Aalborg University Copenhagen

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Title:
Northern and Southern Lighting Cultures in Europe.
Lighting Scenarios for the Indoor Living Spaces

Project Period: 01/02/2017-02/06/2017

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Abstract:

For the thesis semester, the authors, fuelled by their own life experience and driven by their recently acquired knowledge upon lighting design and their desire for implementation, attempted to create user centered lighting scenarios in order to generate awareness among the average users for the qualities of light in indoors living spaces.

Initially they started by defining the concept of a lighting culture and prove that in the European region there are two: the North and the South. The followed process was a combination of investigations of academic papers, a book with interviews from 49 lighting designers around the world and an online survey with participants from four countries: Denmark and Lithuania for the North and Greece and Italy for the South. They started by collecting general knowledge about lighting cultures (academic papers and interviews) and narrowed it down to the preferences of the end user upon the functions taking place in an apartment. More specific and for various reasons analysed in the research, socializing at the living room with a lot of people and eating at the kitchen with guests. An on-site testing took place with actual participants from the four pre mentioned countries, aiming to evaluate the design. The product used for the implementation was Orb by Shade, a lighting fixture with various abilities.

According to the test results and the collected knowledge, the authors proved that there are two lighting cultures in Europe and created a process that if followed could be beneficiary for both the manufactures and the end users. Most importantly, by providing various lighting scenarios, they created awareness about the qualities of light and inspired people into investing in a fixture that could provide those possibilities in lighting.

M.Sc. Lighting Design

Northern and Southern Lighting Cultures in Europe

Lighting Scenarios for the Indoor Living Spaces

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KØBENHAVN

Reader's Guide

Author's Master thesis will be presented and analysed in the following structure. It has five academic parts (Introduction and idea generation, methods and analysis, lighting technique, design and testing, conclusion) which are linked with the thesis' approach, methods and topic. This structure will guide the reader during the whole analysis.

introduction and idea generation

PERSONAL EXPERIENCE

VISION

NORTHERN LIGHTING CULTURE   SOUTHERN LIGHTING CULTURE

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methods and analysis

ACADEMIC KNOWLEDGE   EXPERTS' OPINION   USER'S PREFERENCES
• papers •   • interviews •   • survey •

• Northern and Southern apartments •

FINAL PROBLEM STATEMENT

lighting technique

• ORB •

design and testing

LIGHTING SCENARIOS

CASE STUDY

conclusion

USER CENTERED DESIGN SOLUTION

Reader's Guide

Citations

Citations are made using Harvard Style and will appear at the end of a sentence with the author and the year released.
Example: (Harvard, 2017).

Quotes

Quotes are written in *blue italic* between quotation marks.
Example: *[..]"hazardous and glary giant light source, to a yellow-orange disk that is not harmful nor glary any more, but gorgeous." - Barbara Szybinska Matusiak.*

Introducing new concepts or chapters

First time concept or new chapter mentioned will appear in blue
Example: Will be presented in Chapter 1.2 Context.

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References to the already mentioned chapter will appear in grey.
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1. Introduction

1.1 The generation of the idea

Light, in a way, is the very essence of life. Without natural daylight, photosynthesis for plants would be impossible and as a result they would vanish. After some certain time, the animals relying on plants for food would follow and sooner than later so would humans. It is the sun and its beneficiary energy that sustain life on this planet. On the same note, the inventions of various means of artificial light, starting from the ending of the 18th century and the oil lamp and all the way through to 1879 when Thomas Edison patented the incandescent lamp and furthermore, played a significant part in the industrial revolution and into shaping the world and the pace of life as we know them today. Even though nowadays artificial light is being taken for granted, it is still a vital part of our life, a truth vividly illustrated by the fact that more and more technologies are being surfaced aiming not only in a more efficient illumination but also in a more proper illumination. After all, light is not only connected with the preservation of life but also with its quality.

For the authors of this paper, living and studying in a multinational environment and having the opportunity to exchange opinions and experiences with each other, lead to one realization: in a standard modernized society like the one we live in today, it is very hard to find differences among the western world in lifestyle, habits, society and the pace of life. Even in a multinational region like Europe with so many cultural backgrounds, the everyday life and people's habits are pretty much the same. One of the few things escaping this condition is light and the way people use it, feel it and interact with it. This is happening probably because the artificial light is in strong relation with the natural daylight and the latter with the geographical position of every country. For example, people in the South region of Europe perceive artificial lighting in a completely different way compared to the people of the North region of Europe. Their lifestyle, their work environments and their residential activities are pretty much the same but the effect that a rich daylight has on their mentality alters the way they perceive, understand and use artificial light.

The authors, by the time they arrived to Denmark had their very own way of viewing the light, influenced by their own life experiences and their educational background. When, through various conversations, the differences mentioned above were spotted, it quickly became the ground zero for this thesis. In more simple words, the group thought that the reasons for the different way that people from the South act around light than people from the North needed the investigation and the comparison of these two Lighting Cultures (concept defined in paragraph 1.2.1 Lighting Culture). In addition, the fact that throughout our education none of lighting fixtures manufacturers that we met, mentioned the cultural background that light can have and the fact that the majority of the average users have no idea about the scientific values of light, reinforced our interest about further investigation on the matter. The recently acquired knowledge upon the science of light made this research much more interesting, as now the members were educated accordingly and far more qualified.

1.2 Context

1.2.1 Introduction

There are many factors which could influence the perception of light from people from different regions. A fact better understood by paying attention to the architecture of the two-North and South regions of Europe. In the northern area, windows are big, there is a lack of shading systems, and there are windows on the roofs. The houses are built this way to receive as much daylight as possible in their interior. On the other hand, the southern architecture is entirely different. Windows are medium sized, no roof windows and there is a shading system in all of the openings. Also, due to the climate conditions, the average inhabitant of the North region spends a significant amount of more time inside the apartment compared to residents from the South who spend a big part of their lives outside of it. These two factors, the amount of light entering the interior of the house and the time spent inside it by each inhabitant, along with the quality of the natural light could alternate the perception and the understanding

of light by people. In the next chapters, the authors will attempt to define what is a lighting culture and to analyze the differences between South and North regions when it comes to light.

1.2.2 Lighting Cultures

By saying Lighting Cultures, the authors define the relation between Natural and Artificial light, in detail the way natural light affects the use of artificial light in indoor living spaces based on various geographical positions and social habits. Acknowledging the latter, two different lighting cultures in Europe was defined in this paper, the north, and the south. As a result, the perception and use of artificial light in indoor living spaces will be analyzed to find the regional varieties and users' preferences.

1.2.3 Definition of Northern Lighting

Daylight is vital for people all around the globe, but it may be seen contrastingly in different places and regions. The Northern countries are unique because of their closeness to the North Pole. The capital cities of northern Europe's countries are situated starting from 54° N and above (UNSD, 2017). To be more specific, the countries are Iceland, Ireland, the United Kingdom, the Faroe Islands, Norway, Sweden, Finland, Denmark, Estonia, Latvia and Lithuania (Figure 1). Natural light in Northern countries is entirely different from southern countries in Europe. The reasons for this are a very low solar angle during the year, long moments of twilight and frequent overcast sky (Figure 2 and Figure 3). These geographical and climate facts have a strong impact on the illuminance level on the ground, the color of daylight and the modeling of the landscape, buildings, terrain, and people.

Figure 1
Map of Northern Europe Countries
(Noskaitis, 2017)

Figure 2
Sun path diagram Vilnius
(Gaisma.com, 2017)

Figure 3
Sun path diagram Copenhagen
(Gaisma.com, 2017)
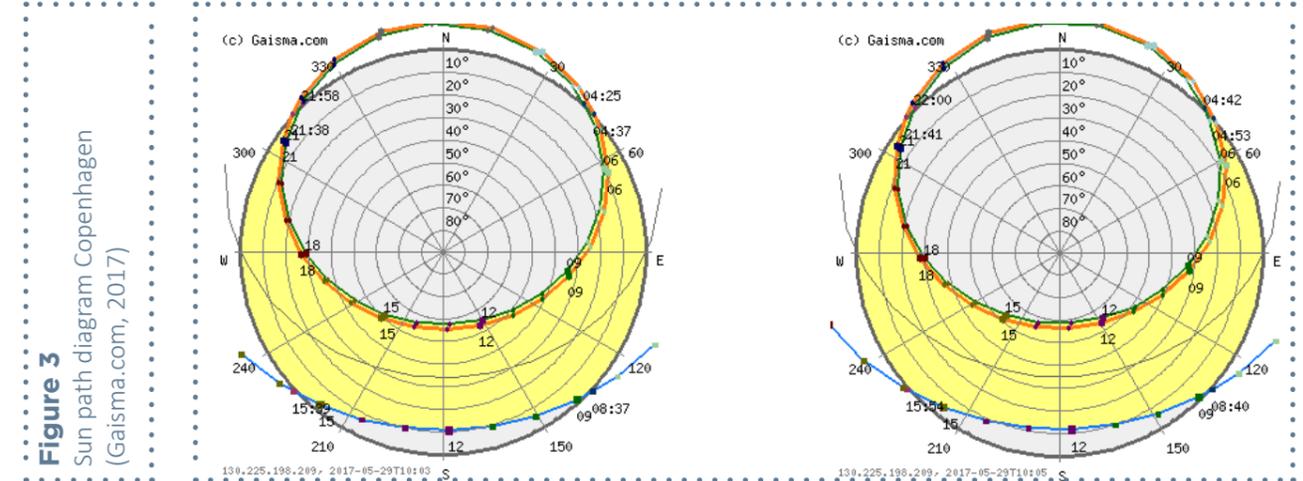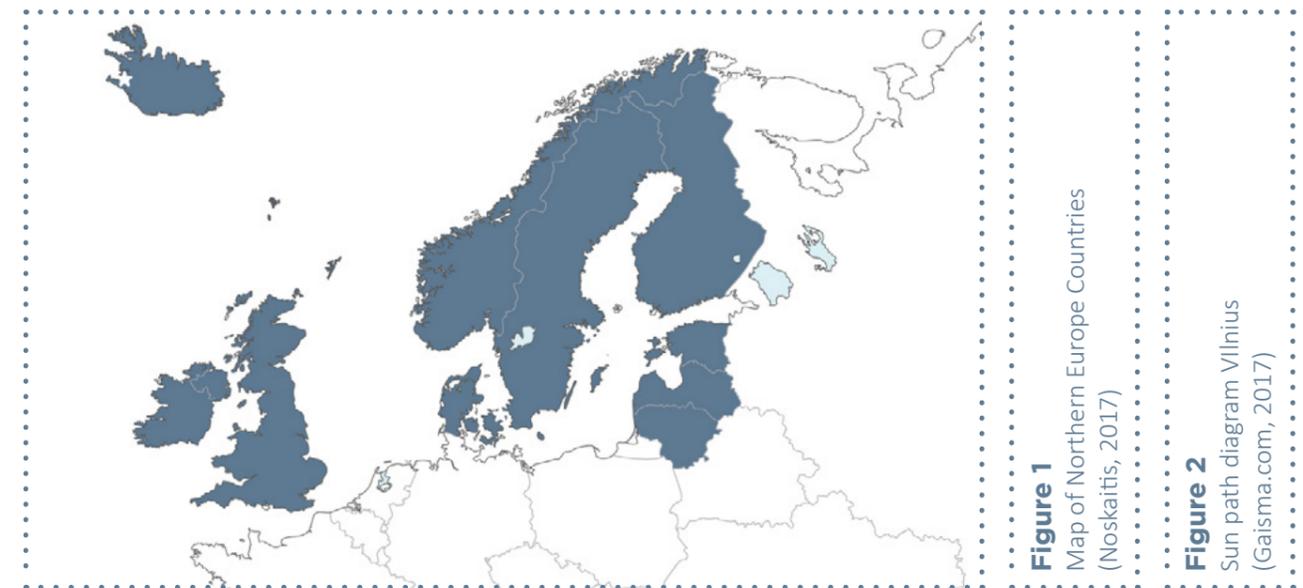
"Looking at the sun slowly gliding down toward the horizon and changing appearance from the hazardous and glary giant light source, to a yellow-orange disk that is not harmful nor glary any more, but gorgeous." - Barbara Szybinska Matusiak.

Northern environment makes an incredible domain and lighting conditions for the people (Matusiak, 2012). The mix of different natural lighting conditions such as colour of daylight, a direction of the sunlight, long and colorful shadows during the twilight and overcast gray sky could be defined as Northern Lighting. (Figure 4 and Figure 5)

Due to the lack of the direct sunlight over the year in Northern countries, people tend to use artificial light during the day. The combination of natural daylight and artificial light creates a phenomenon way of understanding and defining lighting design. The multiple uses of different light layers and delicate understanding of the aesthetics leads to the definition of Nordic Lighting, which will be presented in the next Chapter 1.2.3 Nordic Lighting Design.

Figure 4
Colorful sky during the twilight
(WallpaperPulse, 2016)

Figure 5
Long Shadows
(DIAL GmbH, 2017)

1.2.4 Nordic Lighting Design

Nordic lighting design is an integral part of Scandinavian Design traditions which is minimalistic and functional (Nordisklyspris.com, 2017). Nordic lighting design is a part of Scandinavian design even though it is not visible to people outside the Nordic regions. The concept "Scandinavian design" is well-known around the world, and it aims to create final value. Furthermore, it forms an initial groundwork of benefits including aesthetic and functional design qualities (Kalsbøll, 2016).

