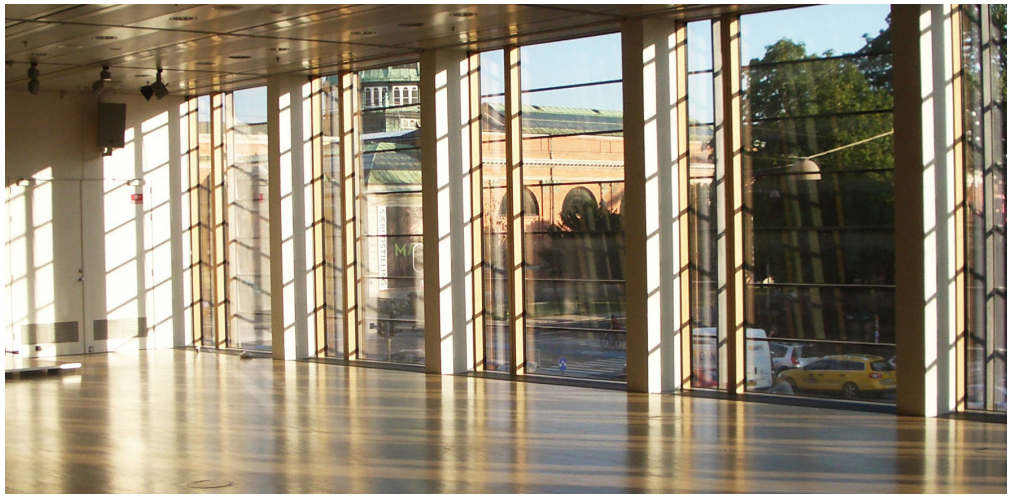
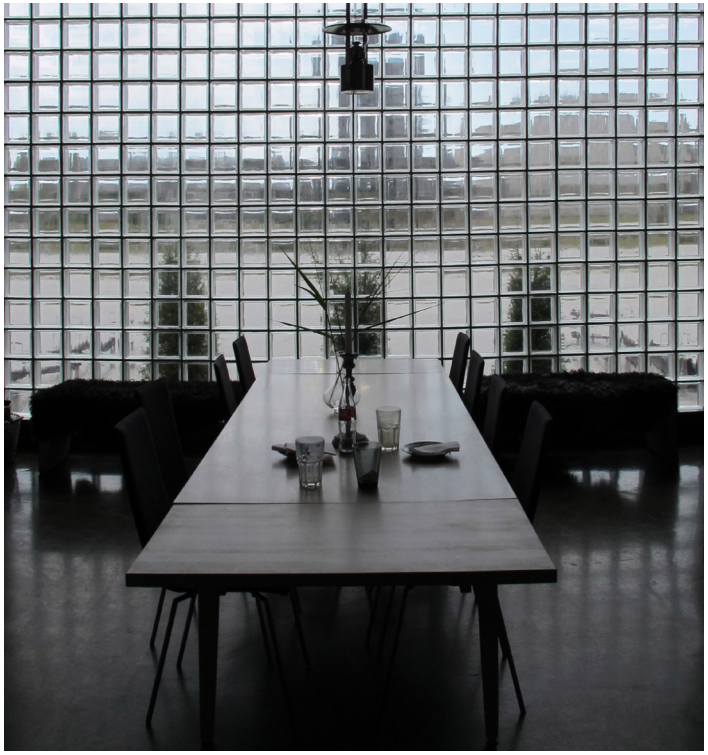
# PERCIFAL

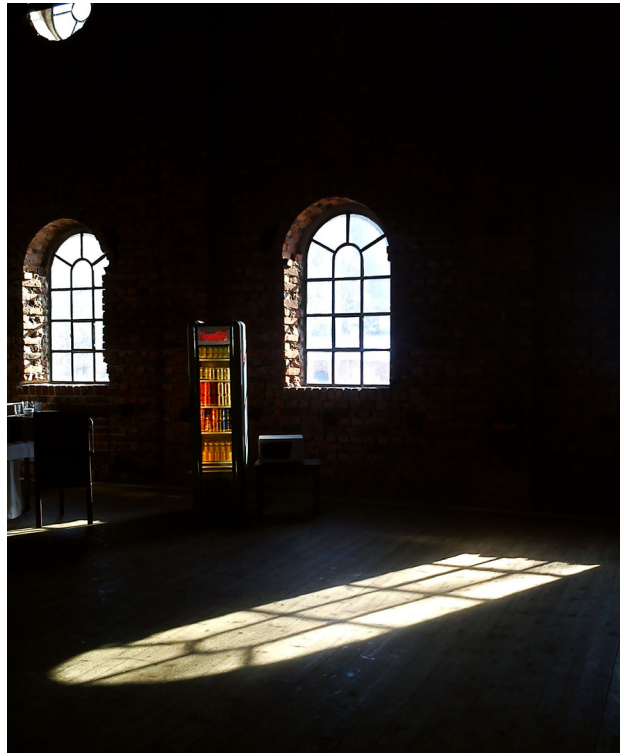
## Perceptual spatial analysis of colour and light

Background and study guidelines Ulf Klarén 2011

SYN-TES Report 2E







Using the visual concepts discussed in PERCIFAL you may learn to assess an environment on the basis of the visual character of light and shadows.

# Preface

The study guide *PERCIFAL – Perceptual analysis of colour and light* introduces concepts and methodological framework for describing and analysing visual experiences in spatial contexts. The starting point is a method for visual evaluation of light in space, developed by professor Anders Liljefors at the KTH School of Architecture in Stockholm. Anders Liljefors has also participated as a consultant on the PERCIFAL-project. The aim is to enable description and communication around the spatial total effect of colour and light; through discussion and analysis of systematically gathered data it is possible to learn more about how we see and gain a better understanding of how colour and light shape our spatial experience. The working process resembles that of artists; less essential details are sacrificed in favour of the overall impression. Thereby one can describe important basic aesthetic and visually functional spatial qualities that are difficult to reveal by other means. The international research on colour focuses largely on issues regarding colour measuring and colour rendering in different media, and rarely touches on issues concerning the holistic understanding of space. For several decades now, Swedish research has been an international leader in the investigation of the experience of colour and light in spatial interaction.

During 2010 and 2011 an interdisciplinary project called *"SYN-TES: Human colour and light synthesis: Towards a coherent field of knowledge"* was carried out at Konstfack – University College of Arts, Crafts and Design, Stockholm. SYN-TES was financed by the *The Knowledge Foundation* (ref. no 2009/0195) and involved about fifteen colour- and light specialists from companies and different academic disciplines. All participants were also working on other research and/or developmental work on light or colour issues. Within SYN-TES the group met regularly for seminars to bring different knowledge traditions closer to one another and to join in formulating the basics for a unified field of knowledge covering both colour and light. In connection with this a number of sub-projects has been carried out on adjacent issues. PERCIFAL is one of these projects.

Stockholm, October 2011
PERCIFAL project group

Associate Professor Ulf Klarén

I SAMARBETE MED
KK-stiftelsen

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## Partners in the SYN-TES project

ALCRO

NCS Natural Color System®

PHILIPS

PERCIFAL
**The Perception Studio / Konstfack–Univ. College of Arts, Crafts and Design 2010-2011**

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Translated by: **Philips /Harald Arnkil /Ulf Klarén**

