



Lighting Cultures in Northern and Southern Europe

An Investigation of Living Spaces

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[...] a northern and a southern lighting culture exist. This study focused on some of the aspects in the complex discussion of lighting cultures and was able to define some common issues to delineate preferences for the north and the south.

Abstract

In order to create awareness of different qualities of light in indoor living spaces, two different lighting cultures are being investigated; Northern and Southern European. We therefore investigate the relation between natural and artificial light, based on geographical position as well as social/cultural habits of different countries. The aim is that this approach will inform the user on how different lighting scenarios can improve the use of the space. The investigations are based on end user's preferences and illustrate how awareness of different lighting cultures can be used in different lighting design scenarios. The findings from this specific project are meant to support the development of scenarios for future lighting fixtures and control systems based on a deeper understanding of cultural and geographical parameters.

Keywords: Lighting Cultures, North and South Europe, User centered design, Lighting design scenarios, Indoor living space, Dynamic lighting, Artificial light

Introduction

This investigation is based on the hypothesis that the use of artificial light has a relation to the natural light in different geographical locations. For example, people in the Southern region of Europe use and experience artificial light differently than people of the Northern Europe. There are many factors that could influence the experience of light from different areas.

When the first three authors arrived in Denmark to study at a master programme in Lighting Design they each had different ways of perceiving the use of natural and artificial light. The hypothesis of this paper is that this difference was influenced by their diverse life experiences in their home country and their distinctive cultural backgrounds.

The various regional origins of the authors played a significant role in the group's understanding of residential lighting design using both artificial and natural light. Two group authors are from Southern European countries, Italy and Greece, and one from a Northern European country, Lithuania, living and studying in a multinational environment, such as the international Master programme in Lighting Design in Copenhagen, and having the opportunity to exchange opinions and experiences with each other, created awareness of the differences mentioned above, and created the interest for this topic.

The investigation, understanding and definition of Lighting Cultures was defined as the main task of this research paper. A qualitative user centered approach was considered to be the most appropriate methodology. Experiments were set up to define and test lighting design scenarios and solutions. A multitasking lighting fixture named Orb, was used for the experiments, testing the lighting scenarios. The luminaire can provide different modes of illumination from different directions.

Lighting Cultures

Through a definition of the term Lighting Cultures, a consensus was reached to describe the term as a relationship between natural and artificial light. This was achieved by describing how natural light affects the use of artificial light in indoor living spaces, based on the various geographical positions and along with cultural and social habits. Thus far, there was not an existing specific definition of lighting cultures, only personal observations and examples of using the lighting in different regions. Therefore a northern and a southern European lighting culture were defined. As a result, the perception and use of artificial light in indoor living spaces will be analysed to find regional varieties and users' preferences

Definition of Northern and Southern lighting

To investigate and define the Northern and Southern lighting cultures in Europe, four different countries are considered. Two in Northern Europe: Lithuania and Denmark, and two in Southern Europe: Italy and Greece. The Northern countries are unique because of their relative proximity to the North Pole. The capital cities of the northern European countries are located at 54° N and above (UNSD 2017). Natural light in these northern countries is different from southern regions in Europe, due to very low solar angle during the year, long moments of twilight and frequent overcast sky (Mathiasen 2016). These particular geographical and climate based factors have a strong impact on the illuminance level on the ground, the colour of daylight and the modeling of the landscape, buildings, terrain and people (Matusiak, Anter a 2013 25-38). The mixture of different natural lighting conditions such as colour of daylight, the direction of the sunlight, long and colorful shadows during the twilight and overcast grey sky could be defined as Northern Lighting. (Mathiasen 2016) (Figures 1 and 2)

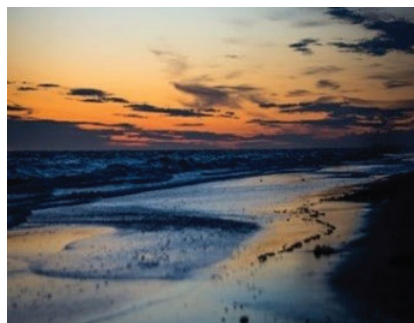


Figure 1. Colourful sky during the twilight (WallpaperPulse, 2016)

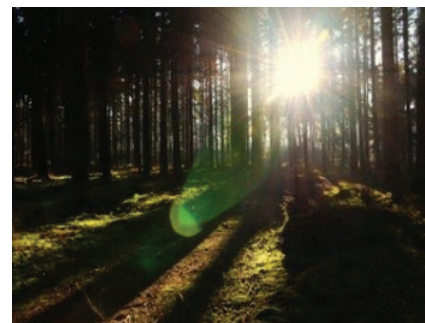


Figure 2. Long Shadows (DIAL GmbH, 2017)