Figure 6
Low Sun Angle
(Vaa Eriksen, 2017)

Figure 7
Low Sun Angle
(Vaa Eriksen, 2017)

The enthusiastic and point by point evaluation for light itself in the Nordic nations is unequivocally affected by the qualities and deficiencies of Nordic sunshine. For example low sun angles and the variations in both color and magnitude (Figure 6). Chiefly winter light makes Nordic society extraordinarily touchy to getting enough light (artificial light as well as daylight), light with a suitable color temperature, light that does not cause glare and light that creates atmosphere. The Nordic light is ambient light from the sky which is defined as sky's light (Mathiasen, 2015). And

also being the most steady source of light, it is likewise an incredibly valuable source of light. This nature of the sky is portrayed by its expansive lighting up a surface, extending from the skyline to the pinnacle.

The Nordic countries already have a strong position in sustainable technologies. Many projects are driven by potential energy savings, so it is important to stress that Nordic Lighting Design is not only artistic taste and function but as well as power utilization, solidness and ecologically friendly materials. Vitality directions in Nordic nations are among the fiercest in Europe, which gives a head begin in this perspective.

What people see is defined by space combined with light. Light is manipulative, it underscores and covers. Light shapes and may make course and core interest. The responsive plan of light in conjunction with a design is vital for ideal human presence and work in areas. The Nordic Lighting design style can be found in any product or design category since conditions above are an integral part. The outline can be extremely oversimplified, downplayed and humble, yet still in full understanding with the idea.

"I believe in Nordic lighting design as a brand that is competitive enough to be exported to the rest of the world, a brand that builds on three important resources. The first is the spectacular sceneries of nature - they inspire us. The second resource is the people who are active in the industry – they accumulate both the knowledge of light and understanding of fine design traditions. The third is the cultural diversity that characterizes the five Nordic countries" - Natallia Sørensen.

To sum up, Nordic lighting design is a mixture of well-combined aesthetics. It includes the functional relation between light and architecture, ambiance and atmosphere and human-centric lighting (Walerczyk, 2012).

1.2.5 Perception of light in Northern countries

As it was mentioned in Section 1.2.2 Definition of Northern Lighting, people who live in the countries of the north have a different understanding and perception of light. Either it is natural daylight or artificial light. Due to the latitude of the northern countries, the natural transition between the day, dusk and the night, creates a unique environment and lighting conditions for the inhabitants.

The further north you travel, the longer the "blue hour" - the period of twilight and dusk where indirect light results in a blue hue (Figure 8). In northern countries, it could last up to two hours. Therefore people up north are more familiar with colorful skies. The Nordic Lights (aurora borealis) allow people in northern countries to understand and appreciate the dynamics of color temperature and the delicate use of colored lights. The best states to represent the northern lighting design approach would be the Nordic countries which are Denmark, Sweden, Norway, Finland, and Iceland.

People in northern countries tend to use a warm color lighting in their domestic environment due to the common change of light during the day and warm colors of it. These points play a role in the way people become familiar with the light (The Color of Culture: Lighting Design around the World, 2017). (Figure 9)

Figure 8
"Blue hour"
(Arne Dahl, 2016)
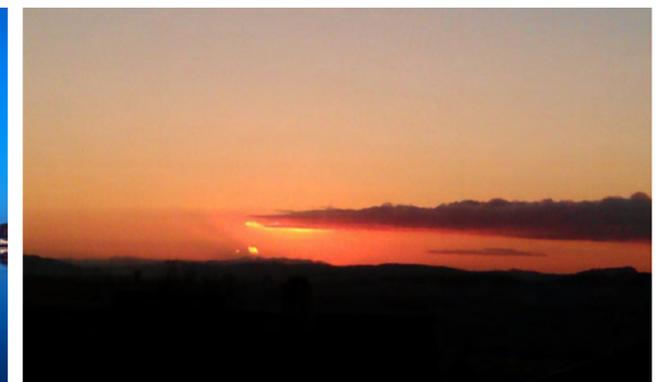
Figure 9
Warm colors of natural light
(Arne Dahl, 2017)

1.2.6 Importance of Light in Northern countries

A light had always determined and influenced biological rhythm of all living beings. Because most people nowadays spend a large part of the day indoors, this plays an important role and must be taken into account when considering lighting design proposals in the northern countries. The state of people's health can be positively influenced through the use of lighting design. To feel comfortable in spaces, as well as to be able to concentrate, people require much more light than they need to see or to take in information simply.

This aspect is vital in northern countries. As a result of their geographical location, daylight hours are shorter in winter which can lead to depression, sleep disorders, mood changes and so on (Partonen, Lönnqvist, 1998). Lighting designers must accordingly develop light compositions that create the desired and necessary contrast to the darkness and support the biological needs of the users. The living space needs to be well lit and follow the natural daylight changes to create a vital living environment and to prevent the possibility of depression and other disorders.

1.2.7 Use of Light in Northern countries

In northern countries, artificial lighting during a large part of the day is used on a background of daylight (Volf, 2010-2011). This interplay of daylight and electric light has a significant effect on the aesthetics (Figure 10). Practically speaking it changes both understanding of light and of color. It is hard to disregard the use of artificial light or ignore the significance of adequate sunlight in northern countries. For instance, adding artificial light to the building without sufficient natural light is not a way to do and ground lighting on daylight alone as well. Alvar Aalto is a valuable case of this sensible connection between natural and artificial light. Identifying the combination of beauty and strength of artificial light, though never neglecting the vital daylight, he used daylight in his buildings together with artificial light. In Scandinavia, people cannot live solely on daylight or exclusively on artificial light. Aalto was one of the first to break with the modernist thoughts of creating an international style, turning away from a purely rational and functional architecture (Norvasuo, 2010). Local experience and emotions as functions equally important as the physical functions. The light and well-being is a result of daylight and artificial light working together, not just replacing but enhancing each other. The combination of daylight and artificial light, working with light zones, integrating artificial light with the architecture, locating the light in the room and so forth defines the use of the light in northern countries (Figure 11).

Figure 11
Lighting layers in domestic spaces
(JUNG, 2017)
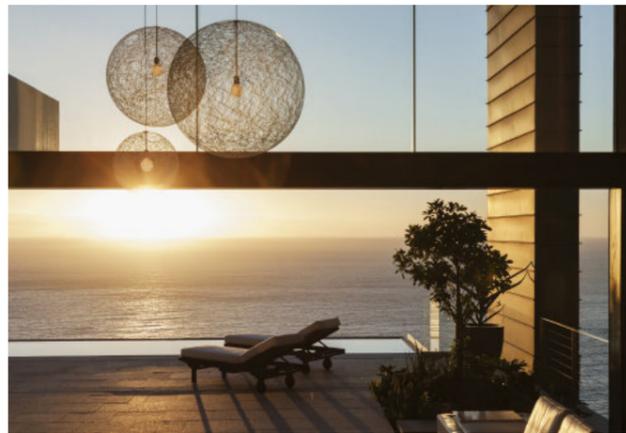
Figure 10
Interplay between daylight and artificial light
(Ledvance, 2017)

1.2.8 Definition of Southern lighting

Unlike the concept of Northern lighting, it is very hard to find specific data, analysis or scientific research to support the definition of Southern lighting. This lack of scientific investigation could be linked to the low interest in deepening the relationship between light and human behavior in the Southern European countries (Figure 12). Therefore, the three authors are determined to define the concept of Southern Lighting as opposed to Northern Lighting.

In order to define and explore the concept of Southern Lighting, the writers add personal experience of the perception of natural light, the use of artificial light, and the comparison of these observations between their countries of origin and Denmark, as their current country of residence.

Figure 12
Map of Southern Europe countries
(Noskaitis, 2017)

To support the current research scientifically, meteorological data are also analyzed, as considered the more objective source. Through the use of Satel-light.com, it is possible to collect and analyze various information for each European country. The website provides with detailed information about every region of Europe, such as climate description and daylight analysis throughout the year. The relevant knowledge gathered from this source was mainly the one about daylight: natural light characteristics in southern countries and its comparison with northern countries. The scientific knowledge is used by the authors to support and confirm their personal experience and statements through this section. Figure 13 and Figure 14 are used to show the frequency of sunny skies in Italy and Greece during the year.
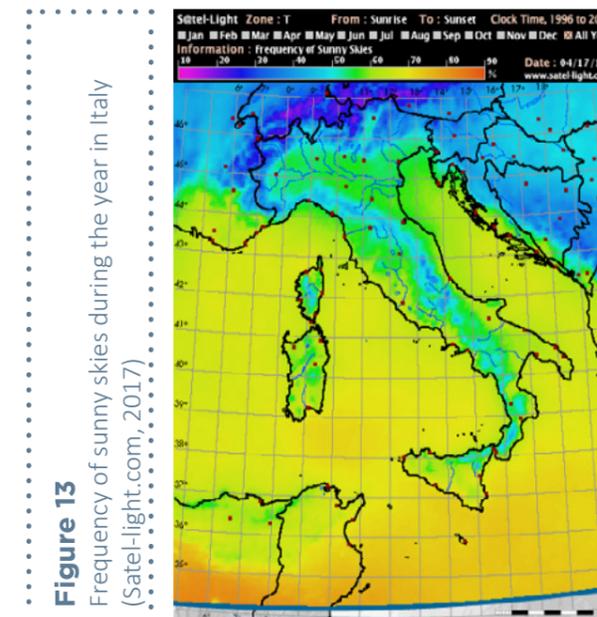
Figure 13 Frequency of sunny skies during the year in Italy (Satel-light.com, 2017)
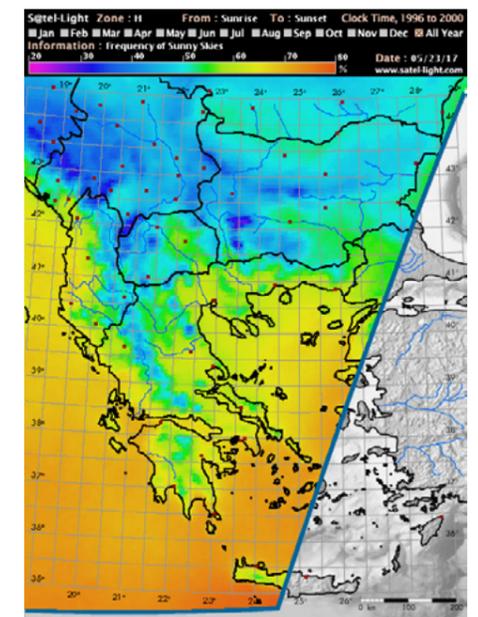
Figure 14 Frequency of sunny skies during the year in Greece (Satel-light.com, 2017)

The Southern Lighting can be defined through the following characteristics: natural light mainly comes only from the Sun, therefore, objects' lighting goes through considerable changes during the course of the day and different periods of the year. Since the sun has a rigorous light it characterizes bright environments which sometimes can be identified as glaring with brilliant colours and sharp shadows.

The Sun's direction, color, strength and hardness vary greatly throughout the year, defining distinct perception of the indoor and outdoor spaces during different seasons (Figure 15 and Figure 16). A specific geographical location also plays a major role, however, any bright environment would never be characterized as depicting warm light.
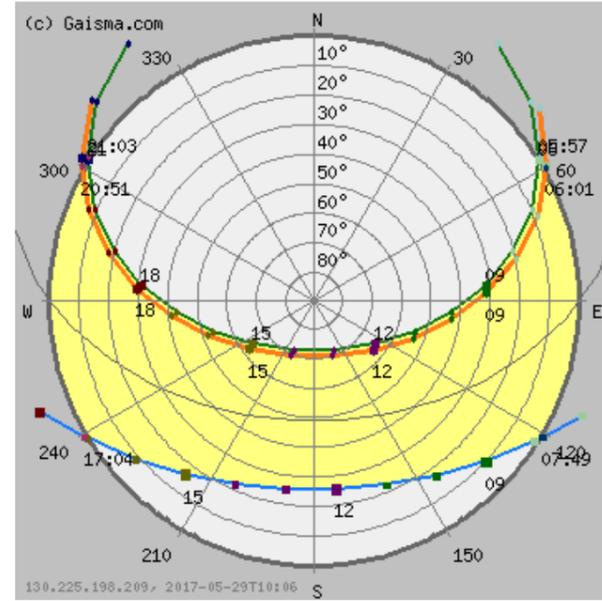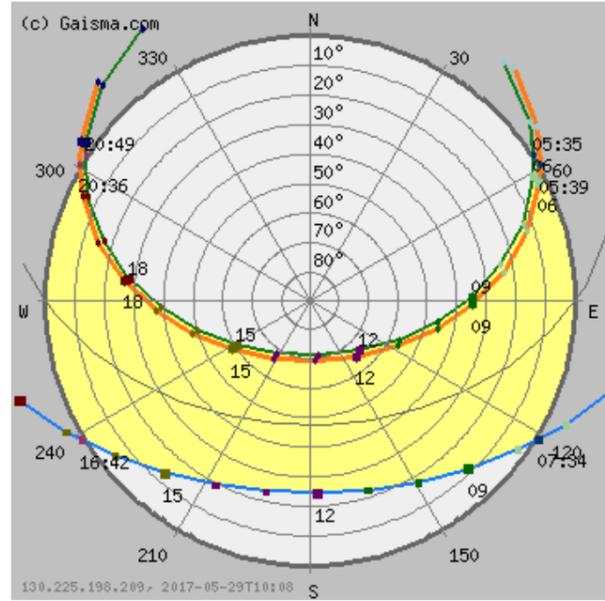
Figure 15
Sun path diagram Rome
(Gaisma.com , 2017)

Figure 16
Sun path diagram Thessaloniki
(Gaisma.com , 2017)

1.2.8 Southern lighting Design

In Southern Europe design in its various forms of expression represents a discipline of historical tradition that is still alive in the society nowadays. In Spain the design is inspired by organic shapes, brilliant colors, and creative solutions: it can be described as a meeting of imagination and practical solutions (Figure 17). Italian design, on the other hand, is known for its quality, classicism, and sophistication all over the world (Figure 18).