# Contents



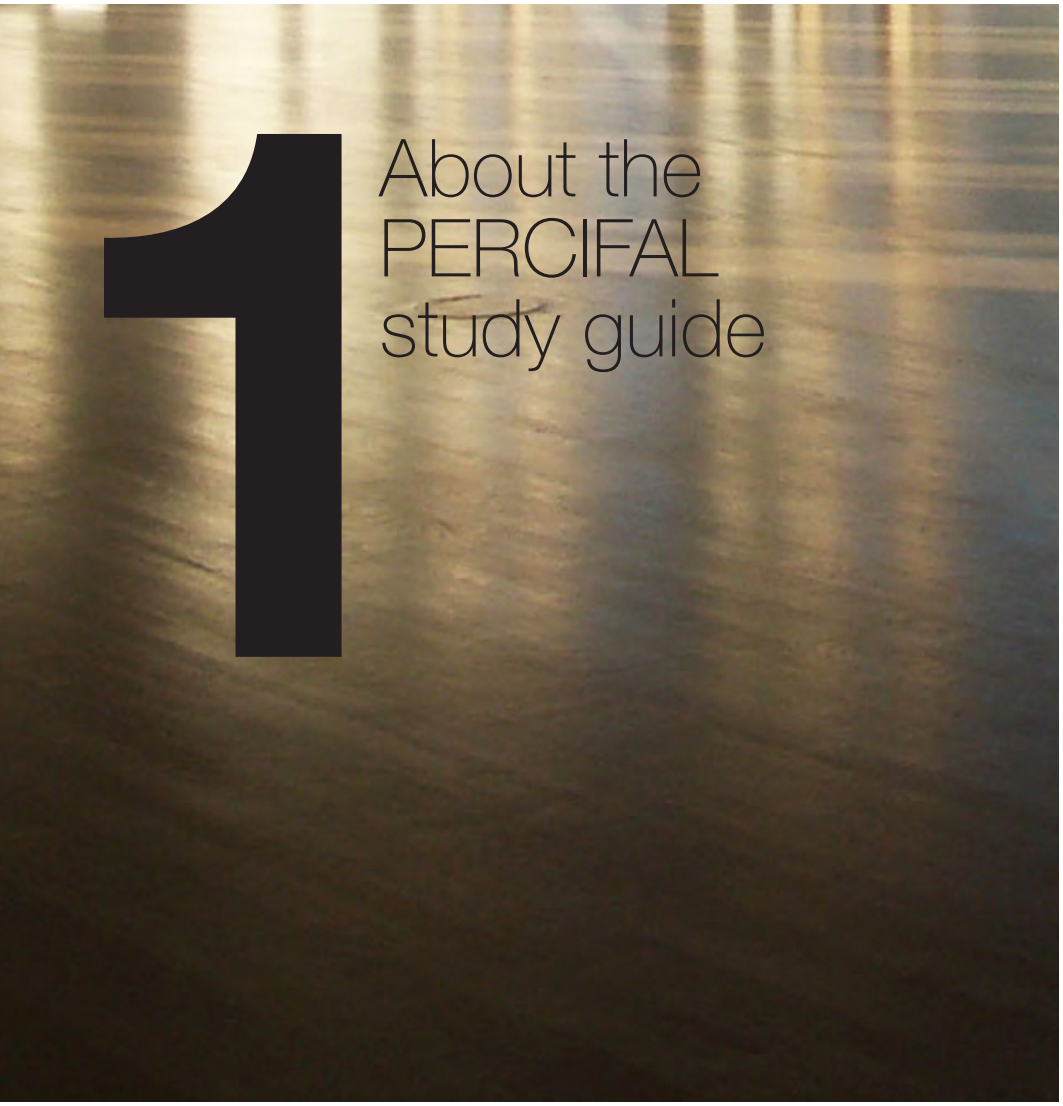
## SYN-TES report series

Available for downloading at www.konstfack.se/SYN-TES

1. **OPTIMA** Metodstudie om färg, ljus och rumsupplevelse (OPTIMA Methodological study on colour, light and spatial experience) by Karin Fridell Anter
2. **PERCIFAL** – Perceptiv rumslig analys av färg och ljus (PERCIFAL – Perceptive spatial analysis of colour and light). Background and study guidelines by Ulf Klarén (Also available in Norwegian and English)
3. **LJUS- OCH FÄRGBEGREPP** och deras användning by Karin Fridell Anter (Light and colour concepts and their application)
4. **LJUSFÖRSTÄRKANDE FÄRGSÄTTNING AV RUM** (Interior colour design effects on preferred level of light) by Cecilia Häggström & Karin Fridell
5. **SYN-TES 2010-2011**. Interdisciplinära studier om färg – ljus – rum (SYN-TES 2010-2011. Interdisciplinary studies about colour-light-space) by Karin Fridell Anter, Leif Berggren, Ulf Klarén, Johan Lång & Pär Duwe.
6. **FORSKNINGSÖVERSIKT**; Rumslig samverkan mellan färg och ljus. (Research survey: Spatial interaction between colour and light ) by Karin Fridell Anter et al.
7. **Colour shifts behind modern GLAZING** (in English) by Barbara Matusiak, Kine Angelo & Karin Fridell Anter

## Printing instructions

Please note that the layout is based on horizontal double A4-format. Therefore print the papers double-sided, if possible. . The chapters 1 *About the PERCIFAL study guide* (p. 6), *4. Perceptual spatial analysis* (pp. 14-17) and *6. Checklist for documentation of observation location* (pp. 28-30) addresses the teacher or tutor. These passages contain a methodological description and a teacher's guide. The passages to be copied for the participants are *2. Describing color and light* (pp. 8-9), *3. PERCIFAL's visual concepts* (pp. 10-13) and *5. PERCIFAL – Observation form* (pp. 18-27) *7. Literature on light, color and space* (pp. 32-34) can be printed and handed out to the participants as guidelines for further reading.



# 1 About the PERCIFAL study guide

This study guide is first and foremost meant for use at university-level education in architecture and design. With certain level adjustments it can also be used at high school-level, art and design studies or intermediate-level, preparatory and orientational studies in architecture, interior and furniture design. The guide can also be used by professionals in the colour- and light fields as well as by end-users and clients for systematic visual description and dialogue about planned or existing spaces.

The guide contains a short theoretical introduction to colour, light and space, followed by a specific overview where the eight visual concepts of PERCIFAL are defined and commented on. Also included is a teacher's tutorial with practical advice, instructions and suggestions for the visual analysis along with an observation form with systematically posed questions.

This model of analysis has been tested and developed step-by-step within the frames of educational programmes for design and architecture in Sweden (Ulf Klarén, Karin Fridell Anter, Perceptionsstudion, Konstfack, Stockholm), Norway (Barbara Matusiak, Institutt for byggekunst, form och farge, NTNU, Trondheim) and Finland (Harald Arnkil, Aalto University School of Arts, Design and Architecture, Helsinki). It has also been tried during seminars with professionals in the fields of color and light. The trials show that PERCIFAL more than meets the stated pedagogical goals and opens up to compelling comparisons between physical description and visual experience of color, light and space. Given strict definitions at each stage it should, according to the SYNTES Research Group, also be eligible as an analysis tool in scientific contexts. The method and an evaluation of the pedagogical trials were presented and debated at AIC 2011, Midterm Meeting of the International Colour Association, Zurich University of the Arts, Zurich, Switzerland (see appendix, p. 36-44).

# 2 Describing colour and light

People working with colour and light design know the importance of a trained eye and an intuitive capability to interpret one's own experience of colour and light. However, this is not all it takes. These professionals also know that apprehension of visual environments calls for a conscious discrimination of the different colour- and light qualities comprising the spatial total experience, along with the ability to observe the interaction of these qualities. Another factor to take into account is that colour and light design are always factors in teamwork involving a large number of interests. What is experienced or imagined must in some way be mediated to others.

Colour and light interact in a very rich and complex manner in our environment. Still, in practice, we tend to treat colour and light separately and we are yet to develop linguistic concepts for describing color and light together in spatial contexts. PERCIFAL is an attempt to introduce, test and discuss some such concepts.

In lieu of visual concepts, colour and light experiences are often described and analysed using physical or technical terms. This may contribute to the false premise that physical readings also measure what we see and experience. Using physical readings to describe what we gather from vision is both misleading and false. It is to give a simplified picture of something we know to be more complicated.

## Experiencing spatial coherence

The experience of colour and light springs from very complex perceptual processes, but occurs seemingly without hindrance and conscious exertion. *Appearance* is only revealed in living creatures. Available to us when attempting to describe the human experience of colour and light are comparisons of our own observations to those of others. We live in a spatial world set in constant change. Our perception and comprehension of the world around have been shaped by ecological conditions. What we see is colour and light, we register visual differences and similarities, but we do not primarily attend to colour or light conditions as such. Our spontaneous experience is a complex and living world around. Colour and light mediate and construct our experience; we experience the world visually *through* colour and light. All senses contribute to this, but our vision affords us instant appraisal of the spatial whole.

In order to serve the shared needs of creative work, our spontaneous experiences must be made apprehensible and communicable. Understanding and dialogue is facilitated by shared concepts. In PERCIAL, eight defined visual concepts are used to pinpoint the spatial colour/light experience: *Light level, Light distribution, Shadows, Light patches, Specular reflections, Glare, Colour of light* and *Surface colours*. The internal relations of these experiences in the coherent spatial context are discussed in the visual analysis.

## Adaption of perception to change

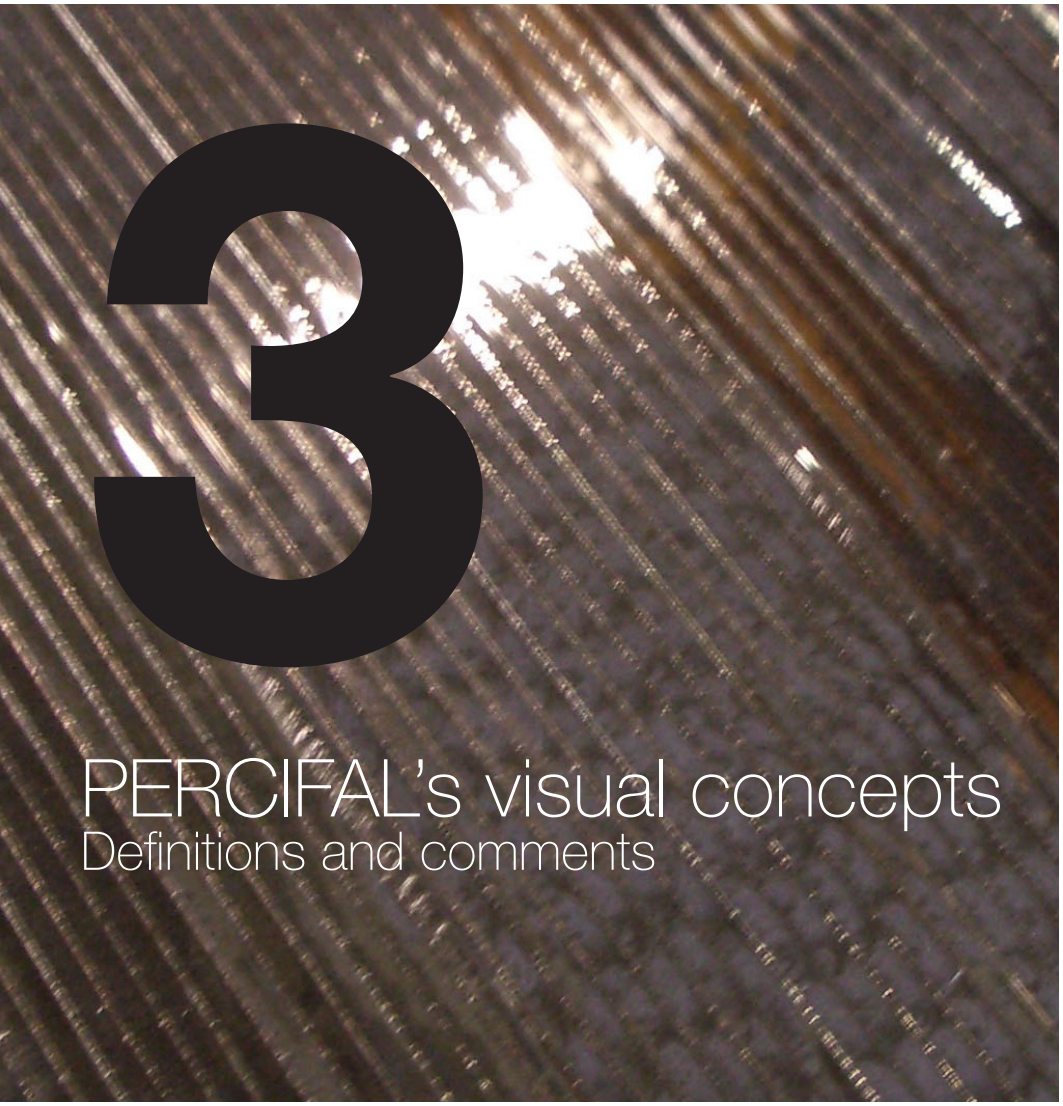
Our perception of colour and light varies with our movement through the space. The direction of the light affects the shape of the shadows and creates front- and backlight. Different light sources produce lighting with different colour of light, while the colour of daylight varies continually throughout the day. This affects the colour we see in objects around us. Thus, the outer spatial world is in constant change. Our visual system counterbalances physical alterations in our environment, which helps us perceive the external reality as relatively constant. To experience is to go through continuing adaption to the changes and contingencies in the environment and – as far as possible – to spontaneously ignore natural shifts in perspective as well as variations in colour of light. This so-called adaption is not governed by will, but happens spontaneously. When the light in one space is altered from for example cool morning light to warm evening light, the colour variations are less noticeable than what a physical reading would indicate. When the alterations in our environment grow too big for spontaneous adaption we grasp the spatial context. Our intuition tells us that an altered wall colour is the result of an external light source or is being affected by light reflecting from another wall. We can at the same time imagine what colour a surface would be during normal lighting conditions.