Unlike the concept of Northern lighting, the concept of Southern lighting is not well described in the literature. Therefore, it will be defined in contrast to Northern Lighting, by adding personal experience of the perception of natural light, the use of artificial light, and the comparison of these observations between the countries mentioned above. In the southern region of Europe the majority of the daylight intake is direct sunlight. Since the sun has a rigorous light it characterizes bright environments which sometimes can be identified as glary and with sharp shadows. Few variations in the direction of the sunlight colour, intensity and hardness are visible throughout the year, even if the changings are not as evident as in the northern part of Europe; they are the ones defining distinct perception of the indoor and outdoor spaces during different seasons (Figure 3 and Figure 4).



Figure 3. Sharp shadows in Southern countries (Baker, 2017)

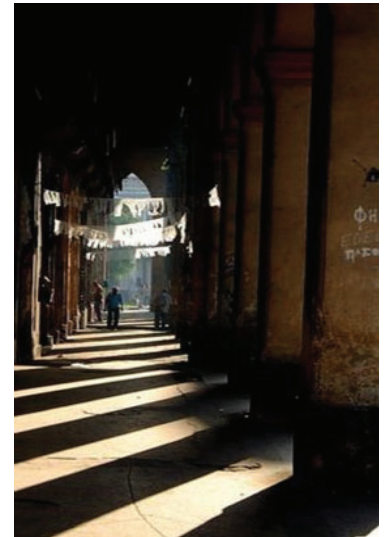


Figure 4. Sharp shadows in Southern countries (Baker, 2017)

Perception and use of light in Northern and Southern European countries

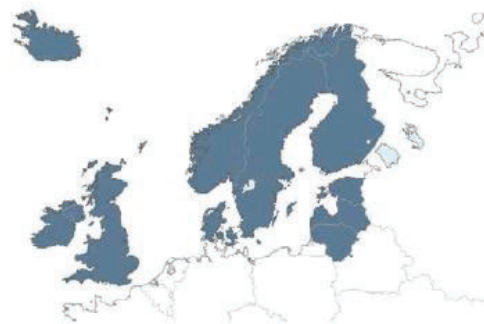


Figure 5. North European countries



Figure 6. South European countries

Our basic ability to sense and interpret light, comes from our experiences of natural light. In addition, people's cultural background, religion, and social habits play a significant role in perceiving light. Understanding of light is tightly connected to the interpretation of the world surrounding us. This interpretation of sense impressions is so deeply rooted in us that we often take it for granted (Jensen 2007). The perception of the space surrounding us is a subjective experience, strictly related to the environment and lighting conditions we are used to live in. Since both factors are dependent on the geographical position, they have an influence on the population's habits and culture. It is possible to deduce that perception of light, both natural and artificial, is entirely different in Northern and Southern European countries (Figure 5 and Figure 6).

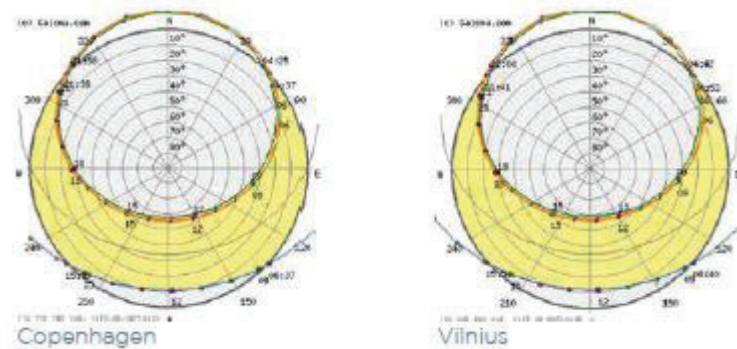


Figure 7. Sun path diagrams in Copenhagen and Vilnius (Gaisma.com, 2017)

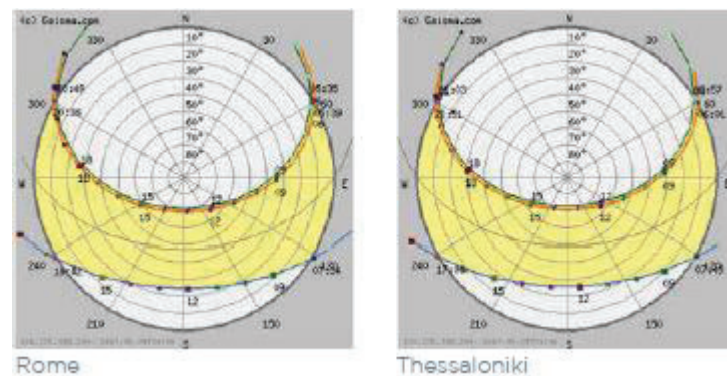


Figure 8. Sun path diagrams in Rome and Thessaloniki (Gaisma.com, 2017)