Figure 17
A Detail of Casa Batlló: organic shapes
(Spainattractions.es, 2017)

Figure 18
IItalian design
(Museo del Design, 2017)

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Lighting design, however, represents an exception to the design tradition of Southern European countries. As described in the previous paragraph, unlike the Northern European lighting, the definition of Southern lighting does not yet represent a clear concept addressable to specific characteristics. In the absence of a particular approach and a detailed description of Southern lighting, it is challenging to provide a definition of Southern lighting design. Throughout the research in this thesis, the group tries to underline the essential characteristics of Southern Lighting Culture in opposition to the ones ascribed to the Northern lighting.

1.2.10 Perception of light in Southern countries

Our basic abilities to sense and interpret the light comes from our experiences of natural light. In addition, people's cultural background, religion, and social habits play a significant role in perceiving the light. Understanding of the light is tightly connected to the interpretation of the world surrounding us. This interpretation of sense impressions is deeply rooted in us that we often take it for granted. (Jensen, 2007). It suggests that the perception of the space surrounding us is a subjective experience, strictly related to the environment and lighting conditions we are used to living in.

Since both factors are dependent on a geographical position of each country, they have a broad 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 North and South European countries. From all type of natural light we encounter, may it be a skylight, sunlight, reflected light or transmitted light, the sunlight is the one people have access to the most in Southern European Countries.

Sunlight is the strongest source of natural light. It is often quite hard because it comes from a distinct direction. It is also the type of natural light that changes the most over the day and the year. The direction, color, strength and hardness vary widely. The hard light from the sun creates sharp and dark shadows as well as bright highlights (Jensen, 2007). (Figure 19 and Figure 20)
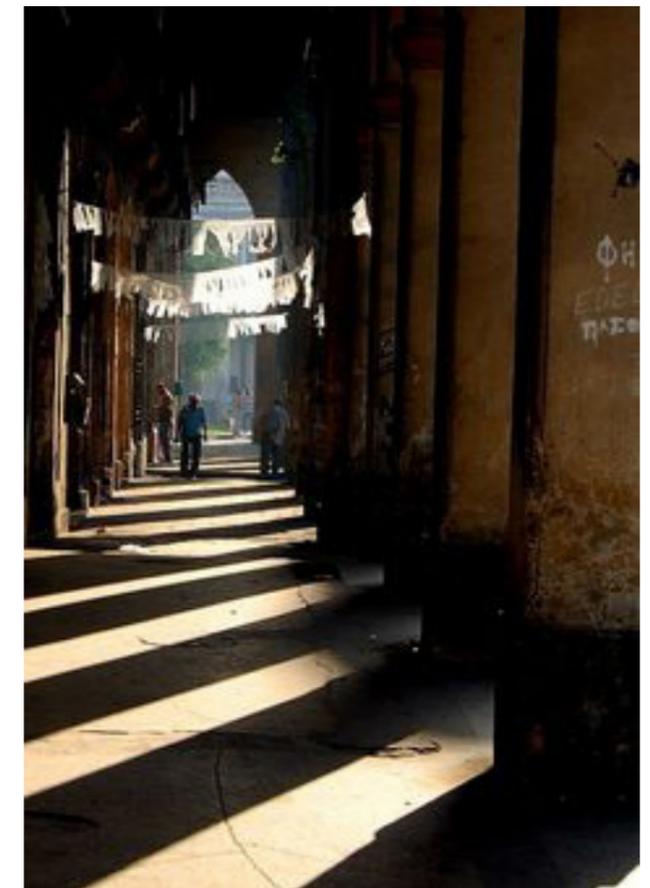
Figure 19
Sharp shadows in Southern countries
(Baker, 2017)

Figure 20
Sharp shadows in Southern countries
(Baker, 2017)

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The sunlight and the sun's movement during the day describes Southern European people's experiences in everyday life: in Mediterranean countries, for instance, the environment is characterized by bright natural light and brilliant colors changing with the seasons. Sharp shadows, sparkling, glare highlights and very a short transition time between day, dusk and night are the key features associated with the region. These lighting conditions have a great impact on the way people use artificial light in an indoor environment.

1.2.11 Importance of light in Southern countries

Due to long periods of natural light and only a few hours of darkness all year long, people's perception of light in Southern Countries is rather different from the Northern part of Europe. The geographical position of this area affects the population's habits, culture and daily routine which leads to only a few hours being spent in indoor spaces. However, lighting conditions in indoor spaces play a role of great importance for the human being: a good lighting solution can support a healthy lifestyle and prevent many disorders. If designed accordingly to a user's biological rhythm, the artificial light should be calibrated to sustain a positive impact on a human's health and needs. It is where the importance of a Lighting Professional arises. The professional can integrate scientific knowledge and cultural characteristics to provide a well-designed indoor environment. Well-considered details can make people perceive the importance of light and educate them about the value and influence light has on our daily activities and body responses.

"Light is not only a matter of empirical data; user's preferences, perception, and experience of the surrounding is indeed influenced by culture and habits" - Mikkel Bille.

The authors of the thesis believe that such a statement suggests that it is possible to describe the light as a cultural phenomenon which is distinct in different societies. The lighting culture can stand as a means of communication, knowledge exchange and a community's expression.

1.2.12 Use of light in Southern countries

In indoor spaces, people try to recreate natural lighting conditions (Figure 21) they are used to perceive throughout the day. This action results in South and North European indoor spaces being lit in different ways and, as a consequence, the perception of similar spaces can be completely diverse.
This attitude leads people from Southern Countries use artificial light only for short periods due to longer bright cycles of days. The interplay between artificial light and natural light is almost absent because of a fast transition between day and night. Living space is lit up by cold light, in an attempt to recreate a natural daylight colour temperature. The task lights are used as complementary sources, meaning that they are an addition to the general light, almost never used individually. The main light source in the house is always the ceiling one, rarely a pendant lamp and more often an integrated ceiling fixture. The light becomes intense but not visible, creating a bright environment which creates a visually bigger indoor space.
Southern European countries have no experience of warm colors which, on the contrary, are common to North Europe due to long transition hours. Consequently, all the light in the living environment is used to create a dazzling space or is completely turned off, with no experience and appreciation of warm colors, dark spots, and soft shadows.

Figure 21
Natural lighting conditions
(CoeLux ,2017)

1.2.13 Conclusion

Daylight has an immense impact on people's perception, well-being, design preferences and use of artificial light. It also affects the layout of indoor living spaces. As it was mentioned in previous paragraphs, the lighting design style choices are made depending on the natural light and how it was perceived from the early days. Having this in mind, the differences of lighting design between Northern and Southern Europe countries were defined. The following are color temperature, light direction and distribution and use of multiple lighting layers (Figure 22).

In the Northern countries, people tend to use warmer colors due to the geographical position and the low angle of the sun. This means a longer twilight period which creates colorful skies 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 colors. The artificial light in Southern countries is used as cold white, more similar to an intense natural daylight.

The angle of the Sun in North and South countries varies a lot which creates the direction and distribution of artificial light different from region to region. Due to long and soft shadows in Northern countries, people use more diffused lighting in the living spaces. The domestic environments in Northern countries have a mix of direct and indirect lighting, and the distribution is designed according to the activities and needs. In Southern 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 countries. As it was mentioned above, the environment of nature creates these templates for people's choices. In Southern countries, residents try to replicate the natural bright environment and use only one lighting layer which is bright general lighting.

All the differences between the regions and how the light is perceived and used in the domestic environments, creates a phenomenon definitions, which could be interpreted as "Lighting Cultures".
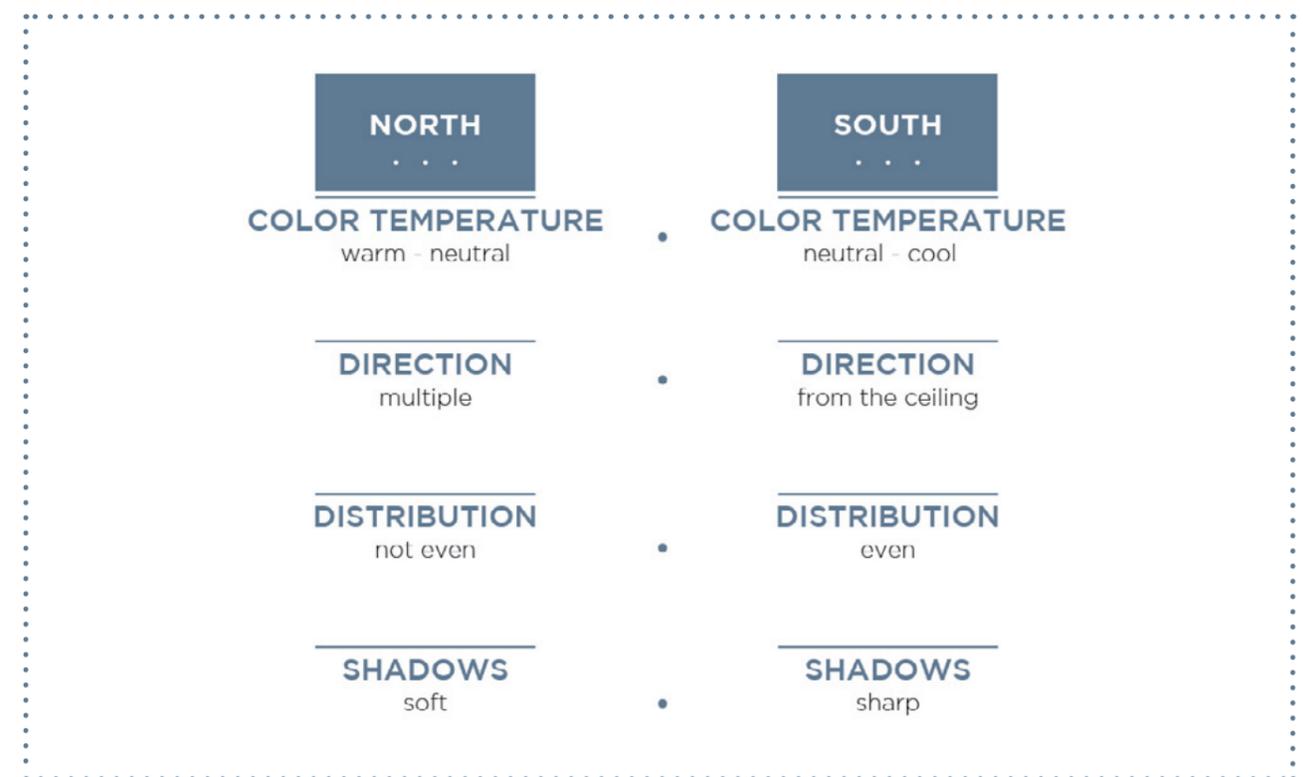
Figure 22
Differences of light use between North and South countries
(Seghi, 2017)
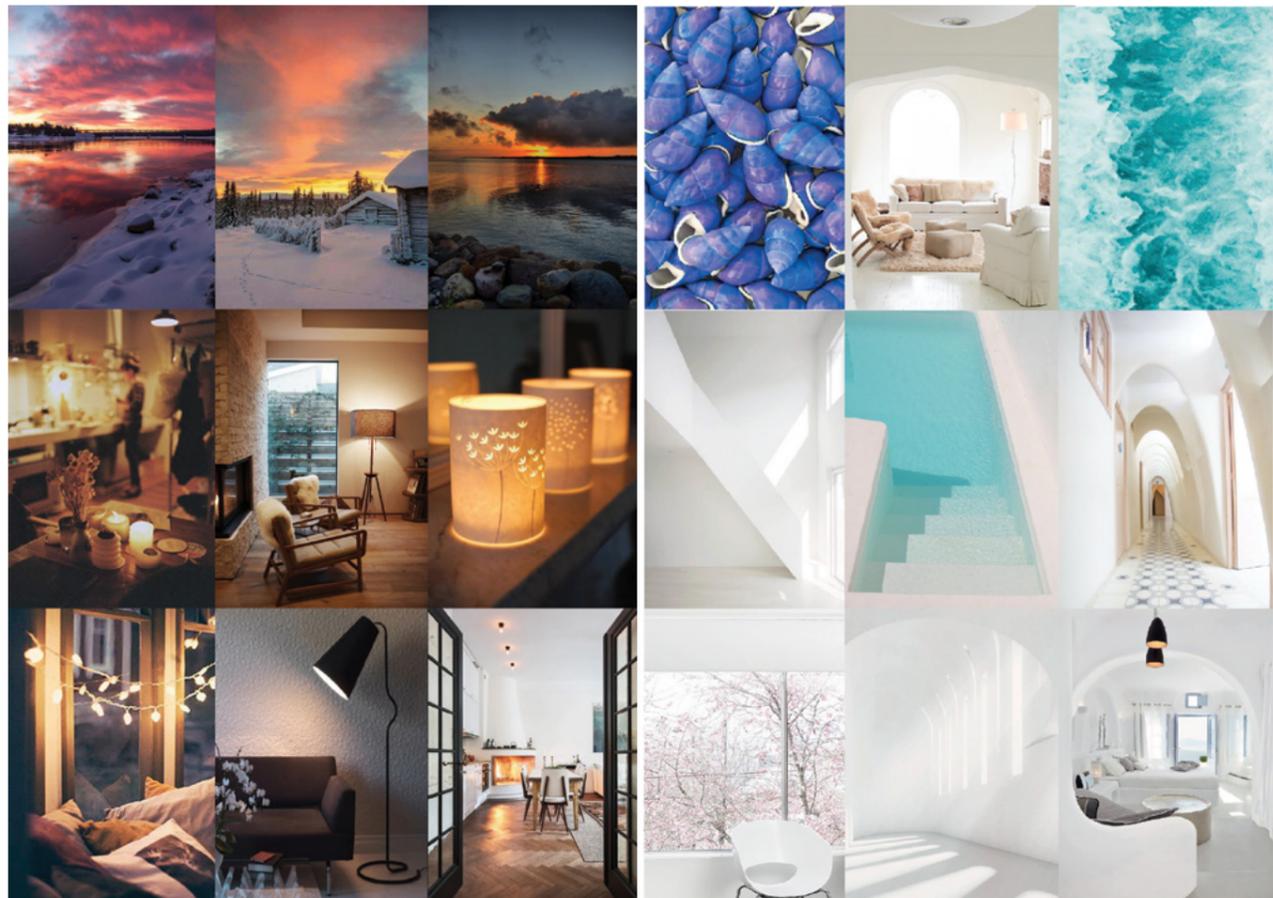
Figure 23
Moodboard North and South
(Casa Battlo, 2017), (Cortez, 2017), (Ellexis, 2017), (Expediciones, 2017), (Indulgy, 2017), (Schuck, 2017), (Sebasta, 2017),
(Shapeshifter, 2017), (Weheartit, 2017), (IntimateWeddings, 2017), (Jurnal de design interior, 2017), (Made In design, 2017)
(Sartori, 2017), (Sundari, 2016), (Svensson, 2016), (Winterfeldt, 2017)