## Measuring colour and light

The physical properties contributing to light- and colour experiences can be measured using instruments. It is for example possible to measure the spectral power distribution in the reflection from a coloured surface or from a light source, or to describe the strength in the radiation found in a given location within a space. In physics, radiation is expressed through wavelengths and energy content (measuring units: nanometer, nm, and kilowatt hours, kWh). Within psychophysics radiation is measured weighed against the presumed sensitivity of the human eye (measuring units: lux, lumen and candela). Physical readings enable comparison of the physical level of illumination and the spectral distribution at different locations as well as how different colour materials reflect radiation. When manufacturing light sources or colour materials it is of pivotal importance to use measuring instruments to guarantee a certain product standard and even quality in production series. The word 'light' is often used to describe both the radiation (which cannot be seen) and the light we see and experience. This creates confusion: a given amount of light (-radiation) measured in lumen or lux can give rise to very different amounts of experienced light. And vice versa: a given experience of light does not necessarily correspond with the lux or lumen readings.

## Human experience and physical readings

Physical or psychophysical readings tell us nothing about the *coherent* perception of spatial light- and colour variations; they do not describe light- or colour adaption or experienced contrasts of colour or brightness. While the task of human perception is to make the surrounding world complete, stable and apprehensible, the measuring instruments simply show what is valid for a specific measuring point at a specific moment in time. The work connected to PERCIFAL is aimed at getting a firmer grasp of the total perceptual effect of colour and light. This is done through observation and formulation of concepts related to human experience, attention and reflection.



# 3

# PERCIFAL's visual concepts
## Definitions and comments

In PERCIFAL, eight defining visual concepts are used to define the spatial colour/light experience: *Light level, Light distribution, Shadows, Light patches, Specular reflections, Glare, Colour of light* and *Surface colour*. These concepts are defined and briefly commented on below. (Concepts and definitions are also included in PERCIFAL's observation form. This form contains, apart from questions regarding the visual concepts, queries concerning the ability to perceive shape under current light- and colour conditions; objects, faces, written text, etc.)

### Light level

Light level is aimed at describing whether the totality of the space is perceived as light or dark. The overall light level sets the character of a space and affects how we orientate ourselves within the space. To estimate the light level as low or high is not to judge it as "bad" or "good" generally or for a specific task.

### Light distribution

Light distribution describes how we experience the way dark and bright areas are located in relation to each other within a space; how darkness and light are distributed throughout the space. Light distribution can affect our experience of disunity /variation as well as unity in a room. Light distribution can vary greatly; it can stretch from monotony with very small light variations to extremely dramatic with strong contrasts between light and darkness. We are very sensitive to how light is distributed and the perception of space is much dependent on the light distribution.

### Shadows

Shadows occur in areas not completely reached by the light; objects have form shadows and when they are in directional light, they produce cast shadows. In this particular case 'shadows' refer to the overall experience of the shading's impact on the room as a whole.

Kalmar Castle

(Photo: Johanna Enger)

Shadows can articulate and emphasize surface structures and the shape of the objects as well as the space. They can also provide an indirect description of the character of the light through, for example, strong or weak contrast in relation to illuminated surfaces or diffuse vs. sharp edges of shadows.

## Light patches

Light patches are defined by their size and deviation from the general light level of a space. They are caused by outside light, reflected sunlight or by stray artificial light sources. For most part, we ignore light patches while experiencing a room. We know that they are temporary and we understand why they arise. Although we do not notice them, they still intuitively affect our total experience of a space. Sometimes light patches are observed due to their location, quantity or particular character (e.g. their deviant colour).

## Specular reflections

Specular reflections can occur on any surface that is totally smooth, glossy and mirror-like, such as glass, metal, polished stone, water or high-gloss paint. They are entirely dependent on angle of view and thus appear differently in different locations in space. Specular reflections can go quite unnoticed; they contribute to our experience of the space, but are perceived as natural elements in the spatial totality. In some cases the specular reflections – through their deviant colour, large contrasts or unusual spatial locations, etc. – disrupt the total spatial experience. On the other hand, reflections and highlights can be consciously used to bring life to a space. Examples of the latter include occasions when high status or festiveness are to be emphasized through the use of reflecting and shiny objects and materials.

## Glare

Glare means that the brightness contrasts in our field of vision are larger than what is experienced as ideal. Glare can be caused by daylight, by windows and electrical lighting from insufficiently screened light sources as well as by specular reflections of bright lights. Glare can arise from large or small areas of light caused by point sources or by lights covering a major part of our field of vision. Glare is so common that it almost always occurs somewhere in the visual field, but we can usually ignore it.
In this case we are to judge the total effect of glare; if it any way affects our total experience of the space.

## Colour of light

Colour of light refers to the colour - or tone - generally experienced in the light in a particular space. The colour of light does not equal the colour of the light source, nor is it the same as the surface colours we can perceive in a space. The most common concepts used to describe an experienced colour of light are'warm' and'cool'. The colour of the light is most clearly perceived when juxtaposed with another colour of light. Imagine you are standing in a room lit with an incandescent light source and it is dusk outside; if you look out of the window, you can clearly see the cooler blue tone of the daylight compared to the warmer yellow tone of the incandescent light. In combination with light distribution and light level, colour of light plays an important role in setting the mood, thus noticeably contributing to how we experience a space.

## Surface colours

A surface colour is a colour that is perceived as belonging to or being an inseparable part of a surface. Our ability to distinguish chromatic differences (contrasts of colour) aid us in separating objects from their backgrounds and objects from each other. Conversely, low contrast between colours presents objects and surfaces as being visually connected to one another. Colour variations and colour uniformity therefore contribute to both spatial variation and coherence. Surface colours or object colours are experienced as relatively permanent and constant, except under extreme variations of the colour of light.

