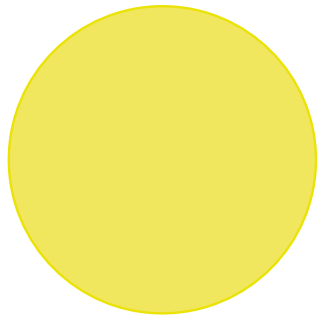
Atmosphere

- The functional effect
- The aesthetic effect
- The symbolic effect

Boyce, PR. 2003, "Human factors in lighting"



Light effect



"Contact with the outside"
Wetton, E. (1986) *"Daylight and win-
dows in hospital wards"*

Daylight and artificial light

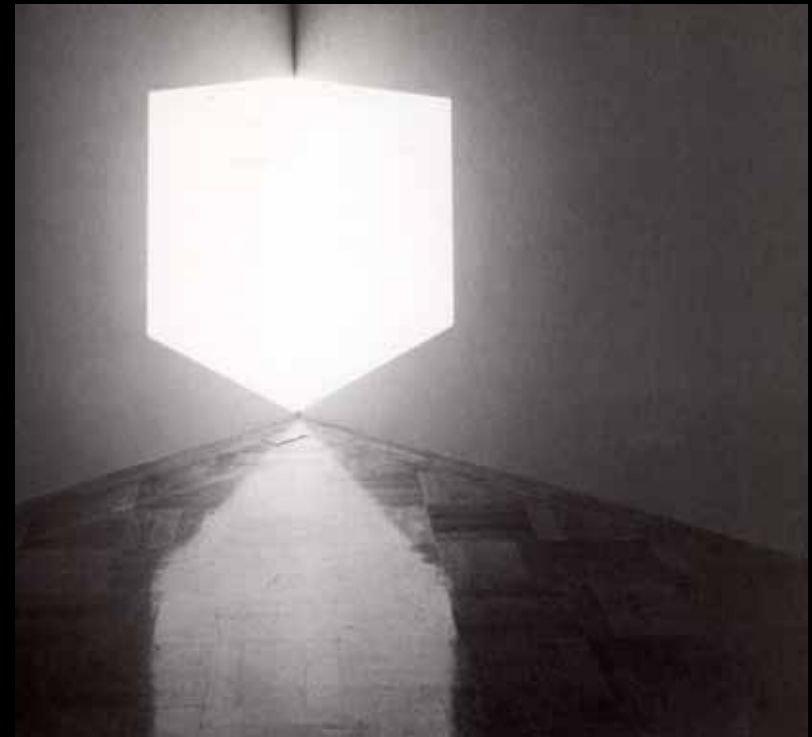
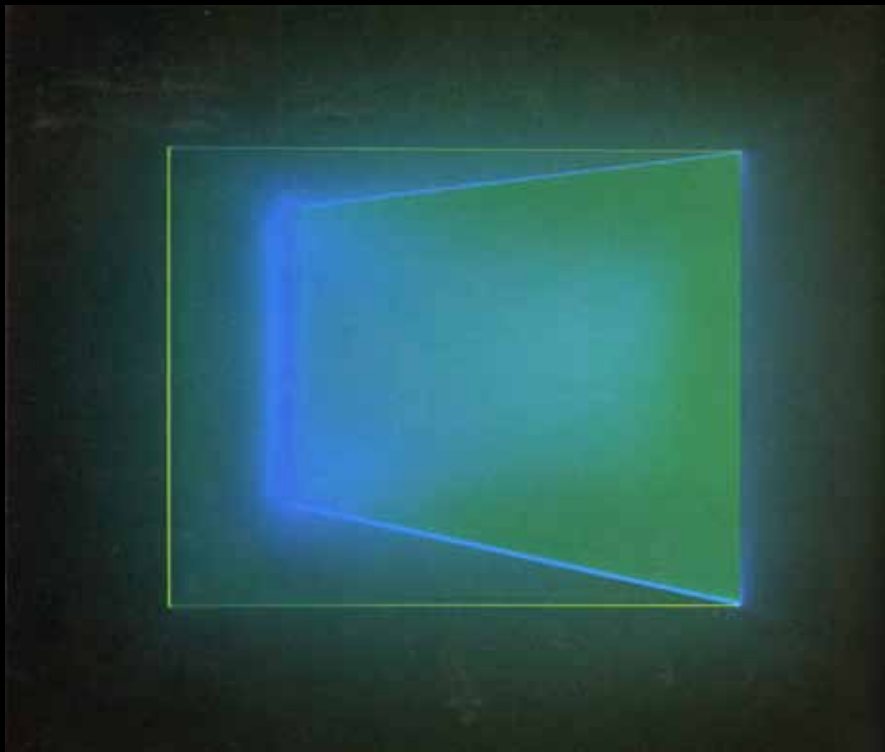
Dalke, 2006 presents a guideline for colour and lighting design in hospitals environments.