In the Northern countries, people tend to use lighting with a warmer white colour temperature. This might be because of the geographical position and the low angle of the sun (Figure 7). This means a longer twilight period, which creates sky patterns and hue environments. While in Southern countries, natural daylight is perceived in another way and a short cycle of twilight eliminates the options for different colours (Figure 8). The artificial light in Southern region has often a colder white colour temperature, similar to the intense natural daylight. The angle of the sun in Northern and Southern European countries varies substantially; making the direction and distribution of artificial light to be different from region to region. Due to long and soft shadows in Northern European countries, people use more diffused lighting in the living spaces. Mathiasen, N. (2016). The domestic environments in Northern European countries have a mix of direct and indirect lighting, and the distribution is designed according to the activities and needs. In Southern European countries, due to a high angle of the sun, domestic environments are designed to have light direction from above, and distribution of the light source is managed evenly in the space. Multiple use of lighting layers such as general lighting, task lighting and ambient lighting is a common combination in Northern European countries. As it was mentioned above, the environment of nature creates these different choices (Ledvance 2017). In Southern European countries, residents try to replicate the natural bright environment and use only one lighting source, as bright general lighting. (Table1). The differences between the regions and how the light is perceived and used in the domestic environments can be interpreted as "Lighting Cultures" illustrated in Table1.

Table 1.

NORTH ...	SOUTH ...
COLOR TEMPERATURE warm - neutral	COLOR TEMPERATURE neutral - cool
DIRECTION multiple	DIRECTION from the ceiling
DISTRIBUTION not even	DISTRIBUTION even
SHADOWS soft	SHADOWS sharp

Methodology

To gather knowledge about Lighting Cultures in Europe, as well as the user's preferences and the use of light in indoor living spaces, four methods were employed. The methods were:

- review of academic papers
- interviews of lighting experts all over the world
- investigation of user's preferences through an online survey
- on-site tests

Tests of lighting scenarios in northern and southern European apartments were conducted.

Academic papers are studied to understand other theoretical definitions of Lighting Cultures. Lighting experts' opinions, regarding their projects and installations from all over the world, are being investigated and analysed in order to reach a deeper knowledge on the way professionals work in relation with different Lighting Cultures. The online user's survey was elaborated to investigate people's' different preferences in the use of artificial light at home, based on the country they come from, as well as their personal experience and habits. The aim was to collect accurate results on the way users from diverse regions use artificial light, in relation to specific spaces and functions. This procedure leads to the following research question:

Is it possible to define a northern and a southern lighting culture, and will the users from the northern and the southern countries choose the appropriate lighting scenarios in a test according to this definition?

The following under-questions and related methods have been defined:

1. Is it possible to confirm the existence of different Lighting Cultures?
Research, review of academic papers.
2. Do lighting designers refer to lighting Cultures in their work?
Practitioner's citations from interviews with lighting designers.
3. Which are the user's preferences according to the definition of Northern and Southern European Lighting Culture?
User's survey

Four apartments in the four different countries were selected and analyzed to investigate how the user's cultural habits influence the preferences of the use of

artificial light in a living space. The socializing activity in the living room and the eating function in the kitchen were chosen.

By selecting two spaces and functions, the authors wanted to test different design solutions for different lighting scenarios in an indoor living environment, according to the Northern and Southern European lighting culture. The goal was to test if the user would choose a lighting scenario according to their geographical background.

Literature Review

In this section, the selected literature is reviewed. Every paper is introduced briefly, along with an explanation and how it is linked to the theme. The main criteria and viewpoints of the chosen literature are defined, and statements are supported by quotes.

The paper "Light and the Aesthetics of Perception", Carlo Volf (Volf 2011 40-41) conducts a study of our perception, focusing more on the effects of light and less on the physical light (lux). The paper attempts to establish a link between the regional daylight and the use of artificial lighting, showing that sunlight, as a background, along with our perception, are determinant factors for how the artificial lighting and the brightness of the room are perceived. Carlo Volf analyses with a scientific and cultural approach, the reason why Scandinavian Countries prefer to use a warm artificial light and people from Southern European countries tend to use cooler CCT. The approach is more than an aesthetic analysis throughout history which leads him to consider geographical and cultural data as well as scientific explanation and perceptual descriptions. In addition, he underlines that lighting perception is not only a matter of scientific knowledge and explanations but a cultural subject strictly connected to the geographical position of each country.