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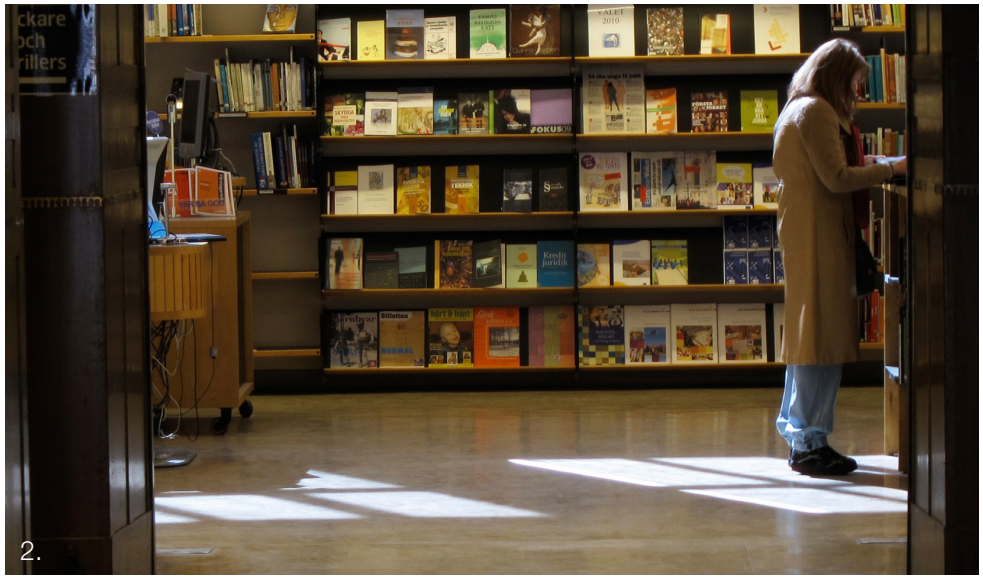
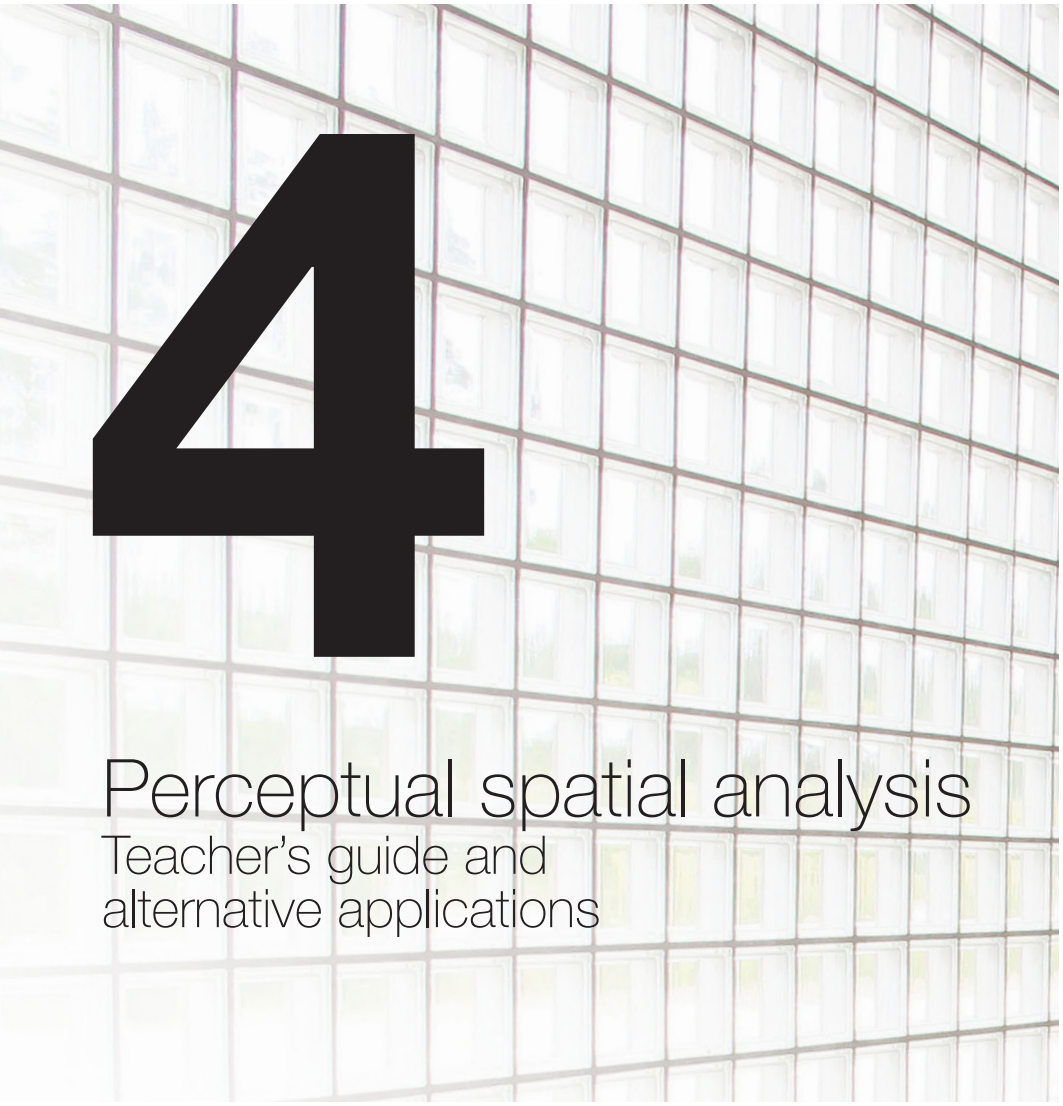


2.

3.

1. Light distribution as a concept refers to how light and shade are distributed across a space.
2. Light patches can be caused by exterior light, reflected sunlight or by narrow beams from artificial light sources.
3. Examples of “cool” and “warm” colour of light.

(Photo: Ulf Klarén)



# 4

# Perceptual spatial analysis

## Teacher's guide and alternative applications

## Teachers' guide

A pedagogical tool can never replace the live pedagogical interaction. However, it can contribute clear starting points and key concepts, relevant questions and methodical processing. That is why only general advice and guidelines are provided here. Your role as a supervisor is to adapt the material to the specific pedagogical situation. The work with the visual evaluation includes *(a) Introduction*, *(b) Observation and on-the-scene documentation* as well as *(c) Follow-up discussion, reflection and analysis*. The Introduction and the Follow-up discussion are vital parts of the process and should, if possible, be allocated plenty of time and are therefore benefited by being scheduled separately, not too close in time to the observation portion of the process. A carefully planned and well carried-out introduction prevents misunderstandings and leads to well-grounded observations, which in turn provide a good foundation for discussion, analysis and reflection.

## (a) Introduction

**Review of basic issues and theoretical background**

The introduction has its starting point in the text *Describing colour and light* (pp. 8–9). It starts with a review/discussion about prerequisites, possibilities and limitations for describing colour and light perception in spatial contexts. Key factors here are the clarification and discussion of what separates physical measurement from perceptual assessment of colour and light. The text can be handed out for reading by the participants beforehand or presented to the group by the tutor. It is up to the tutor at the Introduction to choose the most suitable pedagogical form.

**Review of the observation form: questions and visual concepts**

As preparation for the upcoming observation portion of the process, PERCIFAL's observation questions and visual concepts are introduced. This is conducted with the observation form (pp. 18-27) and the text about PERCIFAL's visual concepts (pp. 10-13) as starting points.

During the introduction each participant should have access to his or her own copy of the observation form as well as the above mentioned text. The best way to familiarize the participants with the visual concepts and and with the observation process is to carry out the review as a group observation of the colour and light conditions in the room where the lecture is held. The participants collaborate in tackling the observation questions and the concepts in relation to the colour and light present in the room. To enable comparisons of observations, we recommend that all participants observe the room from the same direction during this part of the process.

**Information about the observation part**

This is an ideal time to inform the participants about the formalities of the upcoming observation as well as practical prerequisites and observation location(s).

## (b) Observation and location documentation

**Choosing a location for observation**

The choice of location is naturally a question of accessibility as well as of availability of time for making the observations. Regardless of whether the chosen location is inside your own institution or outside it, the selection should as far as possible be governed by the pedagogical aim. Two – or more – locations, with slightly different conditions, facilitate comparisons. An informed selection will result in a more interesting follow-up discussion.

It is also a good idea to station the observations to spaces with well-articulated architectural shape, where the light treatment has a clear purpose. However, this is only a recommendation and not a requirement. Choice of location can be based on many different factors, two key ones being the presence of something interesting to observe and clear pedagogical goals formulated by the tutor.

Public places, such as libraries, museums, malls, churches, etc., provide the advantage of free access and room to comfortably accommodate an observation group. These spaces are, as a rule, well-planned and thought through, architecturally as well as light-wise.

In the trials conducted while developing PERCIFAL the tutors regularly chose several different observation locations with slightly different conditions. For example a trial in Trondheim was carried out in three different public spaces: one showroom with artificial lighting, a hotel atrium and a museum room with a skylight. (Appendix: *PERCIFAL method in use: Visual evaluation of three spaces*, p. 41).

**Before the observation**

On location, it may be advisable to make a brief introduction, to go through the practical considerations and repeat the questions again. It may also be helpful to give a briefing about the place, but not too detailed, as it can affect the assessments later in the observations. It is important that the boundaries of the space to be examined are clearly defined.
Using a moment for orientation will also give participants the opportunity to adapt to the current light conditions; they should have stayed on the observation site at least 20 minutes before the start of the observation.

**During the observation**

The tutor should have planned in advance how participants should be placed on the observation site. The participants' observation points should be distributed in such a way that the group's collective observations in the subsequent discussion can provide a comprehensive, complex and nuanced picture of the colour and lighting conditions. Time of observation should be at least one hour. The participants' responses and comments are to be submitted to the tutor at the end of the observation.

**Documenting the location**

The observation locale should be documented as a foundation for the final discussion (see *Checklist for documentation* pp. 28-29). This is done by the tutor. Some parts of the documentation are to be done in advance, for example noting types of light sources and

Right: Atrium of the hotel building - Port Hall in downtown Trondheim, daytime (main light: daylight). Below: Museum space with sky-light in the Museum of Art in Trondheim, daytime (main light: daylight).
Below right: Part of the exhibition in Nordenfieldske Kunstindustrimuseum (artificial light).

Several different observation sites with different conditions were often chosen for observation during the development of PERCIFAL. For example, in Trondheim the decision was made to investigate three public spaces, an exhibition space with artificial lighting, an atrium of a hotel building and a museum space with skylight. (Appendix: PERCIFAL method in use: Visual evaluation of three spaces, p. 41).



(Photo: Kine Angelo och Barbara Matusiak)

their positioning, layout of the location, which year it was built, name of architect, etc. However, the gathered facts are not to be presented to the participants before or during the observation(s), as the knowledge may influence the results. There are exceptions to this rule, such as year of building or name of architect; these facts can be useful to have while getting acquainted to the location. The majority of the documentation must be done during observation, for example, noting time of day, current weather conditions, light- and colour measuring, etc. If there is time, it may be pedagogically justifiable to let the participants partake in the physical documentation, as long as it takes place after the visual analysis.

Documentation of facts concerning the observation locale must be available at the follow-up discussion and is ideally handed out to the participants before the discussion.