Veitch, J. (2007) *"Office lighting appraisal, performance, and wellbeing; a linked mechanisms map."*



Light: variation-dynamic-intensity-colour

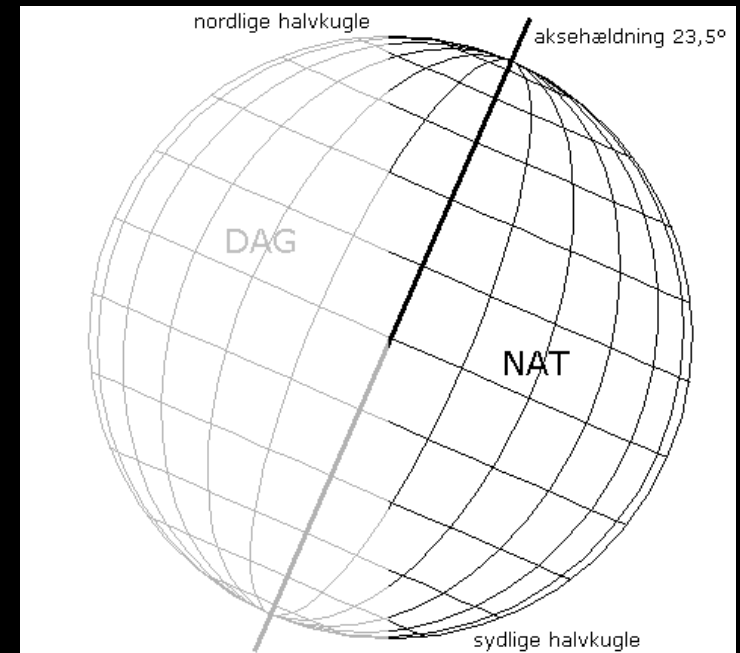
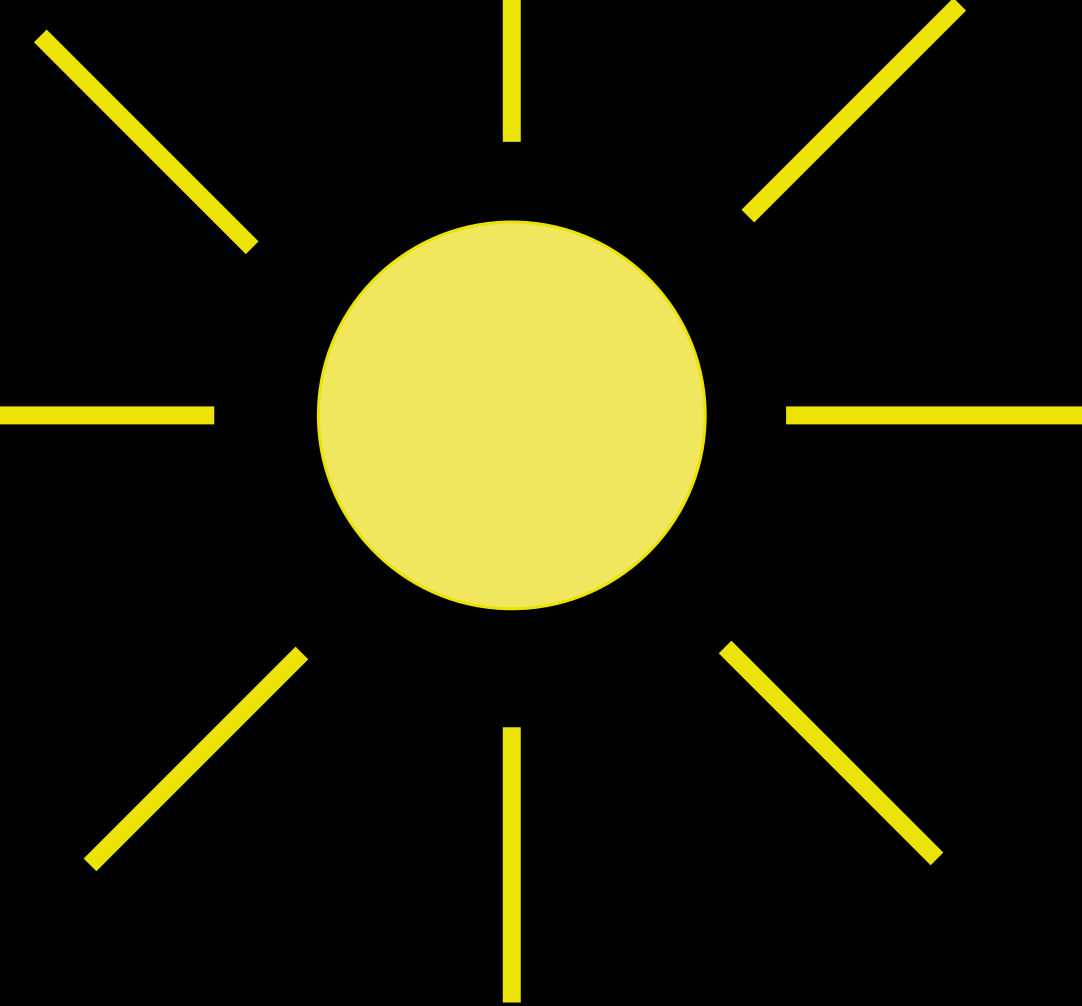
According to James Turrell (1992) our brain will seek order and meaning and it begins to interpret and sort things out, and seek for meaning if there is no accordance between our ideas and expectations of the light. James Turrell (1999) *"The other Horizon"*