An anthropological lighting approach by Mikkel Bille and Tim Flohr Sørensen (Bille, Sorensen 2007) is presented in the article "An Anthropology of Luminosity: The Agency of Light." This article addresses the relationship between light, material culture and social experiences. By analysing three case studies, they define the role of light in different contexts. It explores through history and different countries the role light plays as a metaphor, material agent and social value. The aim of this paper is to investigate the ways in which light works as an element in experiencing the world surrounding us by introducing anthropology of luminosity, as well as an examination of how light is socially used to illuminate places, people, and things, in a residential context. The content of this paper explores the light as a cultural phenomenon addressed to people's social behaviour and habits. The paper offers an exciting method for analysing light from the anthropological perspective as well as an overview on the different meanings light can have by exploring several cultures all over the world.

To broaden the knowledge about the natural daylight differences of the countries, research paper "Nordic Daylight" by Barbara Szybinska Matusiak (Matusiak, Anter b 2013 25-38) has been reviewed. It shows the analysis and results of daylight environments in different latitude. One of the most important findings of this paper is the dominating low solar elevation angle during the year in the Northern European region. Low solar angle during the year causes glare and people living in this area are familiar with various shading options. That could be intuitive body turn against the sun or windows' blinds in the buildings. Due to this fact, the reason why people in Northern European countries prefer indirect and shaded lighting could be defined. Other important information to mention is long periods of twilight in Northern regions. According to the author, this creates a colourful environment which could last up to two hours even though the sun is not visible anymore. Due to that, the assumption could be made that people in the Northern European region tend to use warm white and more colourful lighting.

Lone Stidsen, Niels Thuesen and Poul Henning published a paper in Nordic Journal of Architectural Research called "Mapping Danish Lighting Trends" (Stidsen, Thuesen, Henning 2014). The publication is a research project about Danish lighting trends in domestic environments. They investigated identifying marks of arranging artificial light in a horizontal tripartition of space.

The paper introduced the theory that the lighting trends in Danish homes are defined by high, central and low positioning of illumination, depending on the activity in the domestic environments.

According to the authors, atmosphere can be shaped by light, but there should be common socio-cultural understanding of the group. This means that lighting designers must add a socio - cultural condition in their design in order to create an applicable atmosphere to be experienced by the user. For this reason, investigation of different cultural aspects is a must.

A paper by Rosella Tomassoni called "Psychology of Light: How Light Influences the Health and Psyche" (Tomassoni, Galetta, Treglia 2015) analyses the light from a psychological point of view, investigating the relationships between light-based emotions and behaviours and the psychophysical responses to lit environments providing the interpretative keys of an increasingly complex reality. Even the dark (i.e. the opposite of light) was analysed, describing the effects of particular sensory deprivation. The strategic layout and modulation of lighting by designers may influence the perceiver's mood. The paper takes into consideration light as well as darkness describing them as two opposed values which can shape and direct human perception, characterizing the space and describing the different scenarios. The scientific approach through which light is analysed in this article can be considered as a psychophysical prove to support and explain the author's different perception and understanding of light, based on their cultural background.

In "Lighting up cosy atmospheres in Denmark" Mikkel Bille (Bille 2014) explores the use of light in staging atmospheres in a residential area of Copenhagen. He interviewed 60 people from a particular area of the city about their lighting habits. Through this research, he found out that most of the participants, even though they use light mainly as a way to illuminate a room or create an atmosphere when asked they provided adequate justification and emotional backgrounds of their actions. For some of them, it is a way to communicate with their neighbours creating a feeling of a larger community beyond the confines of an apartment. One participant stated that she always leaves the light on in her living room, when she studies in her bedroom, just to keep her company. An older couple said that they do not feel like they have returned home unless all the lights of their house are turned on. Most of the participants in those interviews gave different reasons for leaving a light on showing that the latter is not only a form of illumination or a wavelength of energy but also it can provoke cosiness, safety, companionship and it can even be used as a way of salutation.

As a conclusion, the literature review gave an understanding of how natural and artificial light can affect the human body, confirming as well several differences between Northern and Southern regions of Europe. The psychological and anthropological approach, described by some of the authors, illustrated the potentials of investigating light from user's perspective, and knowledge on users' perception of light in different cultures.