## c) Follow-up discussion, reflection and analysis

The final discussion constitutes the most vital part of the process: its purpose is to provide a complete and conscious image of the group's experience of the space, and also highlights experiences of the process. Given sufficient time between the observation and the final discussion, the tutor will be able to compile the on-scene documentation and note tendencies or features in the participants' answers and comments. Thus, the tutor has a foundation for answering specific questions that may arise during the discussion and also contributing to making the joint analysis substantiated and structured. The observation forms are to be handed back to the participants before the discussion. The answers and comments are primarily to be seen as notes to aid in the joint analysis. One or more participants may be charged with the task of compiling the discussion: it is important that participants are granted an opportunity to comment on the compilation in retrospect.

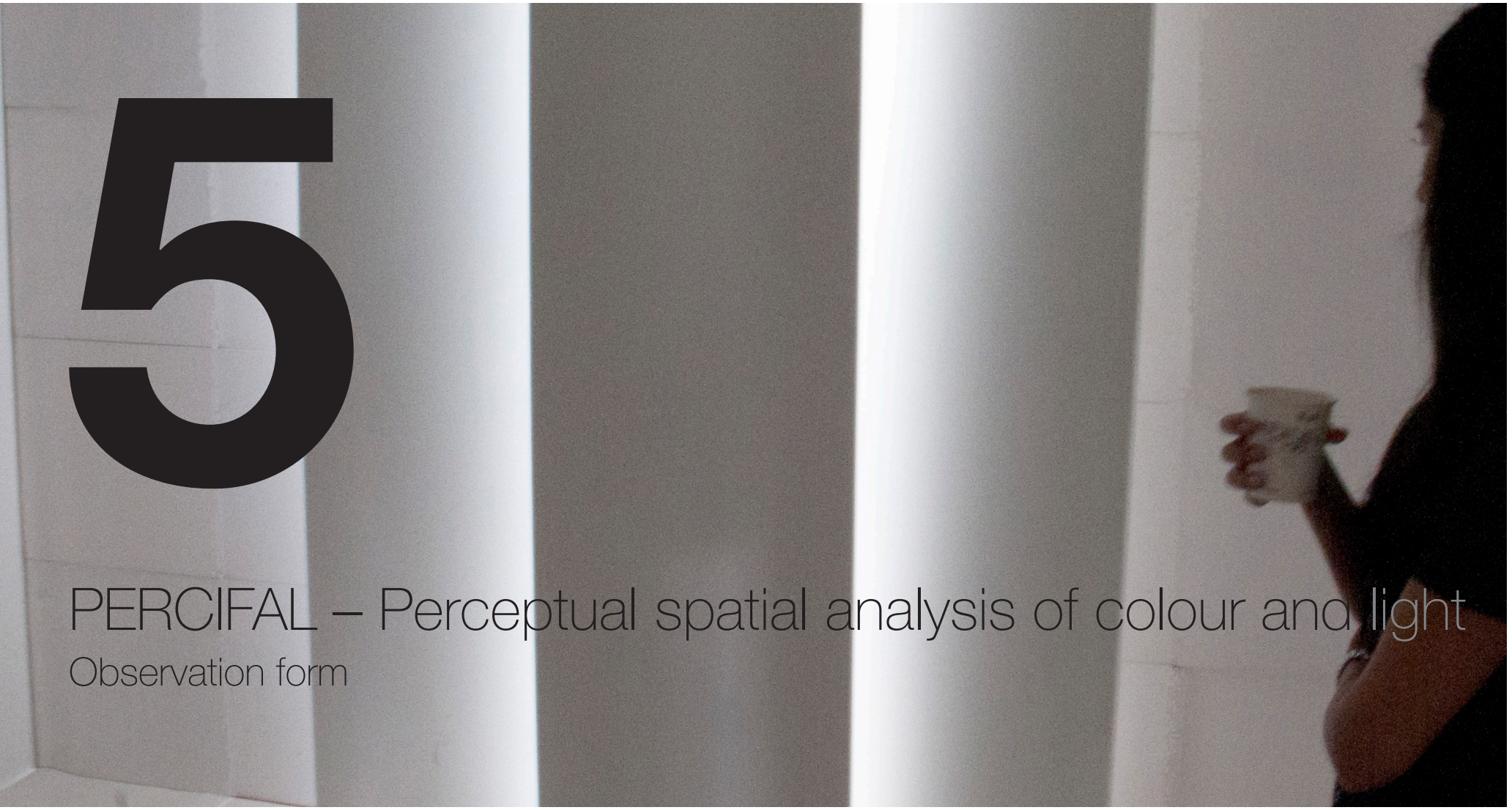
## Alternative uses for PERCIFAL

**When pressed for time**

If circumstances demand it, the introduction and the following analysis can be linked with the observation part, which means that (a), (b) and (c) are scheduled on the same day. In this case, to avoid a false start on the observation, it is best to give the introduction in a space separate from the observation locale. It is also important to stress the discussion- and reflection phase. If you are very pressed for time or the purpose is merely to give a general synthesis, it is possible to select from the introduction (a) the brief background, the joint observation and an the on-scene discussion, without losing any vital aspects. If carefully planned and prepared, this brief one-hour version can still grant participants a general insight into the complexity of colour and light experience in spatial contexts.

**Shared concepts in a professional group**

The analysis material can also be used by professionals within colour and light fields for systematic visual description during the design process. Repeated assessment exercises, starting from PERCIFAL's visual concepts, help develop systematic observation; the group can develop the joint conceptual apparatus and an attention structure with connection to said apparatus in their daily work. It is naturally also possible to practice individual systematic attention using the analysis material. It takes repeated methodical training to develop more secure professional assessment skills. It is in the individual's own interest to carefully observe each finished space. One learns successively by identifying mistakes made and by considering what could have been done differently.



# 5

# PERCIFAL – Perceptual spatial analysis of colour and light

## Observation form

(Foto: Harald Arnkil)

## Prerequisites:

- The observation forms and the concepts have been discussed and subjected to a joint trial in a different space before the observation is carried out.
- It has been made clear, which space and which part of said space is to be observed.
- To enable adaptation, the participants have been in the space for at least 20 minutes before observation starts.
- All participants observe the space from previously agreed positions (approximately alike or distinctly different). The position of observation is recorded.

**Name of observer:** _____

**Date:**_____

**"Name" of space:**_____

**Position in space (stated in consultation with observation leader):**

_____

_____

Important:

- Answer the questions in the order in which they are presented!
- When answers are to be given on a scale: only check ONE box.

## 1. Your spontaneous total experience of the space

In a few sentences, describe your spontaneous overall experience of the space's character and ambience.

## 2. Light level

'Light level' describes how dark or bright the space as a whole appears.
Assess the space's light level. You should not be concerned in your assessment with whether the light level is "good" or "bad".

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**A dark space** **A bright space**

Comments:

## 3. Light distribution

**Light distribution describes the experience of how dark and bright areas are located in relation to each other in the space as a whole, how light is distributed across the space.**

a) Is the space, at eye-level, characterized by even light distribution or by differences of darkness and brightness?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Very even distribution — Very big differences

Which part is darker, less bright?

Which part is brighter?

Comments:

b) Is the space characterized by an even light distribution or by differences in light distribution between higher and lower parts of the space?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Very even distribution — Very uneven distribution

Which part is darker, less bright?

Which part is brighter?

Comments:

c) Can you identify any clear direction in the light of the space? Describe and comment briefly.

## 4. Shadows

**Shadows refer to the overall experience of the shadows' effect in the space as a whole.**

Is the space characterized by contrasts from shadows?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Strong contrasts** **No contrasts**

Which part of the space has distinct shadows?

_____

_____

_____

What colour are the shadows?

_____

_____

_____

Comments:

_____

_____

_____

_____

_____

## 5. Light patches

**Light patches are small areas of brightness deviating from the general light level within a space. They can be caused by external light sources, reflected sunlight or by narrow beams from artificial light sources.**

Is the space characterized by strong contrasts created by light patches from windows and/or light sources?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Strong contrasts** **No contrasts**

Where are the strongest light patches located?

_____

_____

_____

What colour are the light patches?

_____

_____

_____

Comments:

_____

_____

_____

_____

_____

## 6. Specular reflections

**Specular reflections are image-forming reflections, which are typically caused by polished and glossy surfaces, such as glass and metal. Specular reflections are dependent on the angle from which you view them, thus they appear different from different positions in the same space.**

a) Is the space characterized by specular reflections?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Very much so — Not at all

Which part of the space have specular reflections?

_____

_____

_____

How do the specular reflections change when you move about in the space?

_____

_____

_____

Comments:

_____

_____

_____

_____

_____

## 7. Glare

**Glare refers to brightness contrasts in our field of vision that exceed levels of visual comfort.**

Are you disturbed by glare in the space?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Very much so — Not at all

Which surfaces or light sources create a glare?

_____

_____

_____

How does your experience of glare change when you move about in the space?

_____

_____

_____

Comments:

_____

_____

_____

_____

_____

## 8. The colour of light

**Colour of light refers to the hue or tone of the ambient light in the space. The colour of light is not the same as the colour of the light source. Neither is it the surface colours we can perceive within the space. The colour of the light is the result of interaction between the colours of the space and its lighting.**

Do you experience the light as having a uniform colour or can you spot clear variations? Describe these variations and state where in the space the light appears warm or cool or characterized by a specific hue or tone.

## 9. Surface colours

**Surface colour is the colour perceived as belong to an object or surface**

a) What is your general impression of the space's colouring?

Using your own words, briefly describe the overall colouring of the space.

a) Do you experience the space's surface colours as warm or cool?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Warm** **Cool**

Comments:

b) Do you experience the surface colours of the space as a whole as unified or varied?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Very coherent** **Very varied**

Comments:

c) Is the space characterized by contrasts between different surface colours?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Not at all** **Very much so**

Where can you find distinct contrasts?