Light information-expectations-experience



Environment: composition- spatial structure- surface



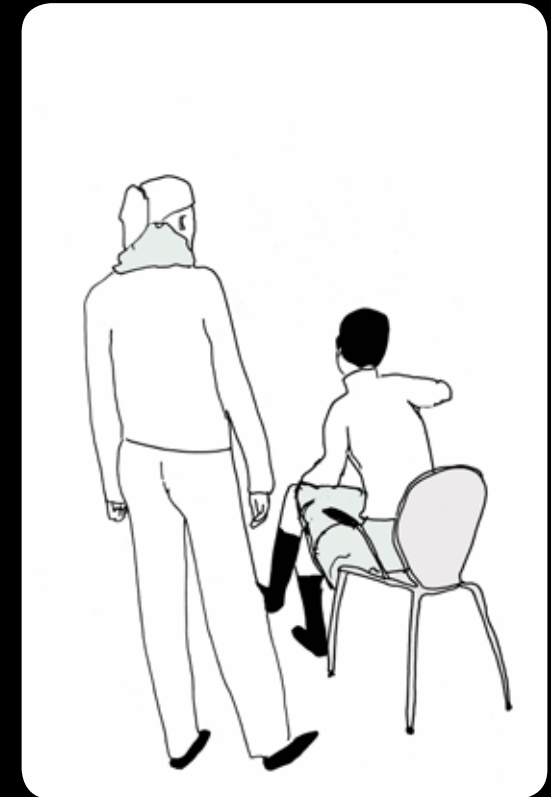
Environment location



Time



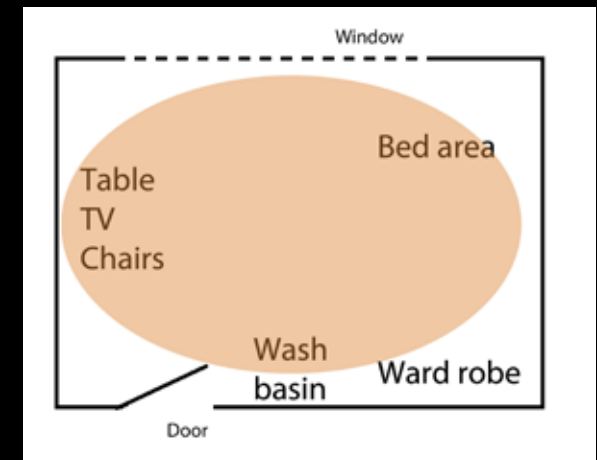
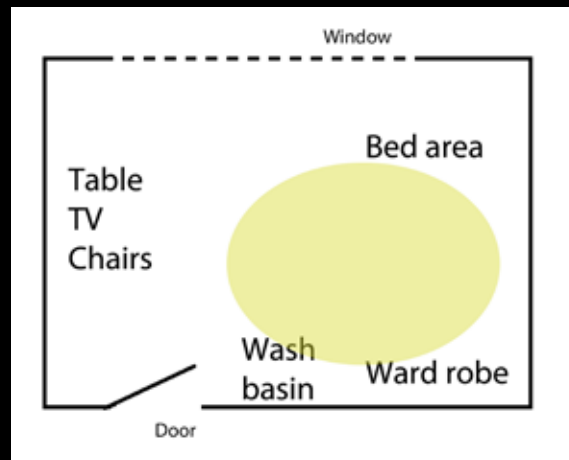
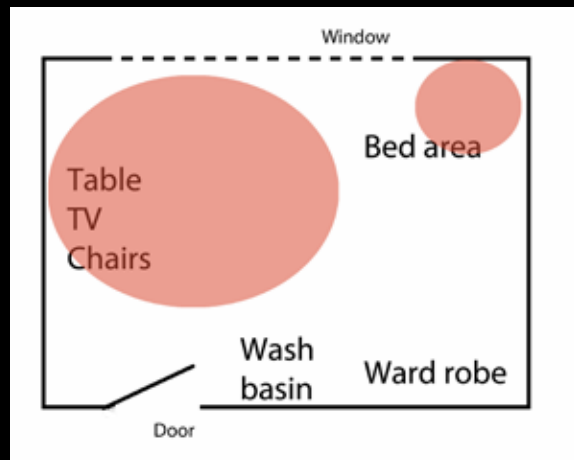
Time



User: Patients-Staff-Visitors

The physical environment, the organizational structure, and the organizational culture can influence affect. Lighting is clearly part of the physical environment and lighting conditions such as the illuminance and the correlated colour temperature of the lighting have been shown to change mood and to change behaviour in a way consistent with positive affect.