1.3 Initial Problem Statement

According to the conclusion and the group's members life experiences, the people in Europe exhibit two different Lighting Cultures, depending on the region they are living, but they also show one similarity: most of them treat artificial light as a supplementary medium of illumination, most necessary for visibility reasons during night time. Subconsciously, they may use the same CCT, direction, and position of light but there are not so many individuals who can justify the reason they are using them. Also, they lack the knowledge of the enormous impact that light can have on their space they are living in, their mentality and their daily routine. Inspired by these facts, the author's thought that it would be a good place to start theirw thesis and extend their research to the matter. In more simple words, the authors believed that designing with the goal of making people understand the importance of light and the major role that the latter plays in the perception of the space, could be beneficiary for the average end user and improve the quality of atmosphere in that area. The idea was to act on people's daily routine, in a space where they feel comfortable and can experience different atmospheres. The environment presenting these characteristics is the house, defined in the thesis as "indoor living space," in which people feel comfortable and relaxed, and they can pay attention to different elements that can affect the quality of time they spend in it. The way of achieving this goal is to combine the two Lighting Cultures, not at the same time, but in the form of various lighting proposals to inform people about the variety of options they can have and the outcomes they can accomplish through this variety. With all these in mind, the author's came across their Initial Problem Statement:

"How can Northern and Southern lighting culture be combined to create awareness about the importance and potentials of the quality of light in indoor living spaces."

1.4 The Group's Profile

Figure 24
Members of the group
(Seghi, 2017)

The group for this thesis consists of three people. Lucrezia-an industrial designer from Italy, Sarunas-an architect from Lithuania and Spyridon-an interior designer from Greece. Apart from the friendship, it is the educational and the national diversity that brought the group together in the first place. Even though all of the members selected creative educations and are familiar with an individual design process, each and every one of them approaches a topic in a different way. A strict and structural way for the architect, an innovative and futuristic way for the industrial designer and a functional and realistic way for the interior designer. When combined, these skills are increasing the dynamic of the group, providing the versatility needed for a creative but pragmatic design solution.
In addition, the different origin of the members, two from Southern countries and one from a Northern one, played a significant role in the group's thinking progress. People from Southern countries where the weather conditions are ideal for the biggest part of the year, feel and understand light completely different than people from Northern countries where the daylight is limited, and an overcast sky is a common phenomenon.
Arriving in Denmark, the group members came face to face with an alternative use of light in everyday life. Suddenly, the quality of light and its color temperature were of huge significance, and average users were highly informed about light's values compared to the people of the country of origin of the members. The lighting education the group received, made things much clearer and provided a high motivation for further investigation and analysis. The reason why people from the same continent while having the same habits dealt with light so differently had to be explored. The group felt that there was enough ground to synthesize a possible solution that could combine and propose various ways of illumination in an apartment, inform people that there are different ways to light up their daily activities and by using light, bring them closer to each other in a more cultural way.

02   Methods

idea generation

PERSONAL EXPERIENCE

VISION

NORTHERN LIGHTING CULTURE   SOUTHERN LIGHTING CULTURE

INITIAL PROBLEM STATEMENT

methods and analysis

ACADEMIC KNOWLEDGE   **EXPERTS' OPINION**   **USER'S PREFERENCES**

• papers •   **• interviews •**   **• survey •**

• Northern and Southern apartments •

FINAL PROBLEM STATEMENT

lighting technique

• ORB •

design and testing

LIGHTING SCENARIOS

CASE STUDY

conclusion

USER CENTERED DESIGN SOLUTION
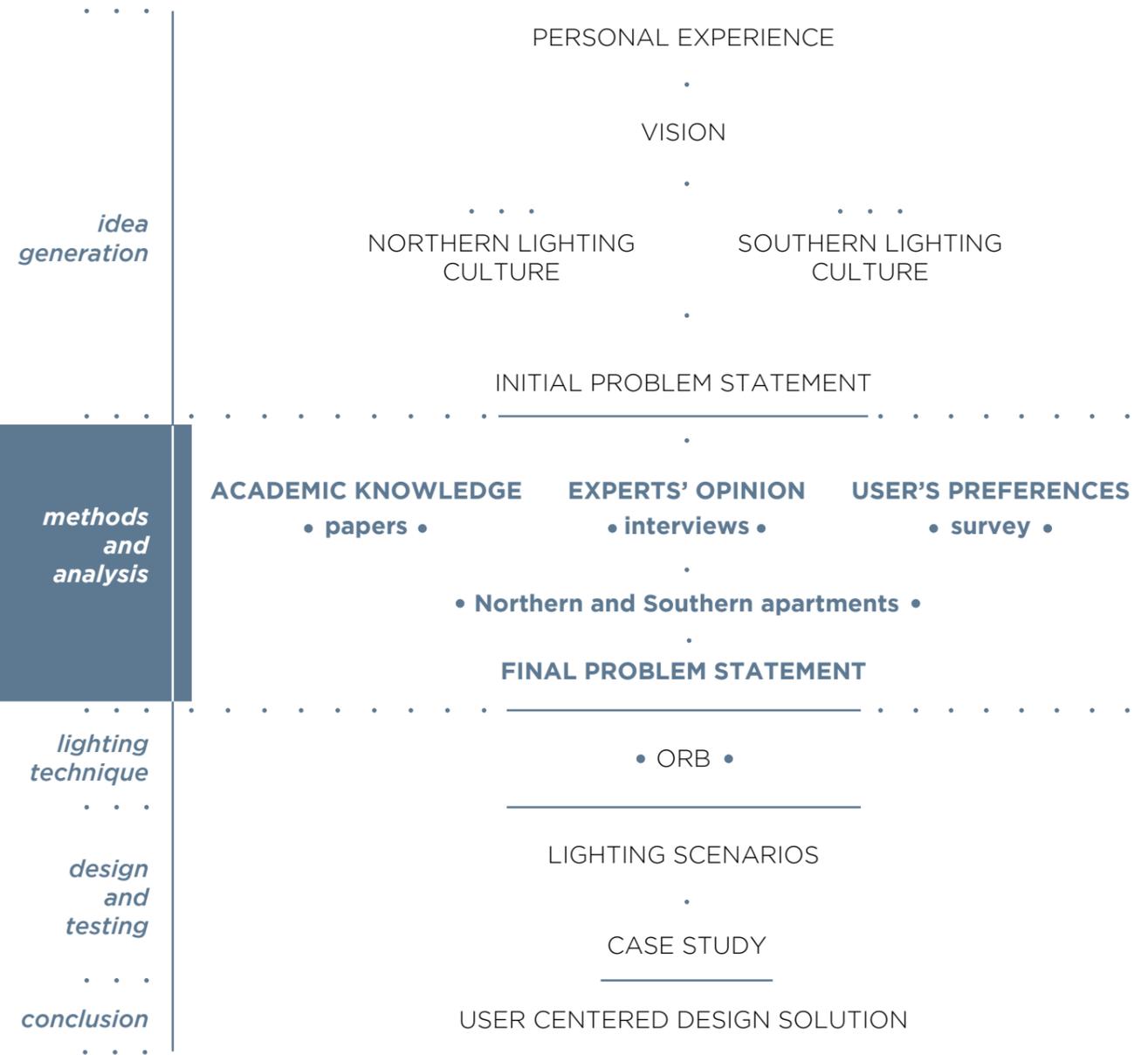
2. Methods

The Master Thesis methodology is defined by the following sections that were used to reach an innovative and holistic lighting design ideas for indoor living spaces. A list of research and analysis criteria and a process model are explained throughout this section. With the aim of demonstrating how, beginning from different life's experiences and combining them with knowledge in the field of "lighting and cultures," the authors can reach the goal of an appropriate lighting design solution which will answer the problem statement.

The students' personal background, observations and experiences in different countries has been elaborated through the problem-based approach and combined with knowledge from the fields of architecture. It was followed by collecting data on indoor spaces and lighting conditions in various European countries. As well investigating lighting technologies in relation to user's preferences and exploring lighting products and solutions to use as a design tool.

Section 2.1 Research criteria and sources, introduces the method how the knowledge was gathered from academic papers, lighting experts' opinions, and user's preferences and used in the thesis to investigate Northern and Southern European Lighting Culture.

Subsequently, section 2.2 Space and functions defines the research carried out to establish common characteristics in indoor living spaces and functions the users perform in it, in Northern and Southern European countries.

Section 2.3 Lighting technique explains the process followed by the students to collect data regarding existing fixtures: a selection of multitasking lighting solutions. The goal is to identify a suitable lighting technique which will represent the main design tool in the development of the final lighting solution proposal.

As a result, Section 2.4 Process Model depicts the strategic integration of the knowledge acquired in Section 2.1 Research criteria and sources, 2.2 Space and functions and 2.3 Lighting technique combining them with the trans-disciplinary based thinking. The outcome of this chapter is the overall procedure that the group followed through the thesis development.

2.1 Research Criteria and Sources

The concept of ''Lighting Culture'', defined in Section 1.2.1 Lighting Culture has been unfolded and analyzed through the use of different research criteria and sources. Academic papers are used and studied to confirm the existence of various Lighting Cultures. Lighting experts' opinions, exploring lighting projects and installations all over the world, are considered to reach a deeper knowledge on the way professionals work in relation with different Lighting Cultures. And a user's survey has been elaborated for concrete proof that people have different preferences based on the country they come from as well as their personal experience and habits. Starting from this research, Europe has been divided into Northern and Southern countries, to investigate better, analyze and compare different Lighting Cultures in determined areas. For a better and quicker understanding of this section, the following list of questions, being the research criteria, and sources used to answer them, has been elaborated in Figure 25.
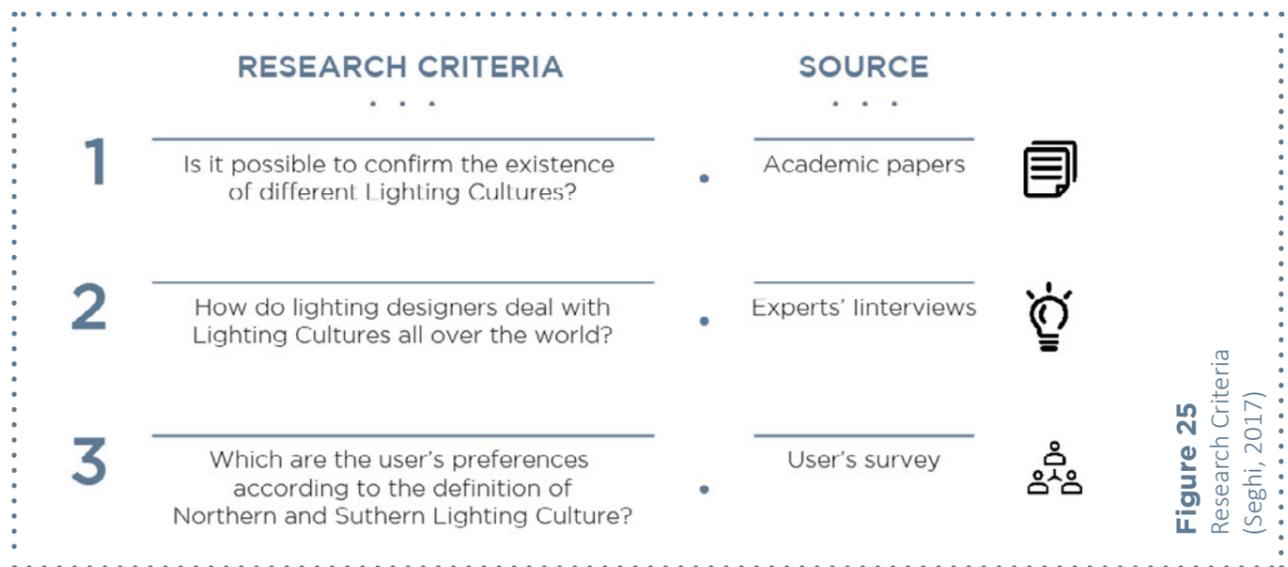
Figure 25
Research Criteria
(Seghi, 2017)

As a conclusion, through the analysis of different sources in the academic field, the professional experience, and the user's opinion investigation, the authors can gather an in-depth knowledge. As well as accurate information, to use as a solid base for the design of a user-centered lighting solution and answer the problem statement.