Comments:

e) What are the surface colours?
Trying to ignore the variations caused by light, what colours do you perceive the surfaces to be? Describe them in your own words and state which surface is which colour.

Walls (state the colour wall by wall, if they differ)

Ceiling (one or more colours)

Floors (one or more colours)

Doors, windows, wall mouldings and other features (specify)

Specific colour accents, f ex. art works or fabrics (specify)

f) Select a few surfaces clearly affected by the colour of the light. Describe the colour they appear to have as a result of the colour of the light (selection and level of detail are specified by your tutor)

## 10. Visual perception of objects, people and text

a) How does the light affect your perception of the shape of objects in the room?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

**Greatly enhances** **Greatly impedes**

Comments:

b) Does the light keep people's natural facial colours the same?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Completely natural — Very unnatural

Comments:

_____

_____

_____

_____

_____

c) How does the light affect your ability to perceive people's facial expressions?

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Greatly facilitates — Greatly obstructs

Comments:

_____

_____

_____

_____

_____

_____

d) How does the light in this space affect your ability to read the sample text below from a standard reading distance?

**Sample text:**

The colour and the light in the built environment affect our experiences and emotions, our comfort and our physiological well-being. The colours of the ambient room influences the light experience and the need for lighting, while the intensity, quality and positioning of the lighting is vital to how we see and experience the colours of the space. Light and colour is of great importance to our health and can also support people's perception, function, orientation and safety. The technical development of the last few decades has created new light sources. These often fulfil the requirements of more efficient energy consumption than incandescent light sources, but we simultaneously lack the overall image and systematic knowledge about the new light source's experiential effects in interior and exterior contexts, their impact on spatial perception and their interaction with colour and other properties in natural and artificial materials. Different methods of defining "good light" are weighed against one another and provide solutions that to varying extents satisfy the demands for energy efficiency, influence on alertness and circadian rhythm, experienced colour of light and colour rendering. The result always ends up being a compromise: to be able to weigh together all these demands, you need a wide understanding of many different aspects of light.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

Greatly facilitates — Greatly obstructs

Comments:

_____

_____

_____

_____

_____

_____

# 6

# Checklist

## for documenting location for observation

The checklist consists of notes made by the tutor and/or an assistant. They can be used for discussions about the connection between physically measurable units and the visual experience of the space or an outward presentation of the room and its different properties.

**General facts about the spaces/building**

Where is it?
Its function
Approximate year of construction
Name of architect, if known
Name of lighting consultant designer/consultant, if known
Is the building/space presented in any publication? If yes, which one?

**Day, time and weather conditions at the time of observation**

Photograph the room and any interesting details, e.g. fixtures and windows
These photographs are used mainly as an aid to memory when necessary

**Measurements of space (area + height)**

If possible, use architectural drawings (including a north arrow!)
Set the physical boundaries for the space being observed

**Window placement**

Positioning and measurements of windows (including breast height = the measurement from floor to the lower edge of the window)
Which cardinal directions are the windows facing?
Are there any curtains or awnings?

Are there any other buildings or any vegetation in close proximity outside the windows, which may influence your assessment of the colour of daylight? If so, describe!

**Walls and floors**

What materials are the different surfaces made of?
(Wallpaper, marble, painted surface surface, etc.)
Describe their structure and other visual properties
(smooth, uneven, coarse, patterned, etc.)
State how glossy they are (can be determined through visual comparison with a gloss scale or through measuring with a gloss meter)
Measure the nominal colours of the surfaces deemed important. This can be done by means of visual comparison to NCS-, Munsell-, RAL- or other standard colour samples placed directly onto the surface)
State on the plan or elevation or in other suitable way where the different materials/glosses/colours can be found
The ceiling is probably difficult to measure – describe it the best you can

**Furniture**

Describe the furniture briefly (e.g. dark brown conference table in the centre of the room with dark green chairs around three red upholstered couches with a glass table in between)

**Lighting**

Positioning of armature
Types of armature
Direction/distribution of light from the armatures
If possible – state what kind of light sources are used in the armature
Describe and/or mark on the plans and elevations or in other suitable way

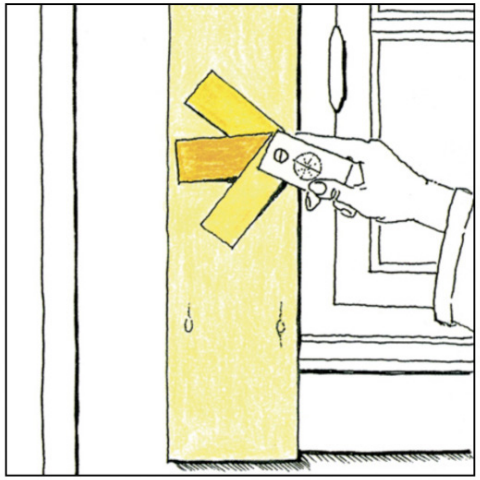
**Measuring of light**

If you have access to instruments designed for measuring light – lux meter or luminance meter – it can be useful to perform readings of the light on the observation location. This enables comparison of physical readings to the human experience as well as comparisons of light radiation in several different observations points. The visual assessment does not always match the readings; a space can be experienced as brighter than another in spite of lower illuminance, which can be explained by e.g. variations in colour- and light distribution. Comparing observations to readings can be part of learning. For more on light measuring: see *To measure light* on p. 31.

**Comments on the usefulness and function of the room**

Depending on the function of the evaluated space and the building in which it is located, there may be a number of different questions relevant to the gathered perception of the space.
Examples of relevant questions:

- Were the end-users consulted during the planning process?
- Was the space specifically designed for one function or can it be used in different ways?
- Is it possible to vary or personalize the furnishing?
- Is it possible to see out of the windows from different positions within the space and from a sitting/horizontal position?
- Is the room protected from outside view?



Visual measuring of the surface's nominal colour. Make sure you place the sample flat against the surface.

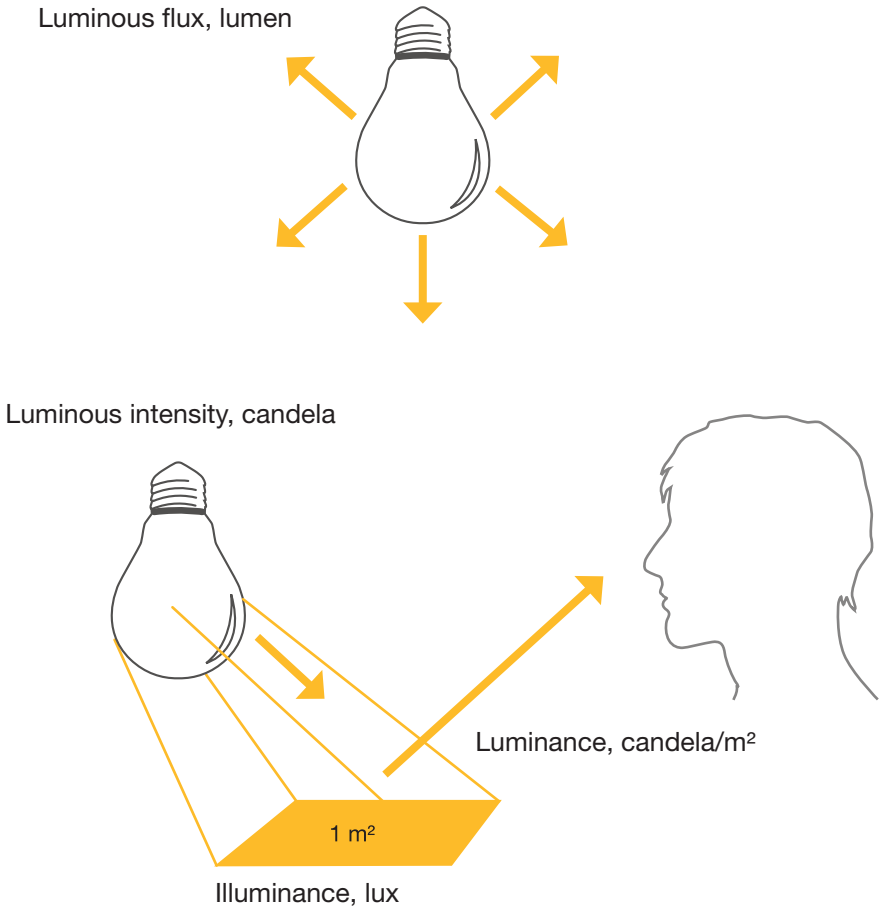
# Measuring light (-radiation)

### Measuring illuminance

*Illuminance* is the measure of incident light on a surface and is expressed in units lux (lx). The lux meter measures the light radiation that hits the measuring cell, usually the radiation falling against the measuring cell's level at an angle of 180°. The illuminance is always stated as a mean value of several readings evenly spaced out across an area. The most common method is measuring the horizontal illuminance, which means that the measuring cell is to be placed parallel to the measuring level. The vertical lighting is important for certain tasks, for example in libraries, on reading- and writing boards and store shelves. When measuring the vertical illuminance the cell is placed parallel to the vertical surface. When measuring the general lighting in a space you usually measure at a level 0,85 metres above the floor.

### Measuring luminance

*Luminance* states how much light radiation is reflected or radiated to the eye from a surface or a light source. It is expressed in units *candela per square meters* (cd/m²). The measuring angle of a luminance meter is usually 1° or less – thus, you need many readings to get a grasp of the total situation: it is important to have a well-defined measuring area whose luminance differences are not too great. There are recommendations for suitable luminance levels and distributions for different spaces.