Mc Clughan C.LB. (1999) *"The impact of lighting on mood"*



User: area-behavior

48 Fundamentals

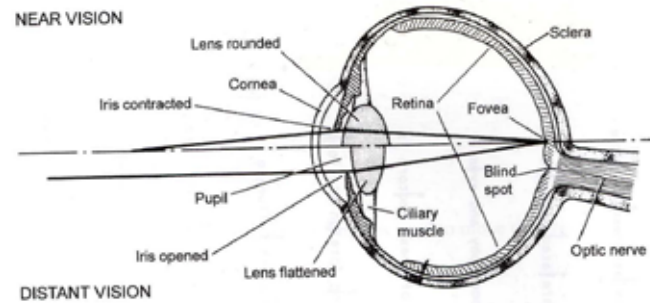


Figure 2.4 A section through the eye adjusted for near and distant vision.

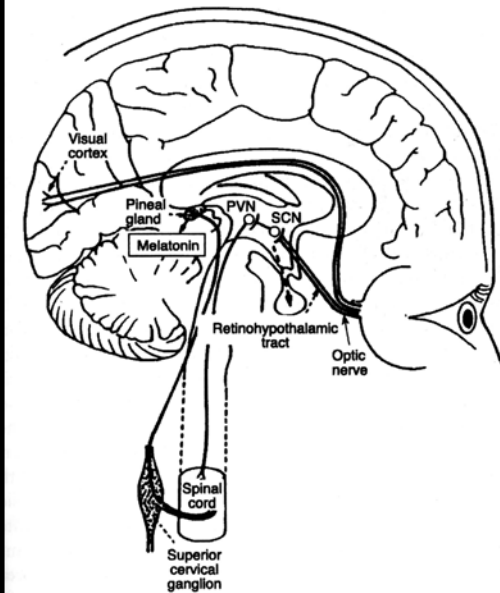
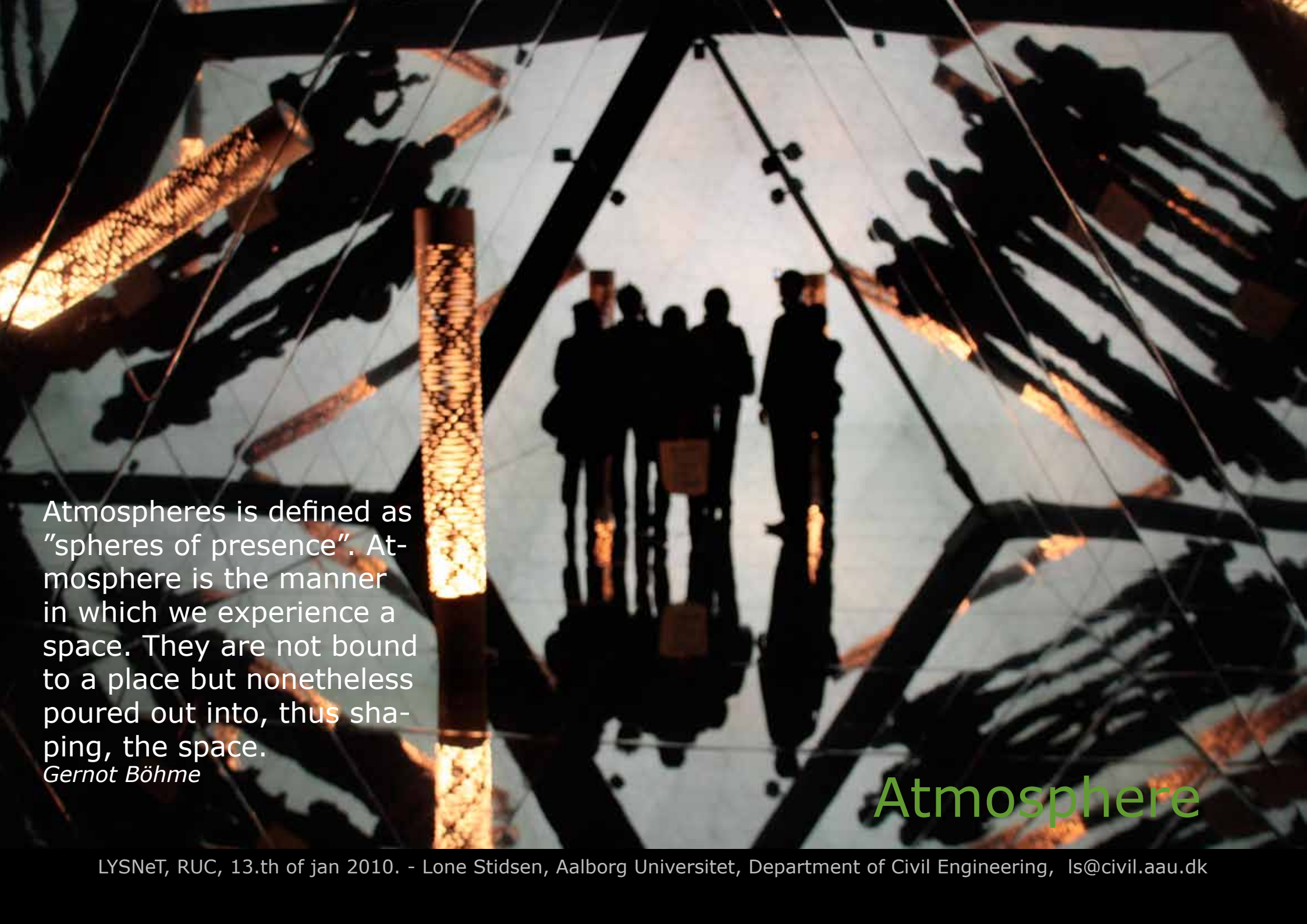