2.2 Space and Functions

After defining the Northern and Southern Lighting Cultures, a more design-oriented research is needed. In this step, the group determines the particular approach for the design of different lighting scenarios. Through the investigations and observations in the various home countries, as well as the one of residence, the writers analyze common characteristics and differences of indoor living spaces, user's cultural habits and preferences in the use of artificial light at home in Northern and Southern European countries. The goal is to depict a limited number of rooms in the apartment and functions performed in it by the user. In this particular case that is socializing activity in the living room and eating function in the kitchen (Figure 26). Selecting these spaces and features, the authors want to define the best design for different lighting scenarios in an indoor living environment, according to the Northern and Southern lighting culture.
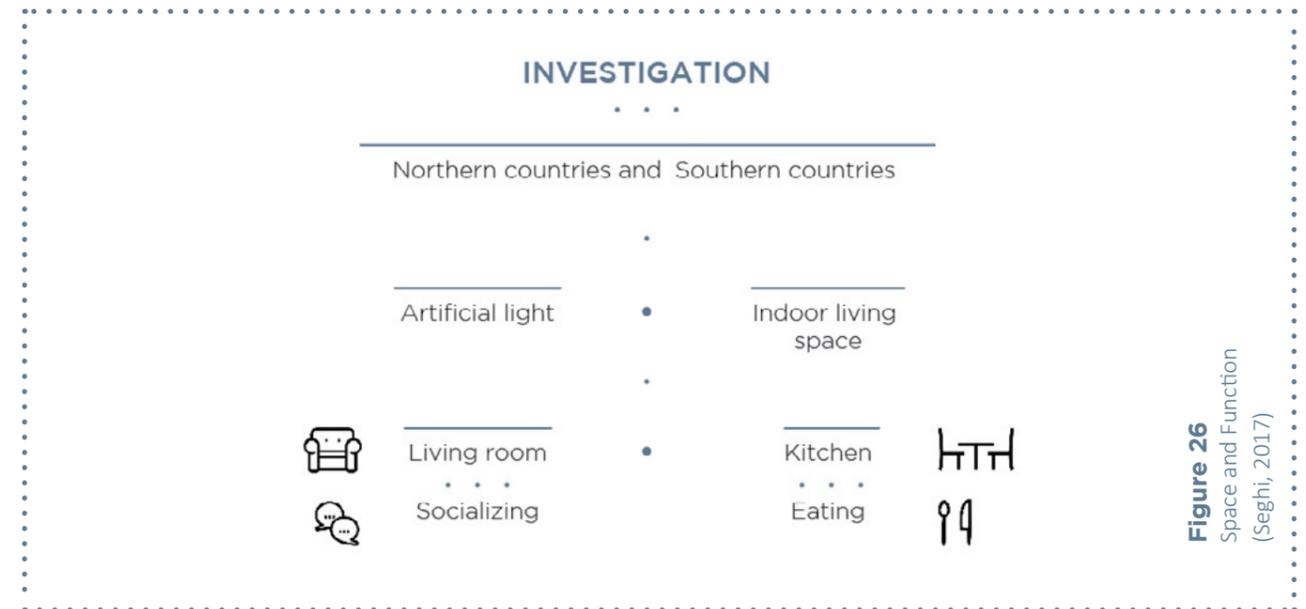
Figure 26
Space and Function
(Seghi, 2017)

The analysis and results of this method will be explained and unfolded in section 3.5 Northern and Southern apartments. Thanks to this process, the authors were able to identify a Case Study, which will be introduced and analyzed in Section 5.3 Case Study, as a part of the Chapter 5 Design.

2.3 Lighting Technique

After the definition of indoor living space and user's functions, in common to Northern and Southern European countries, the students needed to understand which tool was the most suitable for the design solution development. At this stage, several projects from different worldwide known companies and start-up were selected and evaluated through the problem-based approach. The goal was to define the best fixture to use as Design technique and tool during the testing phase, which will be explained in section 5.4 Testing. Considering the inherence and relevance of each project to the specific thesis topic, as well as the availability of the product, the students selected the most inspiring and complete one to analyze in depth. This fixture will represent the essential Design tool, which will be completely unfolded in Section 4. Lighting technique.

2.4 Process Model

This section represents the outcome and conclusion of the Methods chapter, being an overview of the general process followed by the group in the thesis project. Figure 27 illustrates in detail each stage of the Process Model, from the knowledge acquired, to the elaboration of a final design solution. The headlines above the circles refer to the problem-based learning pedagogical model proper of Aalborg University that has become internationally recognized as an advanced learning prototype (En.aau.dk, 2016). Inside the circles, each step represents a different stage that leads the authors to the development of the final proposal.

Figure 27
Process Model
(Seghi, 2017)
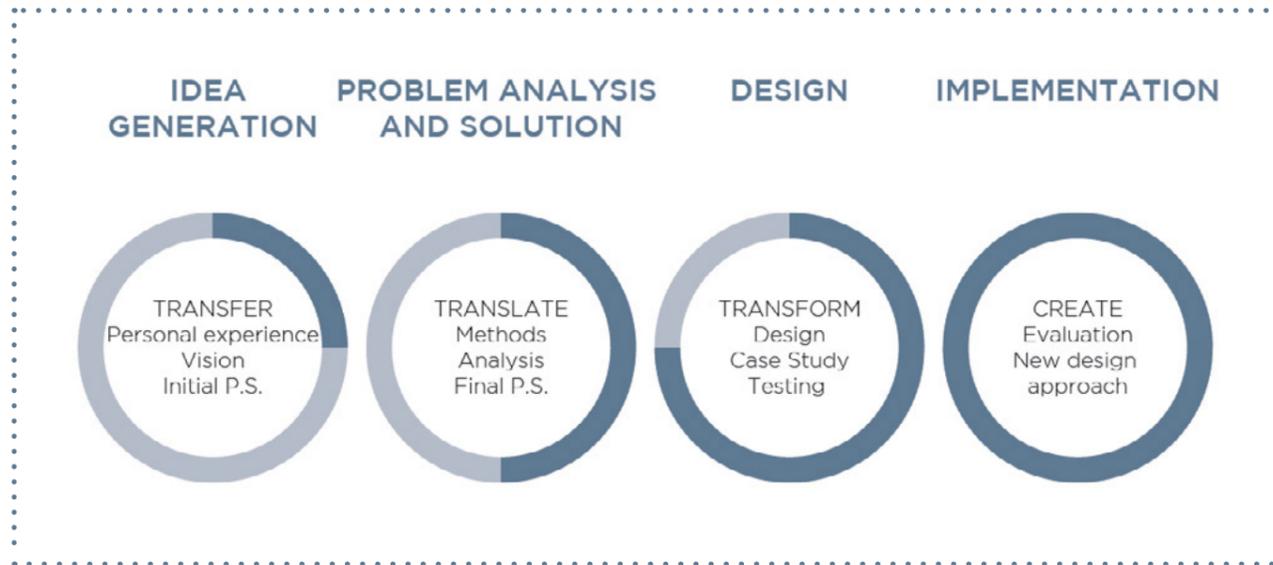
The first stage, Idea Generation, is about transferring knowledge from various disciplines and countries, creating a mutual vision and solid base for the project development. In this step, the initial problem statement is defined.

The second stage, Problem analysis and solution, is about translating knowledge and establish precise criteria for the research and analysis development. During this phase, the authors considered and studied different existing lighting fixtures, as well as indoor spaces and user's activities in Northern and Southern countries. The goal was to define the best tools to use in the Design and testing, the output of this stage is the creation of a personal Design process approach, getting inspiration from existing lighting solutions and innovative design thinking.

The third stage, being Design, is about transforming and evaluating knowledge. The specific Design criteria are defined and described on the base of previous stages' outputs as well as the thesis goals and solved into preliminary design solutions to meet the needs of the users. Initial designs are tested to improve the final design solution and meet the success criteria. The result of this stage is an evaluation, which defines the authors' ability to solve the final problem statement.

The final phase, being the fourth one and described as Implementation, is about communicate and share the new knowledge elaborated in the Design Process, as well as discuss possible future development and proposals for the Design. As a conclusion it is possible to state that through the combination of several types of research and lighting techniques, the authors have a general overview that will lead them to a deeper analysis process, to collect the information needed for the design development.

03　Analysis

PERSONAL EXPERIENCE

VISION

idea generation

NORTHERN LIGHTING CULTURE　　SOUTHERN LIGHTING CULTURE

INITIAL PROBLEM STATEMENT

methods and analysis

ACADEMIC KNOWLEDGE　**EXPERTS' OPINION**　**USER'S PREFERENCES**
● papers ●　　● interviews ●　　● survey ●

● **Northern and Southern apartments** ●

FINAL PROBLEM STATEMENT

lighting technique

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3. Analysis

3.1 Introduction of Sources

For the analysis part of the thesis, authors chose to use three types of sources to define the use and perception of light in different regions of Europe. Type of sources is academic papers, professional lighting designer's experience and end user's preferences.

Each source has been investigated to gather different information on the subject of Lighting Cultures and considered to create a holistic and appropriate lighting design proposal. Academic papers are used by the authors to confirm the existence of different Lighting Cultures, the concept already explained in section 1.2.2 Lighting Culture. Interviews and knowledge from lighting experts are researched by the group to fully understand the way how experienced professionals deal with Lighting Cultures all over the world, as well as to get inspiration from their projects and strength from their knowledge (Laganier, van der Pol, 2011). User's preferences in indoor living spaces are investigated through a survey to have a reliable base for the design of a user-centered lighting solution. As a result, to link the analysis step and the design phase, a research of indoor spaces and functions performed in it by the user, is carried out to understand how Northern and Southern people live their home environment.

3.2 Academic Papers

In this section, the literature, which authors have found to be most relevant to the topic, is presented. 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.

To begin with, the paper by Carlo Volf "Light and the Aesthetics of Perception" conducts a study of our perception, focusing more on the effects of light and less on the physical light (lux). By doing so, the article tries to give a better understanding of the differences of the regional lighting cultures and the influences creating the differences. The article 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. A good physical environment for the human being is as important as the emotional wellbeing.
This article is very useful support for the thesis topic introduction and writer's personal observations on the lighting culture and use of light in Northern and Southern European Countries. Carlo Volf analyses with a scientific and cultural approach, the reason why Scandinavian Countries prefer to use a warm artificial light and Southern people tend to us 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. It does not help the authors in finding any completely scientific explanation for their subjective experiences and observations, but it gives strength to statements and quotes throughout the whole thesis. Underlining 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 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 analyzing three case studies, it argues 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 an anthropology of luminosity, as well as an examination of how light is socially used to illuminate places, people, and things, in a residential context. By exploring the use of light in different countries and historical periods, referring to authors of vital importance, the writer addresses the use of light to various social habits and values in each culture. The author does not propose a solution and final general statement as a conclusion, instead, the article is ended by proposing a question of significant importance: "how do people use light, and what does light do?"

The content of this paper is not extremely relevant to the development of the design solution or the research content. Its importance in the thesis context dwell in the approach it proposes in exploring the light as a cultural phenomenon addressed to people social behavior and habits. The paper offers to the group an exciting method for analyzing light from the anthropological perspective as well as an overview on the different meaning light can have by exploring several cultures all over the world.

To define the differences between the northern and southern countries use of lighting, few papers were investigated. One of them is "Nordic Lighting Design Background" by The Danish Lighting Innovation Network. The content introduces the term "Nordic Lighting" and explains how and why people in northern countries are using specific lighting approach. At the same time, the paper briefly describes the connection between Nordic Lighting and Human-centric design.

The article is useful to support the thesis content by introducing Nordic lighting design concept and explaining the differences between Northern and Nordic lighting design. Even though the differences are minor or for some people might be unnoticeable, they do exist. Nordic Lighting is part of Northern lighting design, which is a combination of different lighting conditions and lighting layers affected by nature and daylight. To add on top, Nordic lighting design represents the aesthetics of lighting, architecture, ambiance, atmosphere and human-centric lighting together in Scandinavian countries. The data from the paper about Nordic lighting design suggests the qualities of the lighting design that could be used as a high selling concept all around the world. It is due to the fact that Scandinavian design is a well-known brand and the Nordic lighting design is part of it.

To broaden the knowledge about the natural daylight differences of the countries, research paper "Nordic Daylight" by Barbara Szybinska Matusiak has been investigated. Information in it shows the analysis and results of different latitude daylight environments.

Some of the findings were extracted from the paper, and one of them is dominating low solar elevation angle during the year in the Northern region. In relation to the topic of the thesis, low solar angle during the year cause glare and people living in this area are familiar with shading options. Either it is intuitive body turn against the sun or windows' blinds in the buildings. Due to this fact, the reason why people in Northern 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 why people in the Northern region tend to use warm white and more colorful lighting.

Lone Stidsen, Niels Thuesen and Poul Henning published a paper in Nordic Journal of Architectural Research called "Mapping Danish Lighting Trends". The publication is a research project about Danish lighting trends in domestic environments. The study investigates identifying marks of arranging artificial light in a horizontal tripartition of space. The agenda of the research is to present a method for documenting sensory qualities of light, which are often described as subjective preferences and not documentable.