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Kalmar Castle

# 8 Appendix

As a part of the ongoing work with PERCIFAL, a location description with two presentations was carried out and presented at the *Midterm Meeting of the International Colour Association* (AIC) in Zurich, Switzerland. The texts below are taken directly from the proceedings of the conference. The first – *Visual analysis of space, light and colour* – is an attempt to describe the method's theoretical background, while the second one – *PERCIFAL method in use: Visual evaluation of three spaces* – describes a practical attempt involving the method and discusses its applicability. Please note that the method has been further developed since these texts were written.

**AIC 2011 midterm meeting, Zürich**
**Interaction of colour & light in the arts and sciences – Proceedings**

# PERCIFAL: Visual analysis of space, light and colour

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## Abstract

This paper addresses the need for better and more accurate methods of recording and analyzingthe visual experience of architectural space. PERCIFAL (Perceptive Spatial Analysis of Colour and Light) is an ongoing project that aims at developing a method of analysis that can capture coherent spatial experiences of colour and light. The starting point for PERCIFAL is a method of visual evaluation of space and light, developed by Professor Anders Liljefors at the former department of architectural lighting at KTH Architecture. PERCIFAL is based on direct visual observations and the recording of these observations by verbal-semantic descriptions using a questionnaire. It has been developed primarily as an educational tool, but we see in it potential for a design tool for professionals as well as for an analytical method for research. The first test results, conducted in Sweden, Norway and Finland, show that the method has significant pedagogical merits and that it allows interesting comparisons between physical measurements and visual experiences of space, light and colour.

## 1. Introduction

PERCIFAL (Perceptive Spatial Analysis of Colour and Light) is a subproject within the Nordic research project SYN-TES: Human colour and light synthesis; towards a coherent field of knowledge. SYN-TES grew from a need to share knowledge and find better ways of communicating across disciplines and research areas that deal with the human experience of light and colour in space. The SYN-TES project gathers together experts in lighting, colour, design and teaching from several Nordic universities, research institutions and companies. This paper presents PERCIFAL's background and methodology. In a separate paper Professor Barbara Matusiak et al. present some examples of its use as a tool for visual analysis.

## 2. Background

Our visual experience of the world consists of a totality of inseparable qualities: space, motion, light, colour, objects, details surfaces and textures. Two essential aspects of spatial experience that are among the most difficult to record and describe accurately, are light and colour. All existing methods tend to reduce the temporal and multidimensional experience of space into either static and flat images or into abstract alphanumerical data. Static flat images, such as drawings, paintings and photographs, the conventional methods for recording experiences of light and colour in space, are able to convey much of the total layout and atmosphere of spaces. They are also extremely useful in recording shape, location and details, but they cannot communicate reliably information about surface colours or levels of illumination.

These can be recorded and communicated by photometric means and colour sample matching, but these methods tell us nothing about the spatial context – and therefore the coherent experience – of the colours, lights, shadows and surfaces. As Arne Valberg states: "There is a fundamental difference between the physically defined stimulus magnitudes (if they are photometric, colorimetric or other) and the subjectively perceived qualities." (Valberg 2005:178-79).

We experience colour and light largely as a result of perceptual adjustment and adaptation. Spatial perceptual situations are highly complex; as we move around and through space, our perception and experience of the spatial totality are successively and simultaneously affected by global and local adaptation to varying illuminations and colours. (Noë, 2004 :17). This interaction of subject and surroundings is essential to our perception and experience of the world and cannot be described in photometric terms.

The total experience of space, conveyed mostly by visual perception, is the final test of the success or failure of any designed environment. PERCIFAL is aimed at providing a tool for understanding the role of some key visual components in successful spatial design. Such visual experiences as lightness, brightness, highlight, glare, colour and shadow cannot be captured or communicated by measuring. They are relational qualities that arise from the subject's participation and action in space. They must therefore be addressed and analyzed in the context of participation and action.



## 3. The PERCIFAL method

The starting point for PERCIFAL is a method of visual evaluation of space and light, developed by Professor Anders Liljefors at the former department of architectural lighting at KTH Architecture (Liljefors, 2006). The cornerstone of this method is the realization that key visual aspects of space and light cannot be described in photometric terms. Originally the method had a purely educational purpose and for several years it has been an important part of the diploma course in lighting design in Jönköping University. This is still a central feature of PERCIFAL and we aim to develop this aspect further. However, the project sees in it also significant potential for a design tool for professionals and a method of analysis for research purposes.

The development is carried out under consent of and in collaboration with professor Liljefors. As an essential part of developing the method, the SYN-TES research team members have discussed and carried out their own perceptive spatial analyses starting from Liljefors's concepts. The PERCIFAL method is based on direct visual observations and the recording of these observations by verbal-semantic descriptions using a questionnaire. These can be complemented with photography, photometric measurement and colour sample matching for later comparison with the visual observations. When possible, plans and elevations of the space in question are used for marking observer positions and measurements. Before moving to the chosen space, the observers are prepared in a training session lasting about one hour. The purpose of the training is to ensure that concepts involved and the use of the questionnaire are clear to the observers.

The method and its background are related and discussed with the group. A "dry run" in the training room or some other preliminary space can also be used as a part of the training. The observers are told that there are no "right" or "wrong" answers to the questions and that they should answer according to their observations, i.e. visual perceptions only. After moving to the space to be analyzed, the observers are given about twenty minutes to adapt to the lighting before starting observations proper. The observers can each be given specific viewing positions within the space or can be let move freely. The viewing positions are also recorded. The observation time can vary, but usually at least one hour is needed for a comprehensive analysis. The observers' answers are later analyzed statistically and their remarks summed up by the supervisor(s). The results are shown and discussed in debriefing session with the observers.
The debriefing is an important pedagogic aspect of the process.

**The questionnaire is divided into the following eight main topics:**

1) General impression of the space, 2) Overall level of light 3) Light distribution in the space, 4) Shadows and flecks of light,5) Reflections and glare, 6) Colour of light, 7) Surface colours, 8) Interaction of space, objects and people.

Under the main headings there are more specific questions, which are either in the form of semantic differential scales or forced choice answers. For example under 3) Light distribution in the space the observer is asked to answer the following questions:

a) Horizontal distribution of light (between different parts of the space, at the same height from the floor): very even — — — — — very uneven?
Which part of the space is dark/shaded?
Which part is bright?

b) Vertical distribution of light (between building parts at different heights): very even very uneven?
Which part of the space is dark/shaded?
Which part is bright?

After each main topic the observer can add further remarks. There are several other places where observers are asked to answer freely in their own words. Sometimes the terms in question are given a short definition to help the observer understand the question and attend to the right phenomenon. For example: *Glare = an uncomfortable brightness contrast in one's field of vision*. Some questions draw attention to factors that are not intrinsic qualities of the space itself, but rather indicators of visual experience in interaction with the space. Under the heading *Interaction of space, objects and people observers are asked: How natural does the colour of human skin/facial colour look in the space?* – an indicator of the chromatic quality of the ambient light; and
*How easy/difficult is it to read the below text at normal reading distance in this space?* – the provided text is set in Arial 8pt, medium grey colour. The aim of the question is to assess both the level and chromatic quality of the ambient light.

Tempelplatsens kyrka "Bergskyrkan", Helsingfors

## 4. Results and discussion

The authors have so far tried out the PERCIFAL method and accompanying questionnaire with seven groups in nine locations in Stockholm and Katrineholm (Sweden), Helsinki (Finland) and Trondheim (Norway) during spring and summer 2010. The observers were in most cases students of art, architecture and design but also lighting and design professionals were involved. So far the observers have had little difficulty in understanding the task at hand. A lot depends on how carefully the briefing is carried out and it is important to stress that observers should rely on their immediate perceptions rather than their preconceived conceptions of colour and light in space.

Some terms in the questionnaire were more susceptible to misinterpretation than others. For instance the concept of glare needed clarification. Glare is an entirely subjective percept, and at the same time one of the most important negative factors in lighting design. The definition of horizontal and vertical distribution of light and shadow, particularly in the case of very high spaces, also caused some difficulties. Light and shadow distribution can become extremely complex and difficult to describe on a single scale. The effects of cueing and expectations became apparent in the questions concerning glare and glitter: they tended to elicit observations of many local instances of strong brightness contrasts and highlights rather than an overall analysis about visual comfort/discomfort. Also the whole notion of visual discomfort is highly contextual: car headlights at night can be irritatingly, even dangerously glaring whereas sunlight sparkling on water (with a far greater level of luminance) can be experienced as pleasant and enjoyable. Such problems have led the authors to consider using questions that are less direct (e.g. the ones concerning skin colour and legibility).

This subjective nature of some of the percepts brings us to the question: how reliable is PERCIFAL as a research method? The very aim of PERCIFAL is to help to describe the coherent and holistic experience of space rather than discreet and individual details. The approach is very similar to that of an artist: nonessential details must be sacrificed for the truthfulness of the whole. We have found that such a method can help to reveal essential aesthetic and visual-functional qualities of space that cannot be addressed equally well by other means. PERCIFAL is a way of collecting and systemizing analyzable data from individual observations.

The methods of analysis are still under development, but even as such the method and data retrieved so far have proven to be of great educational value. Most of the observers reported that their perception and understanding of the visual factors in space became heightened as a result of the tests. They became particularly aware of the effect of adaptation to the perception of brightness and colour tone. They became also more aware of the meaning of such visual terms as brightness and lightness. The method and questionnaire are under continuous augmentation as the tests continue with more groups and locations. Each test so far has led to improvements and additions to the method.