Figure 3.1 A simplified illustration of the RHP axis (from IESNA, 2000a).

User: Visual-Circadian-Perceptual system



Atmospheres is defined as "spheres of presence". Atmosphere is the manner in which we experience a space. They are not bound to a place but nonetheless poured out into, thus shaping, the space.

Gernot Böhme

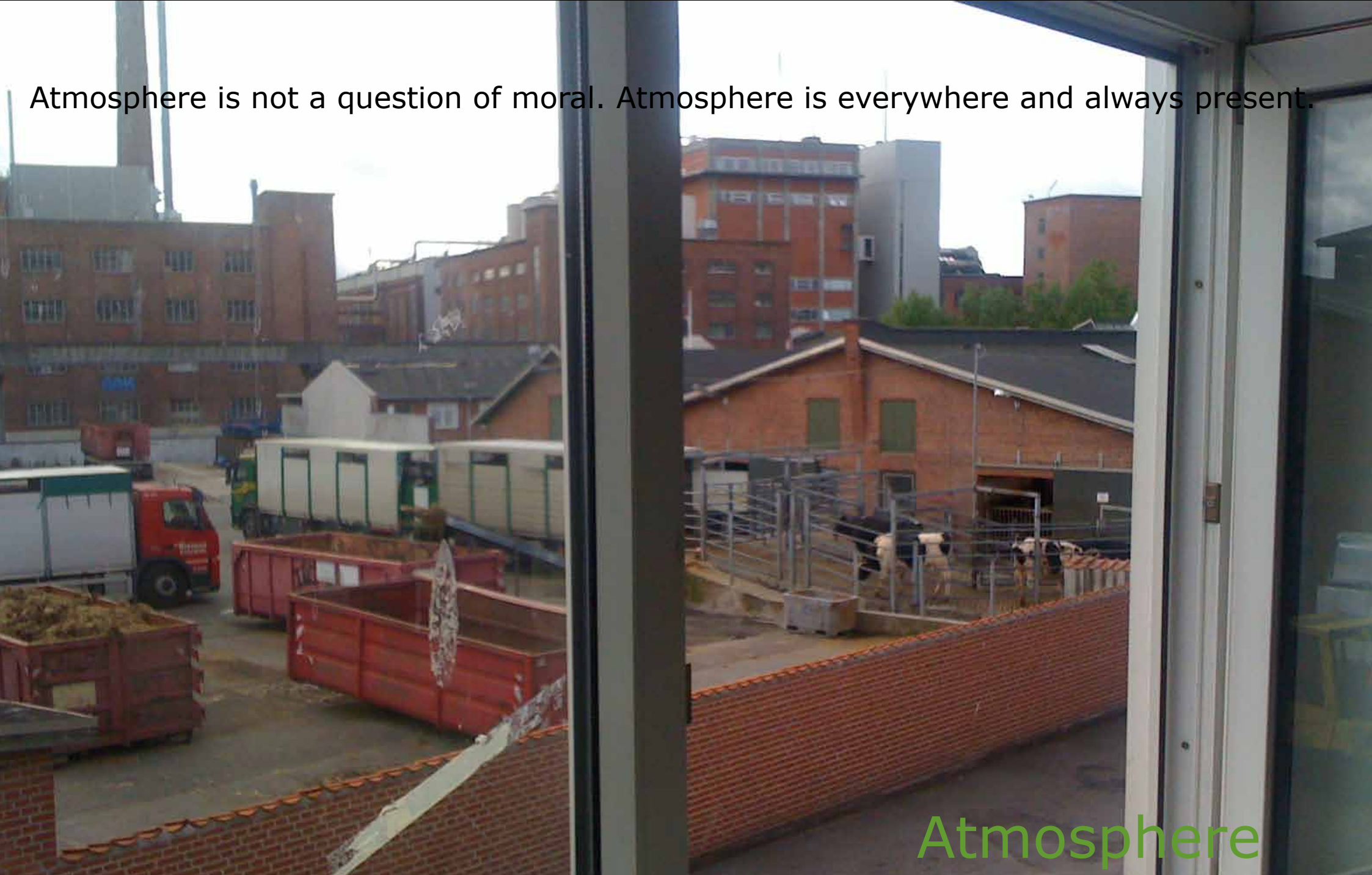
Atmosphere

Atmospheres can not be seen - It must be experienced through other senses and an atmosphere occurs rarely through one sense alone, but in an interaction between several senses. Atmosphere affects people emotionally.

Niels Albertsen "Urban Atmosphere"

Atmosphere

Atmosphere is not a question of moral. Atmosphere is everywhere and always present.



Atmosphere