The paper introduced the theory that the lighting trends in Danish homes are defined by high, center and low positioning of illumination, depending on the activity in the domestic environments. Different activities rooms in 3485 pictures from the Danish trend magazine BO BEDRE were investigated for the arrangement of the lighting setups. The goal of the paper was to consider how the atmosphere can be shaped by light and if it is possible to judge and

evaluate the findings. According to the authors, it is potential to do that, but there should be common socio-cultural understanding of the group. 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. Few factors, such as space, time, light characteristics and user, has to be considered in order to create a light atmosphere that is suitable for people (Figure 28). This observation could be linked with the thesis topic in relation with different cultural backgrounds. To create a design, that is adjustable and suited for different people in different regions, and all the factors need to be analyzed.
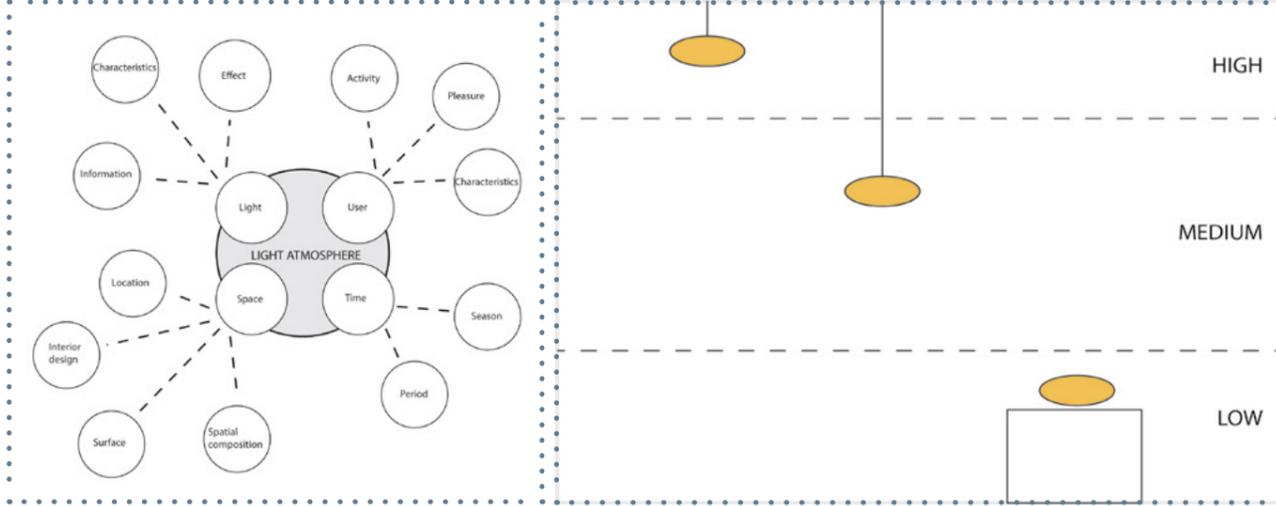

Figure 28
Model of Light Atmosphere
(Stidsen, 2012)

Figure 29
Sketch of Light Tripartition
(Noskaitis, 2017)

The method, how the lighting atmosphere was analyzed in the paper, using three vertical positions of the light fixtures in the Danish houses is a useful tool for the thesis (Figure 29). In this way, not only Danish houses has been explored, but the method was used to analyze apartments in Southern regions. Depending on the space and a function in the flat, universal criteria to judge the position of the fixtures was defined.

A paper by Rosella Tomassoni called "Psychology of Light: How Light Influences the Health and Psyche" analyzes the light from a psychological point of view, investigating the relationships between light-based emotions and behaviors, and the psychophysical responses to lit environment providing the interpretative keys of an increasingly complex reality. Even the dark (i.e. the opposite of light) was analyzed, describing the effects of particular sensory deprivation. Light may stimulate our perceptual apparatus through type and range of exposure to a lighting source and its colors, inducing specific emotional states or behavior in the human. Light is the stimulus that influences most the human perception, but also the psychophysical well-being of the individual in everyday life. The strategic layout and modulation of lighting by light designers may influence the perceiver's mood. The paper describes a scientific approach the role of light in the human perception of the space as well as behavior and well-being. It 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 analyzed 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. Other than a scientific support to personal experience and observation, it is a significant source of inspiration for creating several lighting scenarios, adding specific knowledge on the effect light can have on human mind and behavior, to the lighting culture's concept development throughout the design process.

In research "Lighting up cosy atmospheres in Denmark" Mikkel Bille 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. A finding of high importance as it shows that people include light in their life for more reasons than to make things visible for themselves. For some of them, it is a way to communicate with their neighbors 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 coziness, safety, companionship and it can even be used as a way of salutation.

The article is of particular relevance to the thesis topic and design development. Even if it is only related to Danish social habits and culture, it gives strength to the reason why the authors chose the particular context of "indoor living space," and in it, few rooms and functions performed in them, for their investigation and final design proposal. It also helps the students in defining the most important parameters to create "atmospheres" in relation to different cultures and communities, highlighting the connection between light and people's mood as well as its power to set up and represent a culture or community. At last, by exploring the importance of "hygge" in relation to the Danish culture, it confirms and supports the group's design proposal of using the European lighting cultures research as a tool and subject to understand and communicate different values within communities.

As a conclusion, it is possible to state that through the analysis of academic sources the students gathered knowledge coming from different approaches to the topic of light. The scientific studies gave them a complete understanding of how natural and artificial light can affect the human body, confirming as well several differences between Northern and Southern regions of Europe. Useful findings such as the way the solar angle has an impact on glare and twilight colors can be used by the authors as relevant information to propose lighting scenarios in indoor living space. On the other hand, the psychological and anthropological approach, offered by some of the authors, showed how light can always be investigated from new perspectives. Knowledge on users' perception of light in different cultures was introduced. In order to verify those findings, a personal meeting was held with the writer of the papers "An Anthropology of Luminosity: The Agency of Light" and "Lighting up cosy atmospheres in Denmark" Mikkel Bille. He explained to the group the importance of light from an anthropological perspective providing several insights on the matter. The details of this interview were held as helpful information by the group for the continuance of this thesis and can be illustrated in the appendix. Natural and artificial light were investigated in various ways, giving the group new information. In the analysis the writers found an interesting overview of different research methods, as well as important knowledge to use as a base for a lighting proposal, confirming several statements in chapter 1.Introduction.

3.3 Lighting Designes' Experience

One of the major influences for this thesis was the book "Light and Emotions, exploring lighting cultures/conversations with lighting designers" by Vincent Laganier and Jasmine van der Pol. On the following section, the group has chosen some parts of the interviews from this book that are related to thesis investigation. 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 color. That's a cultural difference" – Manav Bhargava, India, Architect (8 years)

Figure 30
Red Lights in China
(Scrivener, 2015)

Figure 31
Red Lights in China
(Seton Catholic College, 2017)

"When I am in the country, looking up in the sky, I feel myself. Being in the country can teach us to see what is essential for human beings. And much of this has to do with light. Here in Europe, we experience light differently than people living in Equator. I like dusk and dawn, which is very long and differentiated in the North and has nuances of white sky and the warmish, reddish orange sunset. But the steel blue of the sky can also be very beautiful. You don't get this at the equator; there it is light, light off. Light gives me the feeling of being alive." – Ulrike Brandi, Germany, industrial designer (25 years)

Figure 32
Orange Sunset in Poland
(Dziubinski, 2004)

Figure 33
Sunset in Koh Samui, Thailand
(Zobaken, 2014)

"Back in the 80's, Thais liked to mimic the West, but now we are returning to our Asian and Thai roots. Lighting is culture; it is related to who we are. The King can influence cultural thinking and ideology. His philosophy about looking at the Thai roots and preserving them has probably made us realize the importance of cherishing what we posses as opposed to copying somebody else. Design is a cultural reflection." – Acharawan Chutarat, Thailand, Architecture(17 years)

Figure 34
Jim Thompson's house in Thailand
(Fasai, 2013)

Figure 35
Thailand Interior
(Luxury Society, 2016)

27

"The way you project and see light is determined by the kind of climate you live in. here in South America, where the weather is sunny and the sky is blue for most of the year, our experience of natural light and light at night is different from that for people in Scandinavia, for example where they have very few sunny days and months without any sunlight. Their experience of the environment is bound to be different from ours, and this will be reflected in their understanding of architecture and their approach to lighting design." - Carlos Fortes, Sao Paulo, Architect (22 years)

"All the projects we are working on right now in Dubai and Cairo are so much about color change…but not because they want to be Las Vegas. I think it's because in their culture, it's important to find color, 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 become celebratory or is just different." - Barbara Horton, USA, interior designer 29 years

Figure 36
Burj al arab
(Askides.com, 2016)

Figure 37
Cairo Opera House
(Philips Lighting, 2004-2017)

"It fits into a different environment, because there is a cultural difference between North and South, and between West and East. In the South they are attracted to a more violent, whiter, rawer light that is directly associated with the sunlight; it is part of their culture. As you move farther north, it is more about light colors closer to sodium, because the culture is linked to the idea of interior, and so a warm light is more convivial". - Philippe Hutinet, France, theatre lighting 44 years.

"You have to work with both light and darkness because light is only revealed by dark. Light and shadow are all part of the toolkit"; "Regrettably, cultural differences are starting fade with TV, movies and the internet. Nowadays things look remarkably similar wherever you go". - Paul Marantz, architect, USA 52 years.

Figure 38
Light and Shadow
(Jacobs, 2014)
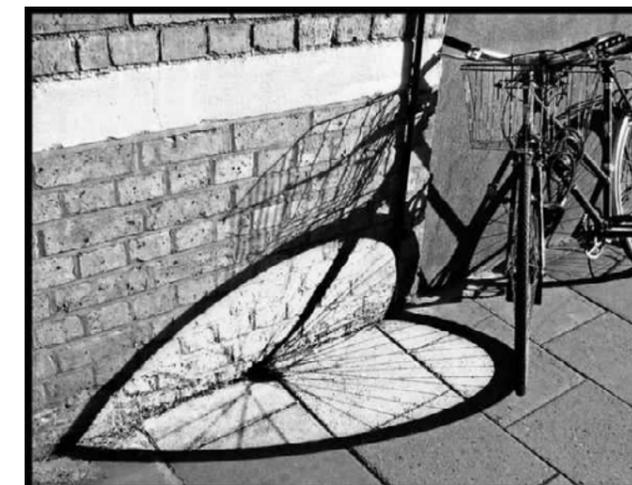
Figure 39
Light and Shadow
(Harman, 2015)

28

"We were engaged to develop the master lighting plan for the city center of the city of Singapore. When we started the project, we were not sure about the cultural influences, but we did understand the climatic conditions, the geography and the fact that Singapore is a multi-racial culture"; "Your use of various color temperatures of white is different when compared to other cities such as Hong Kong or Shanghai, which have lots of colors. Each city has a different latitude and climate. I recently visited Copenhagen. They never use white light there; the colors 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. Color temperature is largely based on climate". - Kaory Mende, Tokyo, Industrial and Environmental design, 32 years

Figure 40
Osaka by Night
(1FREEWALLPAPERS.com, 2017)

Figure 41
Copenhagen by Night
(Free of Copyrights)

"Thais are used to strong sunlight and they therefore want the same brightness when they come indoors. From my observations, Thais prefer more light compared to Europeans. If they have to adjust to dimer lights indoors, they find it very dark. At the same time, Thais are not very keen on strong sunlight (…) so we take these factors and cultural perception into consideration when designing and limit the amount of sunlight". - Vannapa Pimviriyakul, Thailand, Architecture, 16 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. Religion also could play a significant part, but it is out of the scope of this thesis. 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 north and due to the various colors 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 color in their life, and that's why they sometimes prefer colored 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 south 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. In order to sum up, people from the north prefer a much warmer color of light when people from the south will go with a bright white one.

3.4 End User's Preferences

To establish the user's preferences about an artificial light use in indoor living spaces in Northern and Southern regions, an online survey was launched. The main goal was to find out the tendencies of lighting color temperature, direction, and distribution and the placement of the fixtures in two different spaces, the kitchen and living room. Bedroom, even though it was originally included in the survey, got later on excluded as a choice. The reason was that sleeping is a function more closely related to science and ideally the lighting choices should not be left to the end user. Having the survey done, authors can compare and base the results with academic papers and lighting designer's experience to see the preferences for artificial lighting use in different regions of Europe.

3.4.1 Introduction to the Survey

The results, collected by 300 participants, most of them living in Italy, Greece, Lithuania and Denmark, were quite enlightening and close to the group's initial assumptions about the CCT, the positioning and the lighting habits in a residential environment. A total of 28 questions were asked. The first four questions were used to "warm up" the participant and to specify the gender, the age group, the nationality and the country of current residence, followed by five more questions that helped defining the choices of the participants in relation to some of the functions in their apartments as well as its interior. It was the group's decision to focus on the age group from 18 to 35 years old for three reasons:

i) most of the participants belong that age range.
ii) it is the age where people usually get married and 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) they belong to a generation which is familiar to the internet of things and therefore more accustomed to new and radical technologies related to light.

The test results were divided, as mentioned before, in people who were born and still live on the north side of Europe and individuals who were born and still live in the south side of Europe. Immigrants, international workers, and students that have moved from north to south and vice versa were excluded in order to avoid possible bias.