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**Interaction of colour & light in the arts and sciences – Proceedings**

# PERCIFAL method in use: Visual evaluation of three spaces

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## Abstract

In this paper we describe the use of PERCIFAL method for visual registration and evaluation of three architectural spaces in Trondheim: an atrium, a skylight room and a room lit by electrical light. A group of subjects visited those three rooms in August 2010. They were asked to make a spontaneous verbal evaluation as well as evaluation with the help of quality descriptor differentials developed in the PERCIFAL project. Despite differences between subjects, it was possible to find a strong correlation between surface illuminances, the score at Light level scale and the impression of openness/spaciousness versus darkness/gloominess. Furthermore, it was possible to find a correlation between the occurrence/absence of chromatic colors in the room and the impression of the room being serious and severe versus lively and playful.

## 1. Background

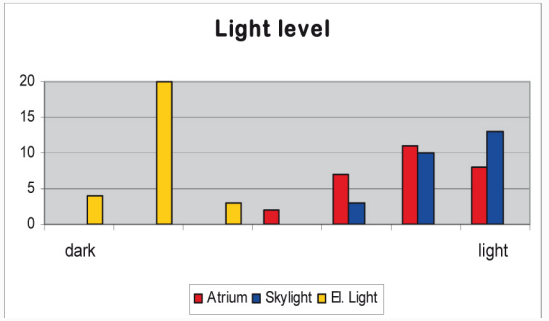
PERCIFAL Perceptive Spatial Analysis of Colour and Light is a subproject within the Nordic research project SYN-TES: Human colour and light synthesis; towards a coherent field of knowledge. SYN-TES is funded by the Knowledge Foundation, Sweden. The project grew from a need to share knowledge and to find better ways of communication across disciplines and research areas that deal with the human experience of light and colour in space. For further presentation of the PERCIFAL method see Arnkil et al.

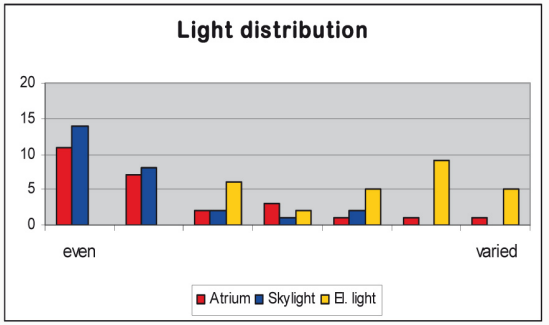
## 2. Method

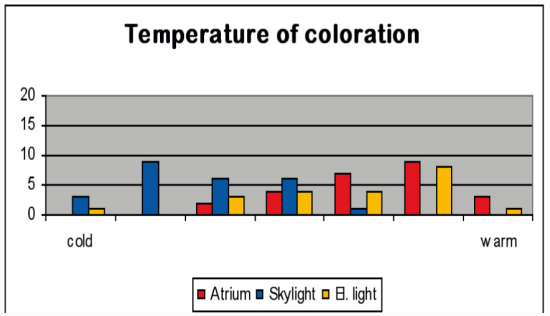
Three architectural spaces in Trondheim, Norway, were chosen for evaluation: 1. Atrium, 2. Skylight room and 3. Electrical light room. The Atrium is a part of the hotel building situated in Trondheim Centrum and called Porthuset. The courtyard is nearly square in plan (11 x 12m) and has a height of 5 storeys. The courtyard is the secondary daylight source for apartment rooms adjacent to it. The glazed roof covers the whole courtyard, some of the window panes at the roof are made of coloured glass; this contributes to a nice play of coloured and uncoloured daylight at the facades of the courtyard, especially during sunshine hours. Daylighting is supplemented by an artificial lighting system that consists of evenly distributed, spherical lamps with compact fluorescent light bulbs, hanging about 3m over the floor. The room is also characterized by a strident colour composition with strong colour contrasts, see figures 1 and 2.

The Skylight room is the largest and most spectacular room in Kunstmuseum, the Art Museum in Trondheim. There is a linear, large and elegantly designed skylight in the room that early dominates the visual environment in the room. It has a specially designed internal sun shading device fastened to a steel construction that has a similar shape to the skylight, but is oriented downwards. Different types of lamps (spots and wall-washers) are fastened around the skylight, but they were not switched on during the visit. The colours chosen on the room surfaces are solely nuances of grey, see figure 3.

Figure 1 and 2. Atrium in the Porthuset, photos Kine Angelo.
Figure 3. Skylight room and 4. Electrical light room, photos B. M.



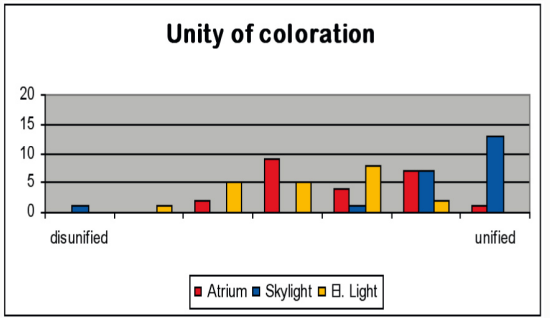




Figure 5. Evaluation results for Light level and Light distribution.
Figure 6. Evaluation results for Temperature and Unity of coloration

The Electrical light room is a part of the exhibition area in the Nordenfieldske Kunstindustrimuseum, a museum of applied arts in Trondheim. The room has some high and narrow windows that are covered by sun-proof textile roller blinds. However, there are gaps between the blinds and the walls, which became very bright during the visit. The room is lit by halogen light spots distributed over the space and giving light precisely where it is needed. The color composition in the room consists of wooden floor, dark gray ceiling and white walls, except for one that is painted in green. (See figure 4).

A group of 30 subjects visited those three rooms in August 2010. The participants were: master students of architecture (n=15), a group of electrical engineers (n=13) and architects (n=2). They were asked to make a spontaneous verbal evaluation as well as evaluations with the help of quality descriptor differentials developed within PERCIFAL: Light level, Light distribution, Shadows and light spots, Glare and specular reflections, Light colour, Surface colour, Interaction between space, objects and people. During the same visit the illuminance was measured in a few places in the room and colour sample matching was carried out.

## 3. Results

**Spontaneous linguistic description:**

1. Atrium: comfortable/relaxing (13), colourful (9), open (8), playful/alive (7), high/tall (7), contrast variety (4), exciting (3), modern (3), warm (2), flat (2).
2. Skylight room: spacious/open (15), light/aerial (14), comfortable/comf. lit (13), large/high (9), sacred/serious (4), exciting (3), cold (3), calm (2), relaxing (2)
3. Electrical light room: dark/gloomy (30), calm/quiet (12), cosy/comfortable (6), uncomfortable (5), mysterious (4), solemn (4), exciting (3), disordered/messy (2), quiet (2), feels small (2), artificial (2)

**The colours in the respective rooms registered by colour matching with NCS samples are:**

1. Atrium: dark gray stone S 8500-N and red carpet S 3560-Y80R on the floor, dark palisander S 8010-Y70R (-Y80R), white plaster S 0500-N and green painted walls S4050-G70Y on one side and S2030-G70Y on the opposite side of the room.
2. Skylight room: white plaster walls S 0500-N, light blue marble tiles on the floor S 2002-B and around doors: S 1002-B
3. El. light room: wooden floor S 4502-Y, gray ceiling S 6000-N, plaster walls painted white S 1500-N, one painted green S 7020-G, black curtains S 9000-N.

The illuminance measured during the visit was:
1. Atrium: 1750 – 2300 lux on walls, 1300 – 6800 at tables, 920 lux at the counter
2. Skylight room: 1200 – 1650 lux on walls, 1350 – 2550 on the floor
3. El. light room: on white walls 150-200 lux, 800 – 1050 lux at the center of light spots and objects, 50 lux on the green wall, 300 – 800 lux on the table 1500 – 2000 lux on the daylighted reveals.

The evaluation results for some of quality descriptors used in the PERCIFAL project are presented in figures 5 and 6; 7 steps differential.

## 4. Conclusions and discussion

The Atrium was described as most colourful, open and playful/alive of all rooms but also as the most comfortable. The colour composition was most vigorous of all rooms. Both, the chromatic red-green contrast and the luminance contrast between walls and window frames are strong. The coloured glass on the roof appearing as reflections on the window glass contributed probably to the impression of the space being playful/ joyful. Since it was the only room having strongly chromatic, warm and bright colours, there is an indication about the coherence between the occurrence/absence of such colors and the impression of the room being respectively serious/ severe versus lively/ playful.
The Skylight room was described as lightest, most spacious, and most serious/ascetic of all rooms. At the Light level differential it was evaluated as the lightest one despite of the fact that the measured illuminance was somewhat lower than in the Atrium. Since the room has the coldest and the most uniform colouration, with nearly no colour or luminance contrasts, it is very probable that the clear impression of lightness and spaciousness is strengthened by this faint, cold and uniform coloration.

The Electrical Light room was liked least of all. It was described as most dark/gloomy, most calm/quiet and most intimate of all rooms. The room was evaluated as darkest in Light level and most varied in Light distribution, something that is in agreement with measured illuminance values. The very high illuminances at window reveals, caused by sunlight, were evaluated as glary by 7 subjects and gave an important reference.

The PERCIFAL method was evaluated as a very useful tool for helping to observe, analyse and better understand spontaneous evaluation of visual qualities of architectural space. Most concepts were easily understandable, besides of specular reflection and modelling. To improve the method the scale for modelling could be changed to e.g. planar – three-dimensional instead of diffuse – clear. The skin colour was evaluated as most natural, the textures as most clear and it was easiest to read in rooms with daylight predominance. The clearest correlation in this survey was found between illuminance values measured in a room, the score at the Light level differential, fig. 5, and the linguistic description of the room: openness/spaciousness versus darkness/gloominess.

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