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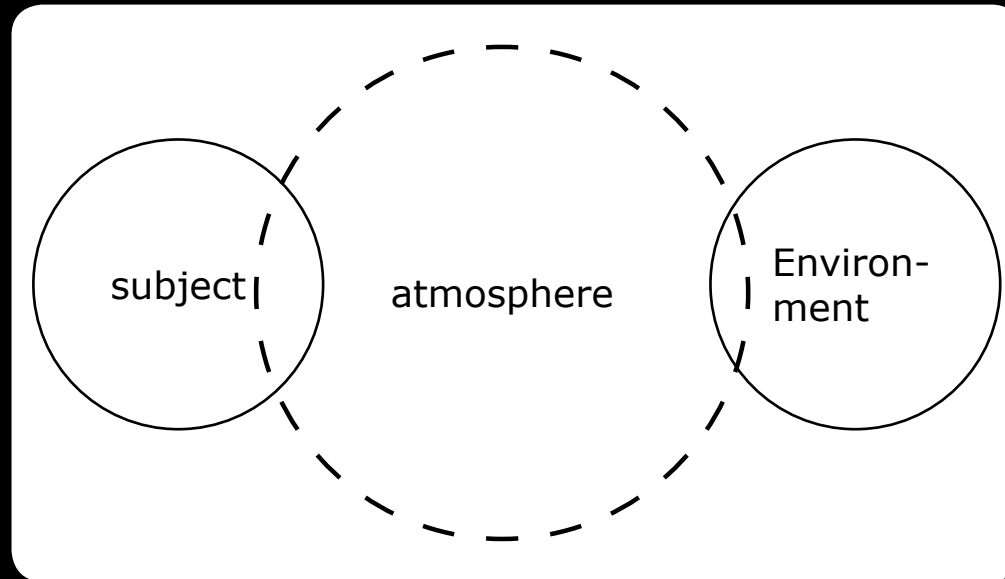
Atmosphere

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Atmosphere

Gernot Böhme (1937), Philosopher, Atmosphere. Introduces in 1995 the new concept of atmosphere and a relation between body and environment



Atmosphere

Gernot Böhme display 3 kinds of space:

The space as medium of presentation

Mathematic, objective analyse of the space separated from the subject.

The bodily presens in space.

Mathematic, subjective analyse of the space: The experience of "being here" and "being present".

The bodyspace

The subject in the center of the space. Based on the way the subject is involved in space "space of action", "the space of mood" and "the space of sensing"