Lighting Designers' experience

One of the major influences for this research was the book "Light and Emotions, exploring lighting cultures/conversations with lighting designers" by Vincent Laganier and Jasmine van der Pol. (Laganier, Van Der 2011). In the following section, citations of the interviews from this book that are related to this topic have been selected. They are provided in a format quote, country of origin-profession and years of experience in lighting design. "For example in India red

signifies danger, but in China it is the most sacred colour. That's a cultural difference " – Manav Bhargava , India, Architect in 8 years "All the projects we are working on right now in Dubai and Cairo are so much about colour change but not because they want to be Las Vegas. I think it's because in their culture, it's important to find colour, vibrance, in everything. Think about it-everything is neutral; their clothes are black and white. So to create something like that makes people feel good or becomes celebratory or is just different." Barbara Horton, USA, interior designer for 29 years.

"Your use of various colour temperatures of white is different when compared to other cities such as Hong Kong or Shanghai, which have lots of colours. Each city has a different latitude and climate. I recently visited Copenhagen. They never use white light there; the colours are much warmer. In tropical cities people like to have whites or blue whites. Tokyo or Osaka has a much whiter landscape than Paris, New York or London. Colour temperature is largely based on climate." Kaory Mende, Tokyo, Industrial and Environmental design for 32 years.

It seems that lighting designers around the world agree upon the fact that people's preferences about light can be affected by two factors: the cultural background and the geographical position of the country they are staying in. Religion also plays a significant role but it is out of the scope of this research. The geographic location is in relation to the natural light and its nuances through dusk and dawn. People from the south are used to an entirely bright environment due to a prolonged sunny weather and prefer the same kind of light in their apartments as well. On the contrary, people from the northern part of the northern hemisphere and due to the various colours of the sky during sunrise and sunset, are accustomed to a more warm light. When it comes to cultural background, each country has its history and social habits that can affect their choices about light. For example, as Barbara Horton stated, people in Dubai wear only monochromatic clothes and mainly black and white. So they need some colour in their life, and that's why they sometimes prefer coloured light. Furthermore, the culture can be described as a fact that has been happening for many years and now is embedded in people's minds and preferences. People from the southern part of Europe are used to a rich sunlight and they prefer a strong, white light. Even when they move to the north, they will still choose a white light. It is part of their culture now. To sum up, lighting cultures are affected by cultural background, history and social habits, according to the experiences of the lighting designers. And based on the characteristics of the natural light at each geographical position, people from the northern countries prefer a warm colour of light whereas people from the south prefer a bright white light.

Survey

To identify the user's preferences for artificial light used in indoor living spaces in Northern and Southern regions of Europe, an online survey was conducted. The objective was to identify the tendencies of the colour temperature of the light, the direction, the distribution and the placement of the luminaires in two different spaces, the kitchen and living room. A total of 28 questions were asked to 300 participants, most of them born, raised and still living in Italy, Greece, Lithuania and Denmark. Immigrants, international workers, and students that have moved from north to south and vice versa were excluded in order to avoid possible bias.

The first four questions were used for the demographic identification of the participants. The additional five questions supported the understanding of the choices of the participants in relation to some of the functions in their apartments as well as its interior. The rest of the questions of the survey were more specific regarding the functions, the CCT and the positioning of the luminaire, as well as the direction of the light. Visual stimulus was provided in the form of pictures-along with the answers in order to inform the participants and make their choice easier and more understandable. The questions asked

were quite clear and straightforward to avoid confusing the participants with technical details and to allow them to express their preferences clearly and based on their emotions, following the qualitative approach (e.g. "When you eat alone, what kind of intensity do you prefer- a bright light, an average intensity or something like a candlelight?). The target group for the survey was the age group from 18 to 35 years old for three reasons:

- i. Most of the participants belong at that particular age group, a total of 196 out of 300. That helped to extract safer results as it was a satisfactory sample size.
- ii. It is the age where people usually create their home from the beginning. As a result, they have a more active participation in the selection of lighting fixtures of their taste.
- iii. The first three authors belong to that same age group and have a stronger connection and understanding of the participants.

The online survey provided the authors with valuable information and brought them closer to the preferences of the average individual without any knowledge about light. These results were the most important from the online survey:

- a. Globalization has possibly created a similarity to people's habits when it comes to functions in their apartments and the light required for them.
- b. In the northern regions of Europe, people are more consistent with their choices about light, its CCT, and directionality. In the south regions, people are experimenting with the variety of their choices, failing to present any consistency on their choices.
- c. People from northern Europe prefer light on an average intensity coming from numerous sources indirectly, whereas people from southern Europe prefer a bright intensity, coming from one or two luminaires, sometimes indirectly and sometimes directly.
- d. There is a difference in the CCT between the two regions but is not as big as expected. Some of the Northern Europeans prefer a warmer light whereas some of the Southern Europeans prefer a cold light, but in general, both groups prefer a neutral white light between 3000K and 4000K. Additionally, people from southern Europe showed that while they are socializing they prefer a brighter environment and sometimes direct light and people from northern Europe prefer an average or dimmed down intensity, indirectly.