3.4.2 Gender, Nationality and Country of Residence

From the 300 participants, a total of 196 belonged to the age group 18-35, 98 from the south regions of Europe (50 males and 48 females) and 98 from the north (38 males and 60 females). Coincidentally, the number of the participants from the south is equal to the number of the participants from the north leading to a safer data extraction. 57 Italians and 41 Greeks answered the questions and only 3 of them are living in another country in south Europe. For the North, 58 Lithuanians, 15 Danish and 25 from various countries replied, all of them currently residing in the country they were born and raised. Most of the people are living with another person in their apartment, 48 from the south and 50 from the north.

3.4.3 Functions, Habits and Interior

Following the questions about the origin, the participants were asked where they spend most of their time inside their apartment. Judging by the results, it seems that southern people spend less time in the kitchen compared to the people from the north. They both spend most of their time in the living room. In the attempt of understanding better the interior of their apartments, the participants were asked if their kitchen is connected to their living room, if they have a dining table in their kitchen and if they have a different dining table for special occasions. The source of these questions was the group's members life experience, and the aim was to determine exactly how the participants perform some functions, like eating alone, with a close friend or spouse or when there are other

people as guests. Their replies were almost identically split, proving the group's original observation that was stated at the beginning of this thesis, that in a standard modernized society like Europe there are no significant changes in the way people live their lives. The only difference was that 50 people from the south replied that they did have another dining table for special occasions when only 20 people from the north replied the same. The choice of the bedroom, even though it was included in the survey originally, it was later abandoned by the group for the reason that lighting conditions before, during and after sleep is a matter that should be based on scientific data and not on user's preferences due to the importance of the function in someone's life. (Figure 42 and Figure 43)
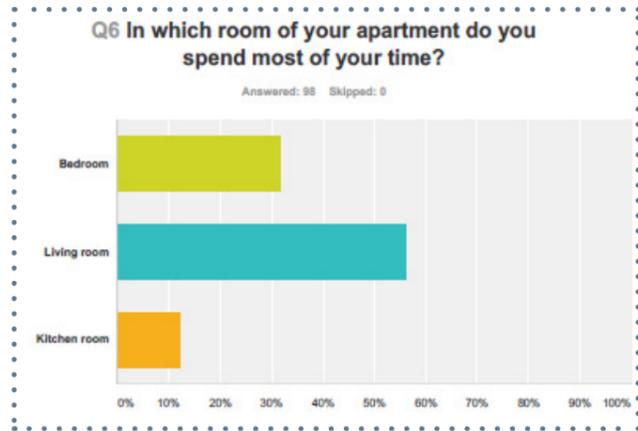
Figure 42
1.Survey North
(Survey-Monkey, 2017)

Figure 43
2. Survey South
(Survey-Monkey, 2017)

3.4.4 Kitchen

The rest of the questions of the survey were far more specific regarding the functions, the CCT and the positioning of the fixture as well as the directionality of the light. Pictures were provided along with the answers in order to inform the participants and make their choice easier and more understandable.
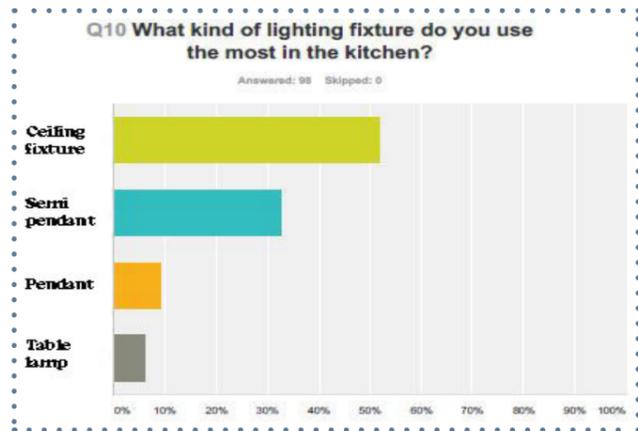
Figure 44
3.Survey North
(Survey-Monkey, 2017)

Figure 45
4. Survey South
(Survey-Monkey, 2017)
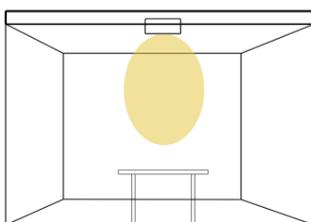
Figure 46
Ceiling Fixture
(Noskaitis, 2017)
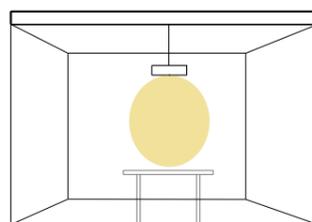
Figure 47
Semi-Pendant Fixture
(Noskaitis, 2017)
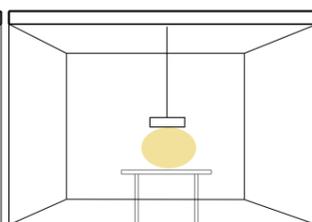
Figure 48
Pendant Fixture
(Noskaitis, 2017)
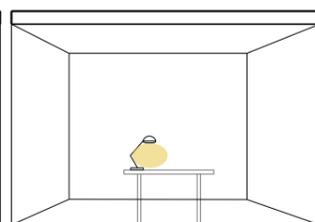
Figure 49
Table Lamp
(Noskaitis, 2017)
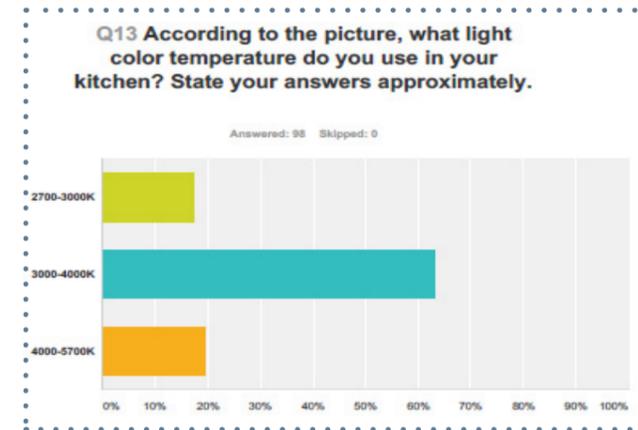
Figure 50
5.Survey North (Survey-Monkey, 2017)
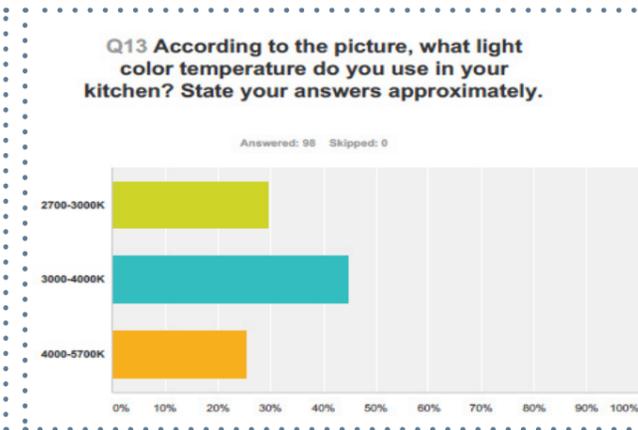
Figure 51
(Survey-Monkey, 2017) 6. Survey South
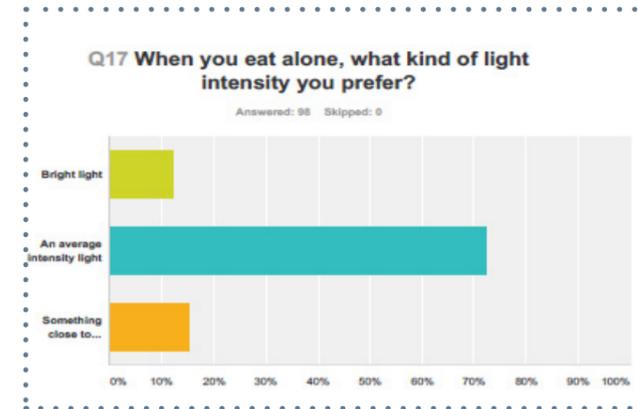
Figure 52
7.Survey North (Survey-Monkey, 2017)
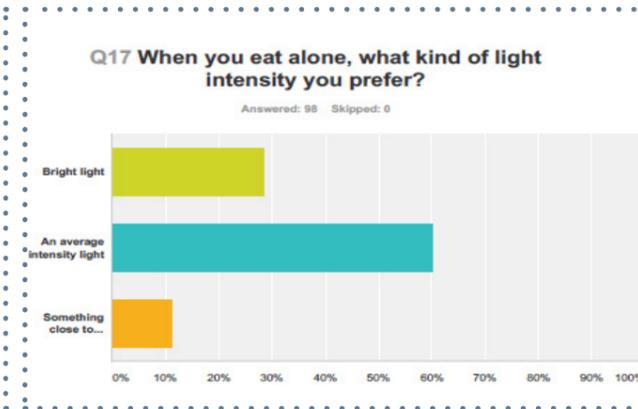
Figure 53
(Survey-Monkey, 2017) 8. Survey South
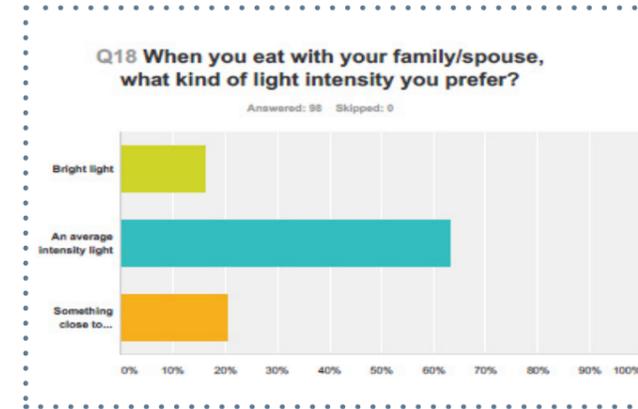
Figure 54
9.Survey North (Survey-Monkey, 2017)
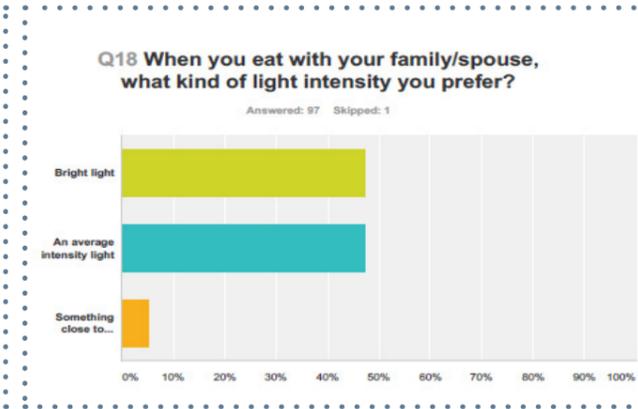
Figure 55
(Survey-Monkey, 2017) 10. Survey South
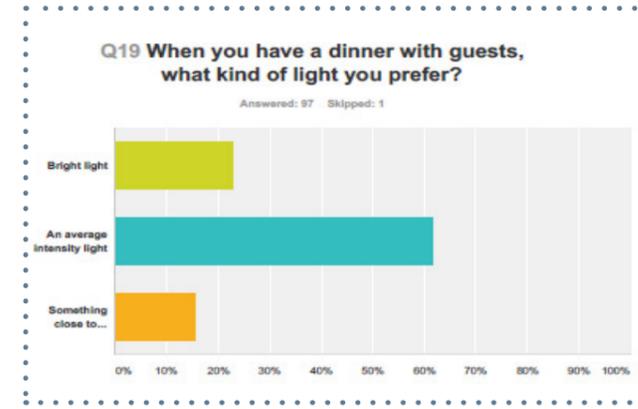
Figure 56
11.Survey North (Survey-Monkey, 2017)
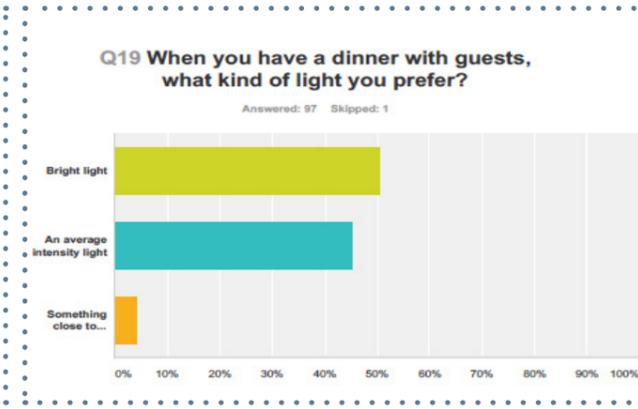
Figure 57
(Survey-Monkey, 2017) 12. Survey South

Judging by the answers, there are no significant differences in the types of lighting fixtures used by the people in the two regions, in the kitchen. Of course, even the minor ones have their meaning but mostly in explaining some alternations in the way of thinking of and seeing the light. For example, even though both of the participant groups prefer a semi-pendant lamp, only one living in the south prefers a table lamp. A fact that agrees completely with the experience of the authors coming from Italy and Greece. A big surprise is the fact that 51 people from the North stated that they preferred a ceiling fixture when only 30 gave the same response from the south. On the same note, 11 people from the South indicated that they have a pendant light, something that was not expected, as generally, people from the south prefer bright environments and light coming from high above. It could be explained by the significant influence that Nordic design has on citizens of Europe, but according to the survey, most of the participants from the South (51) responded that they prefer a ceiling fixture.
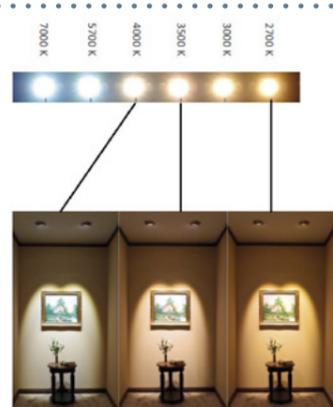
The surprising facts did not stop there. When participants were asked about the CCT (Figure 58) they prefer in the kitchen, 62 people from the north replied 3000-4000K when only 44 from the south gave the same answer. The group's members, living for at least two years in Denmark and being influenced by the light there, were expecting a choice for a more warm light for the northern people and a more cold light for the Southern. The answers showed a much bigger variation in the CCT of light in the south were in the north there were more consistent. That could also be happening because of the lack of knowledge about the light in the southern regions, as the daylight is rich and coherent most months of the year.