Atmosphere



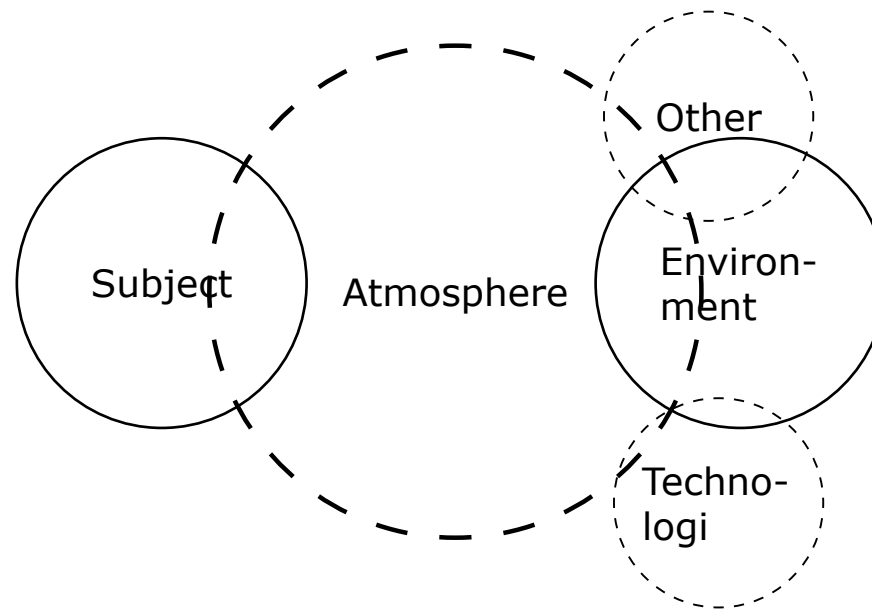
Sensing



Sensing

Peter Dalsgaard og Karen-Johanne Kortbak (University of Aarhus) introduce a social parameter and technology to the concept of atmosphere in the context of design.

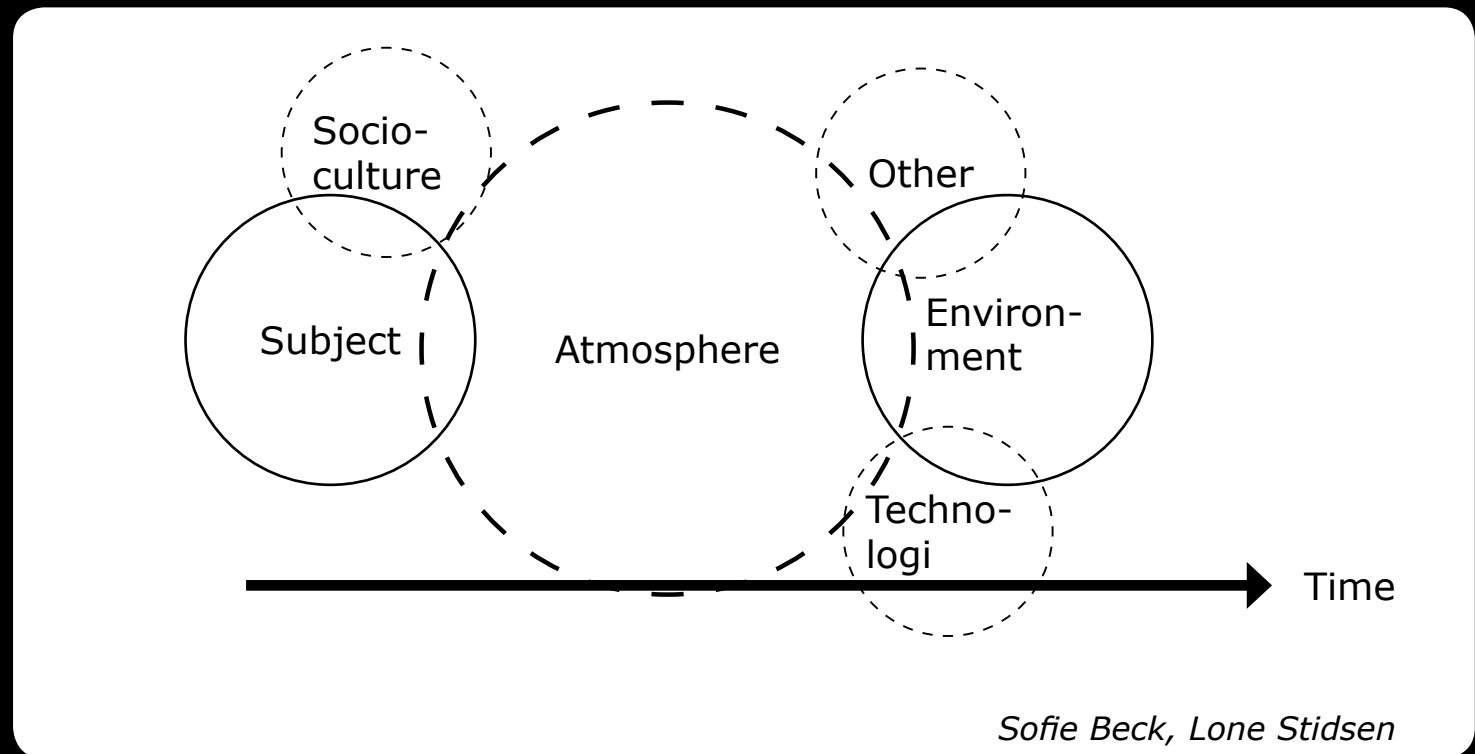
In addition, they point out that the concept of time is an essential factor because atmospheres must be seen as a processual phenomenon.