Northern and Southern apartments

As four different apartments in Denmark (Figure 9), Lithuania (Figure 10), Greece (Figure 11), and Italy (Figure 12), have been analyzed, some similarities and differences between Northern and Southern European regions could be extracted. First of all, when talking about the kitchen and living room in the apartments, Northern European regions tend to have them in a separate room which is not the case in Southern Europe. An open space, such as a connected kitchen with the living room, is more common in Southern European regions. Secondly, the CCT of the light in North Europe is between warm and neutral white, whereas in Southern Europe people tend to use neutral and cold white. The position of the luminaires differ from place to place, but there is a tendency to use pendant and table lamps in Northern Europe while ceiling recessed or mounted luminaires are found more often in Southern European countries. When comparing the direction and the distribution of the light between the countries, differences stand out. There are more lighting layers, brighter and darker spot areas and narrow lighting distribution in the Northern European region. On the contrary, a wide distribution of light and evenly lit spaces is more frequent in Southern Europe. More dimmed environment stands for Northern Europe and much brighter spaces for Southern Europe. As the results cannot be taken for granted, that the different use of light is only common for the specific region, some differences stand out as guidelines for use of light in the Northern and Southern European countries.



Figure 9. Denmark



Figure 10. Lithuania



Figure 11. Greece



Figure 12. Italy

Testing Lighting Design Scenarios

In this chapter, the findings are translated into lighting design scenarios and being tested to the end user’s preferences. The goal of the project is to illustrate lighting design potentials for indoor living spaces based on the qualities of Lighting Cultures in Northern and Southern Europe. To be able to consider and judge different elements in the final design proposal, two success criteria have been defined, in which various design elements as well as social and cultural habits, will be included (Table 2)

Table 2.

EVALUATION

- Quantitative •
criterion

FUNCTIONS

• • •

Specific activity
in the
defined space

- Qualitative •
criterion

ATMOSPHERE

• • •

Comfort based
on
cultural habits

LIGHTING DESIGN PROPOSALS



Lighting Designs based on Northern and Southern European cultures in different scenarios

The lighting proposals represent two different lighting scenarios for the kitchen, and two for the living room. Each lighting design is based on the knowledge upon Northern and Southern European light cultures.

A total of four different lighting scenarios were created. The first two scenarios were designed for a group of people socializing in the living room. They were

created adjusting the position of the luminaire, the CCT, the direction of the light, the intensity and the distribution. The other two scenarios were designed for a group of people eating in the kitchen. They were also created by adjusting the position of the Luminaire, the CCT, the direction of the light, the intensity and the distribution. (Table 3) was created to visually show the space and functions the authors considered to be relevant for the final lighting proposals-scenarios.

Table 3.

REGION	Northern Europe	•	Southern Europe
USER	 A group of people	•	 A group of people
SCENARIO	Spaces Living room Kitchen	•	Functions Socializing Eating

Four lighting design proposals

As a guideline to follow during the design and test stages, two more tables of relevant findings are presented below: (Table 4) summarizing the results for the living room for Northern and Southern European countries and (Table 5) for the kitchen for Northern and Southern European countries. Those two tables show the guidelines to create each lighting scenario.

Table 4.

		NORTH	SOUTH
1	Direction	Indirect - Both (table lamp)	Indirect - Both (secret light)
2	CCT	Neutral - Warm white	Neutral - Cool white
3	Distribution	Multiple sources	Evenly lit
4	Intensity	Average - Dimmed down	Average - Bright
5	Position of the fixture	Semi pendant	Ceiling

LIVING ROOM

Table 5.

		NORTH	SOUTH
1	Direction	Direct	Direct
2	CCT	Neutral - Cool white	Neutral - Warm white
3	Distribution	Atmospheric	Functional
4	Intensity	Average - Bright (16% candle light)	Bright - Average
5	Position of the fixture	Ceiling	Semi pendant

KITCHEN

Four test scenarios

Based on the findings from the analysis, lighting design scenarios were created in collaboration with the luminaire Orb (Shade 2016). These scenarios are illustrated below.

First scenario: Northern lighting in the living room

Two Orb luminaires were used for this lighting setup. A pendant lamp placed over the coffee table and a table lamp next to the sofa (Figure 13 and Figure 14). The CCT is warm white and the light is direct downlight. The distribution of the light is narrow, creating brighter spots on the table area and next to the sofa. The combination of brighter and darker areas around generates different lighting layers. The intensity used is an average of Orb’s maximum level.



Figure 13.

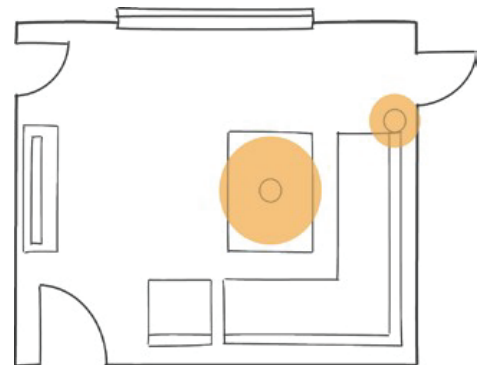


Figure 14.

Second scenario: Southern lighting in the living room

Two Orb luminaires were used for the Southern scenario as well as for the Northern one. The difference is the position of the fixtures. They are two semi-pendant fixtures placed over the coffee table (Figure 15 and Figure 16). The CCT is cool white and the direction of the light is both direct downlight and indirect uplight. The distribution of the light is wide. The combination of two luminaires hung closer to the ceiling and with the option of up and down light together creates a brighter and evenly lit space. The intensity used is higher than an average of Orb’s maximum level.



Figure 15.

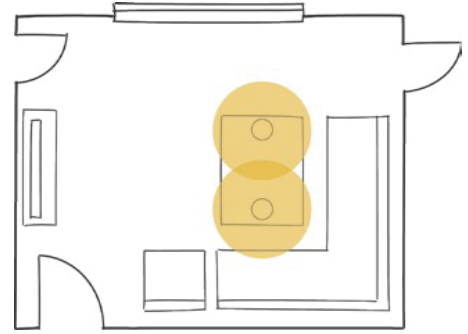


Figure 16.

Third scenario: Northern lighting in the kitchen

One Orb luminaire was used for this lighting setup. It is a semi-pendant fixture over the dining table (Figure 17 and Figure 18). The CCT is neutral and cool white and direction of the light is direct down. The distribution of the light is narrow, creating a brighter spot on the table area mainly. The intensity used is an average of Orb's maximum level.



Figure 17.

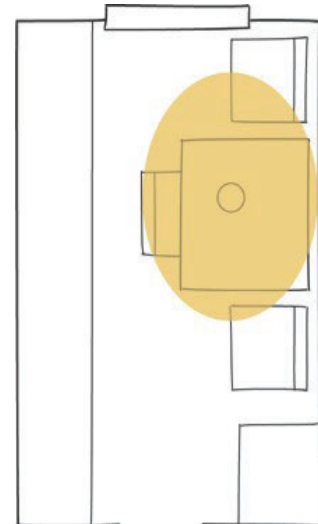


Figure 18.

Fourth scenario: Southern lighting in the kitchen

One Orb luminaire was used for this lighting setup. It is a semi-pendant fixture placed over the dining table (Figure 19 and Figure 20). The CCT is neutral and warm white and the direction of the light is direct down light. The distribution is wide, creating a brighter spot on the table and the area around it. The intensity used is higher than an average of Orb's maximum level.

A testing phase is followed to validate the relevance of various lighting settings and how they can change people's perception of the surrounding space, and how this is referring to the definition of the Southern and Northern European lighting cultures.



Figure 19.

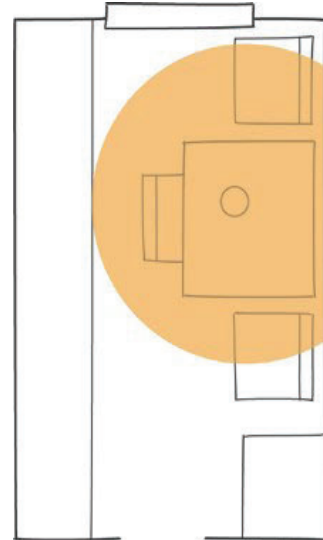


Figure 20.