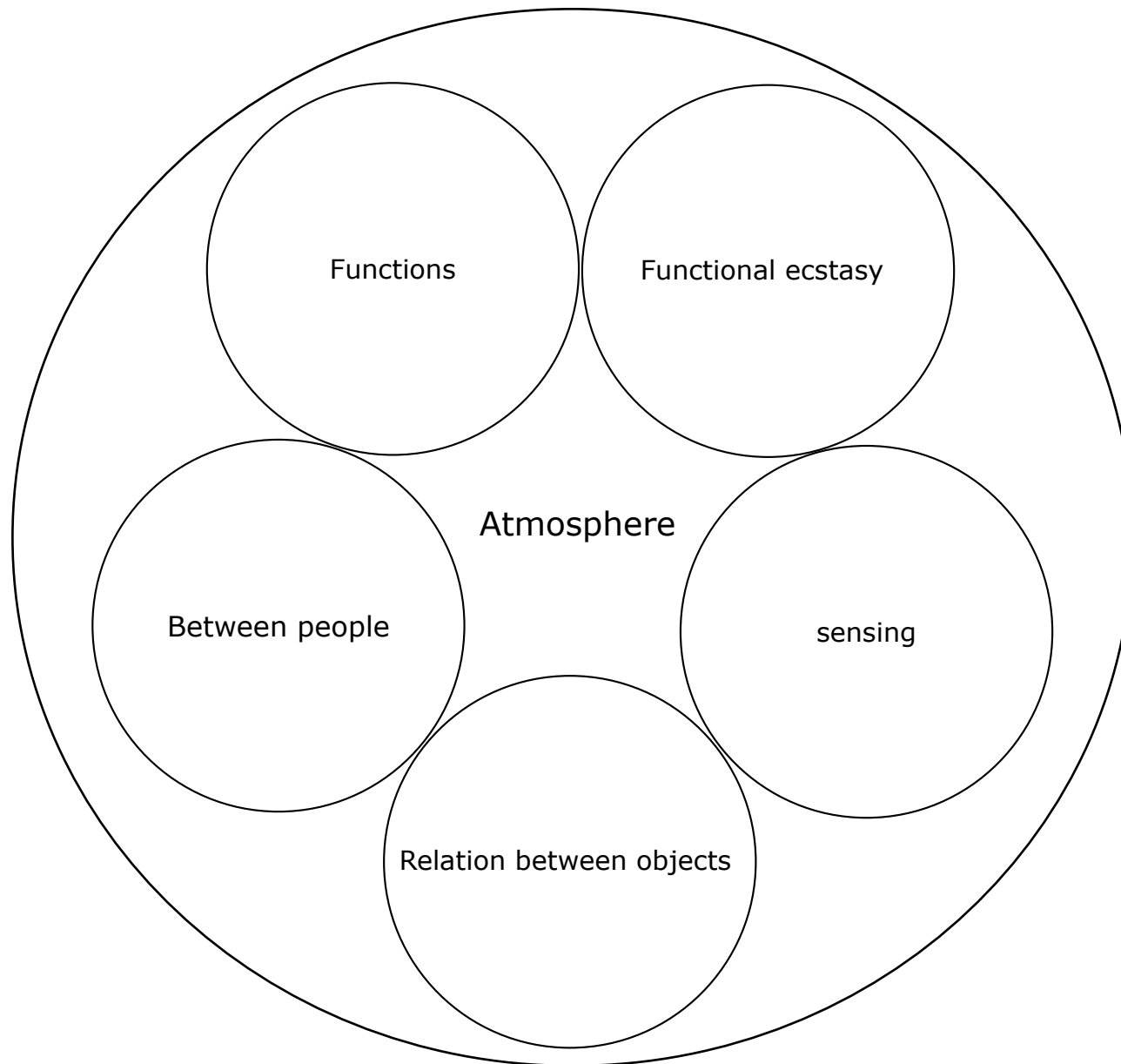
"Staging atmospheres in interaction design", Nordes (2008)

Atmosphere

Adding the parameters Time and socio-cultural value as essential factors in understanding the concept of atmosphere.



Atmosphere



Atmosphere environmental analyse

Atmosphere



- Light supporting both public and private atmosphere at the hospital ward:
- The patients opportunity to actively transform the room atmosphere through intelligent lighting control systems

Focus

Research through design

- Researching: Atmosphere, User, Light, Environment, Time
- Developing concept for lighting design at hospital wards.
- Testing the concept at Odense University Hospital

Publications:

- Technical report: Lighting quality in hospital wards - State of the art : Design parameters for a pleasurable light atmosphere.
- Conference proceeding: Lighting Qualities in Wards : Design Parameters for a Pleasurable Light Atmosphere.
- Poster: Lighting Quality in Wards.

[http://vbn.aau.dk/research/\(19079507\)](http://vbn.aau.dk/research/(19079507))

Plans and documentation