The test took place in an apartment in Copenhagen, in order to provide a genuine environment to the participants of the test. There were 10 participants in total; 6 from the Southern region of Europe and 4 from the Northern region. None of them had any professional relation to light. Each phase of the test was conducted at the scenario related room. (e.g. at the living room for the living room scenarios). Snacks and beverages were provided along with easy listening music in order to invite the participants to relax, make themselves comfortable and feel confident about their answers. The participants were introduced, one at a time, firstly in the living room and then in the kitchen. At each place, they were shown two lighting pre-sets (one for North and one for South) and asked to make a choice. The origin of each lighting pre-set was kept secret as there was a chance to influence the answers and alternate the results. After this and based on their previous choice, they were shown three different variations of possible lighting scenarios, based on the intensity and the directionality of the light, and asked once again to choose. One of these three choices was the lighting design based on the findings in this project. Later, the participants answered questions based on their experience of the lighting.

The aim of the test was to examine how the design of the scenarios referring to the Southern and Northern European regions were experienced and to see if the goal of creating awareness by using various lighting pre-sets in indoors living space could be achieved. In addition, the test could indicate the correlation between the collected knowledge and data, about the preferable lighting standards depending on the origin of the people, and the actual preferences of the end user. Participants were not only asked to choose their preferred lighting scenarios but also to judge the atmosphere, glare and intensity of the settings. The answers provided were in a form of scale from 1 to 5, being: 1=not satisfied, 2=little satisfied, 3=satisfied, 4=very satisfied and 5=completely satisfied.

Findings

The on-site testing indicated that there is a tendency to choose a brighter environment even in a residential space, and this preference is not related to the test person's nationality.

Another observation was made in the living room. When people from north were socializing, they tend to lean back on the couch exposing their faces and their eyes fully to the lighting fixture, whereas people from South have a more "aggressive" body posture. They either sit with their backs in a vertical position or they lean forward as to show that they pay attention to other people. This observation is a parameter that needs to be investigated deeper in future work.

When analysed, the proposed scenarios managed to score satisfactory results. For the test persons from the North and the living room, all the participants were satisfied and above. The scenario scored 3 and below on the scale about the direction of light and the position of the luminaire.

In the kitchen scenario 3 out of 4 participants were from Denmark where people, prefer the luminaire a few centimetres above the eye level. For the people from South 5 out of 6 participants were satisfied and above and the main problem was with the direction of the light. That could arise from the fact that when people from the South regions refer to indirect lighting, they usually mean cove lighting, a possibility that the group could not offer with the orb.

Conclusion

The first step was to define lighting cultures; it was correlated through a literature review, the lighting designer's experience and an online survey. The literature review gave an understanding of how the light affects the human body, the importance of the natural light and knowledge on user perception in different countries. The experiences from the lighting designers gave an understanding of how cultural background and geographical position can define a lighting culture. Finally, the user survey gave information about the user preferences according to light level, colour temperature, light distribution, placement of luminaries etc.

The second step was to combine the results from the first step, in a northern and a southern lighting design for a kitchen and a living room scenario in order to be able to answer the research question: Is it possible to define a northern and a southern lighting culture, and will the user from the northern and the southern countries choose lighting scenarios in a test according to this definition?

A research study, experiences from practitioners and an online user survey showed that a northern and a southern lighting culture exist. This study focused on some of the aspects in the complex discussion of lighting cultures and was able to define some common issues to delineate preferences for the north and the south.

In one case the online survey showed that the people from the north preferred a cool light from a high positioned fixture in the kitchen and the people from the south preferred a warm light. The test of lighting scenarios was made according to this finding but showed that the test persons from the north preferred a luminaire a few centimetres above the eyelevel. Otherwise the lighting scenarios had a high score but with a few comments on the positioning of the fixture and the direction of the light. The users preferred a brighter light than suspected and the differences in the body position of the people from the north and the south in a socialization situation also had an impact on the perception of the lighting scenarios. To answer the question if the users prefer lighting scenarios according to the northern and southern lighting culture definition, we can answer, yes-in most cases-but this study shows that the answers can vary, and it is difficult to take all cultural, historical, geographical and personal preferences into account when you aim at making lighting scenarios that match user preferences.

Future works

A future investigation of this topic could include some of the topics mentioned below. Firstly, the crucial issue of religion. Especially in the southern regions, religion has an important impact on the culture of the people which could alternate their perspective of light.

Analysis of daylight and the importance of it in shaping the lighting culture of a region could be investigated further. Daylight was covered in this paper only as a part of the geographical position of the country.

On the matter of testing the effectiveness of the lighting scenarios, it could be interesting to test them with other multitasking and standard luminaires, to investigate various possibilities and compare the testing results when using lighting bulbs with different characteristics.

Also, a fact of great interest would be to conduct the testing phase in a Southern country and then compare the results to see if there are any alterations. Lastly, a much deeper investigation including more countries from both the North and the South European regions could provide more in-depth results and better understanding of the use of light in various countries.

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