When people got asked about the intensity, some differences began to surface. In the scenario of the participant eating alone, most of the people replied that they prefer a medium intensity light. Also, 28 of the people from the South stated that prefer bright light, a number bigger than double to the number from the north. In the scenario of eating with their families or spouses, 46 people from the south replied that they preferred a bright light when 62 from the north answered an average intensity light. In addition, 20 people from the north said that they prefer a light close to a candle light when only five people from the south gave the same answer. That was the first question that created a difference in the light based on the cultural background of the participants. People from the south regions of Europe, when they socialise-either by eating or sharing a drink in the living room they prefer a more bright environment as they wish they faces of the participants to be fully lit. Also, candlelight in most of the countries in the south has a more romantic or religious meaning. When the participants were asked about eating with a lot of people, 49 from the south preferred a bright light when 60 from the north preferred an average intensity. That comes in agreement with the previous responses showing that when people from the south have guests, they prefer a more bright light. According to the author's experience that happens in order to make the guests feel more comfortable as they are accustomed to fully lit environments and also because a dimmed down light or some dark spots are associated with romantic or malicious intentions.

3.4.5 Living Room

An almost identical procedure was followed about the living room and the user's preferences. A line of questions was asked to find out the type of the lighting fixture mainly used, the CCT, the intensity and the directionality on various scenarios. About the type of the lighting fixture, 41 of the people from the south answered that they prefer a ceiling fixture over 37 that prefer a semi-pendant one. Pendant and table lamp gathered 9 and 7 answers accordingly. On the other hand, 43 people from the north chose semi-pendant lamp over 35 who chose a ceiling fixture. Only seven replied positively to a pendant lamp and a sum of 12 to a table lamp, as expected since this kind of lighting fixture is far more popular in the north than it is in the south. Regarding the CCT the answers were pretty much the same. The majority answered a light between 3000-4000K. One interesting fact though is that 15 people from the south chose a light between 4000-5700K over only 7 people from the north.

Moving forward to the scenarios the same logic as before was used: sitting alone, with a close friend and with a bigger group of people (guests).
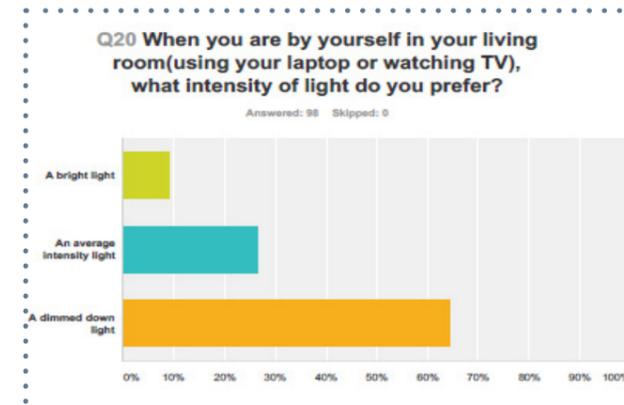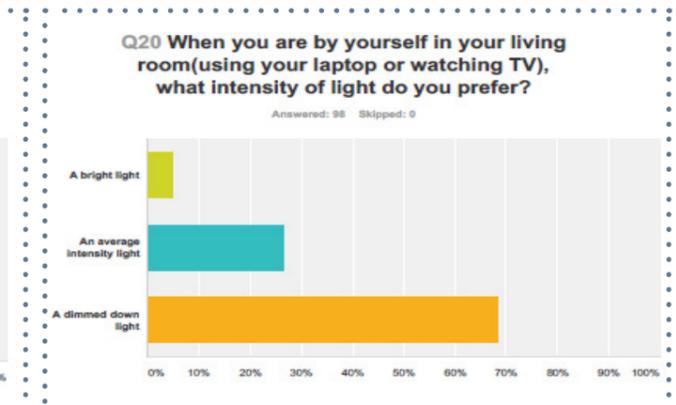
In addition to these scenarios, participants were asked to choose the number of the fixtures they use and the directionality. For sitting by themselves, people from the north replied that they have two or more fixtures turned on at the same time where the majority of people from the south answered one or two. The responses upon the directionality were almost the same, choosing indirect lighting or a combination of both direct and indirect.
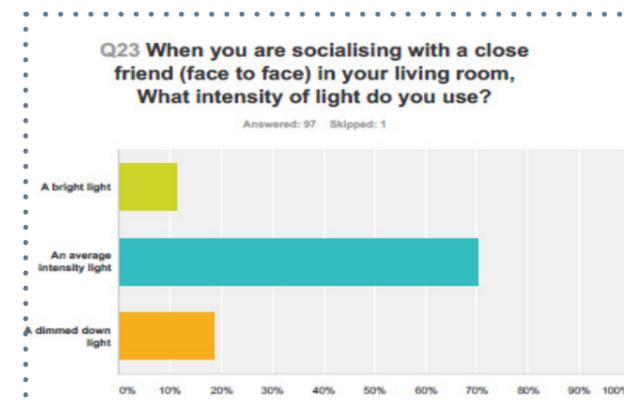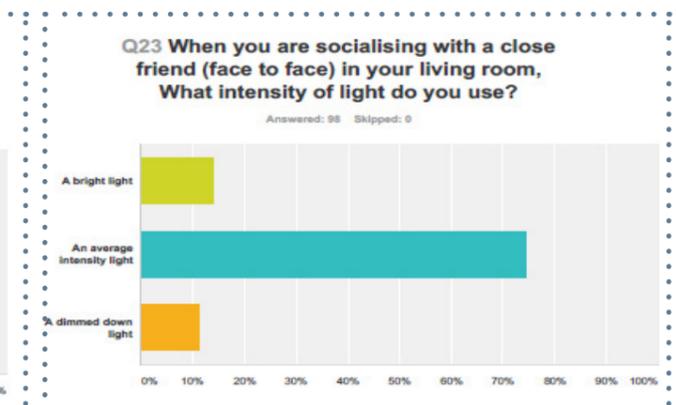
When asked about the fixtures being used in this scenario, participants from the North stated that they mainly use two fixtures (47) or even one (23). The interesting fact is that compared to the previous scenario one can notice that the users use a different kind of combinations of fixtures for each occasion. In the south, participants chose almost equally between one and two fixtures. The directionality of both of the group's preference was indirect (55).
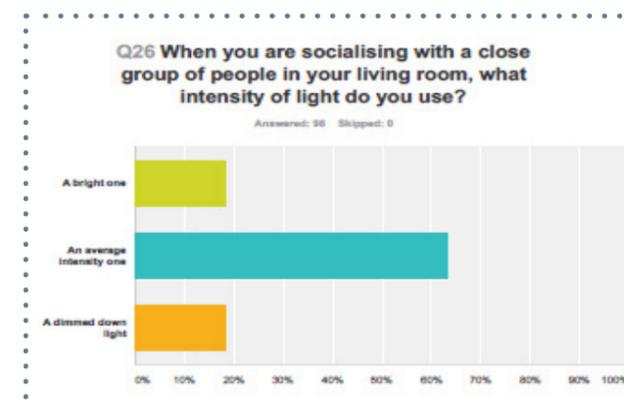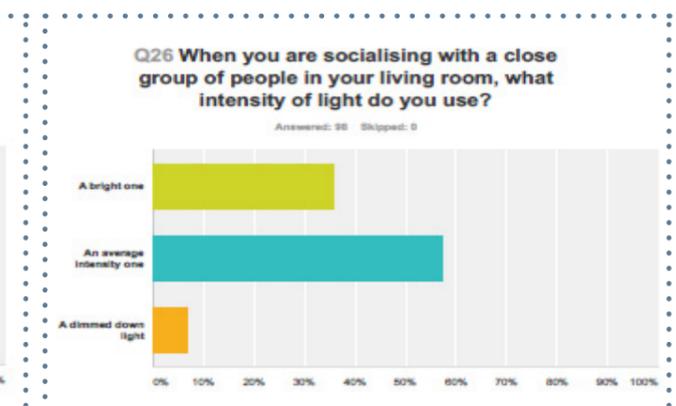
On this scenario, participants seemed to be more conscious about their choices and had various replies. On the question of how many fixtures they use, the majority of people from the north replied two (44), but the other options presented an equal interest. As a result using one fixture gathered eighteen replies, 3 fixtures nineteen and more than 3 seventeen replies proving that the average user, when it comes to creating a friendly atmosphere has very specific ideas in his/hers mind. On the other hand, the majority of the people from the south(50) also chose two fixtures. 27 people chose one, 16 chose three and only 5 chose more than three. It is obvious that there is a significant difference in the way participants from the two regions use light in order to create an atmosphere. On the matter of directionality, there are also some alterations on the results. Northern people chose mostly indirect(48). Thirty-nine people chose both and eleven chose direct light. For the south region though, the replies were a bit different. 45 chose indirect, 28 chose both and 25 chose direct light, proving that Southern people have a far more preference on the direct lighting than northern people.

To sum up, the main differences between people from the two regions are the directionality, a number of fixtures and the intensity of the light, especially when it comes to social life. One can notice that when the participants got asked what kind of light they prefer when they are by themselves they provided almost the same answers. When they got asked though about the light they use to make their guests comfortable, their responses were a bit different. People from the north prefer mostly an indirect light coming from various fixtures on an average intensity or a dimmed down one. People from the south, on the other hand, also prefer an indirect light but some of them chose a direct source of light. The intensity is high and no more than two fixtures at the same time.

3.4.6 Survey Conclusion

The survey provided the authors with valuable information and brought them closer to the average user. Due to the fact that the group's members are from various countries and living in Denmark, some of the answers were expected in relation to their life experiences. Some of the replies though were quite surprising and manage to establish two important facts:
i) Globalization has possibly created a similarity to people's habits when it comes to functions in their apartments and the light required for them.
ii) On the northern regions of Europe, people are more consistent with their choices about light, its CCT, and directionality. On the south regions though, people are still experimenting with the variety of their choices.
In addition, people from the north prefer light on an average intensity coming from numerous sources indirectly, when people from the south prefer a bright intensity, coming from one or two fixtures, sometimes indirectly and sometimes directly. There is also a difference in the CCT between the two regions but is not as big as expected. Some of the Northerners prefer a warmer light when some of the southerners prefer a cold light, but in general, both groups prefer a neutral white light between 3000K and 4000K. In more simple words, people from the south showed that while they are socializing they prefer a brighter environment and sometimes direct light and people from the north prefer an average or dimmed down intensity, indirectly.

3.5 Northern and Southern Apartments

In this section, four different apartments from Denmark, Lithuania, Italy and Greece will be analyzed and presented. As the thesis topic stands out regarding the indoor living spaces, one of the methods to extract the results is site analysis. As authors noticed the differences between North and South Europe's lighting preferences in the apartments personally, reliable results could be presented by comparing various apartments. This method could determine verification of the results from the survey mentioned in 3.4 End User's Preferences. Indoor living spaces from Denmark and Lithuania represents Northern region while apartments from Italy and Greece stands for the Southern region. These four choices represent authors' country of origin and common country (Denmark) where all are based at the moment.
In the standard apartments, spaces appear as a living room, kitchen, bedroom, bathroom and utility room. To relate space and the function performed in it and get the results where people spend most of their time in the apartment,

authors used the survey, presented in the chapter above. The results showed that those areas are a living room and a bedroom. As an outcome to that, a bedroom was swapped with the kitchen due to the reason that more functions can appear and more people can perform in it. So the most relevant rooms, to create different lighting atmosphere, are the living room and the kitchen. The spaces in the apartments that are not related to the activities performed by the group of people are excluded from the design proposal.

3.5.1 Denmark

An apartment was chosen to be analyzed located in Frederiksberg district, Copenhagen. It is positioned at the top level, entire four floors. Windows are facing north and south side. The total size of the apartment is 40.78 square meters. The apartment has one bedroom, living room, kitchen, bathroom, small toilet and hall area. As the spaces and functions been defined by authors and presented in chapter 2.2 Space and Functions, the living room and the kitchen will be extracted only. Figure 65 shows the floor plan of the apartment, gray color displays the zone of the living room, and blue color symbolizes the kitchen.
The kitchen area is 11.2 square meters. The shape of the space is not solid, it has some cutouts, which means that kitchen counter is divided. An oven is situated opposite to the fridge and cupboard, whereas the sink is placed next to the windows. The dining table is located on the left side of the kitchen when entering the space. It has four chairs to sit.
As shown in Figure 66 there are four light sources in the kitchen's area. Lighting fixtures are placed hanging over the dining table and the sink. As well, there are two light sources behind the cupboards, which works as the task lighting. Pendant lamps are positioned in the middle of the room's height. CCT of the fixtures is warm white. Pendant lamp over the dining table has a shade, directing light down and distributing it on the table and some area around. Another pendant over the sink has a shade as well but the light is more diffused and evenly distributed around the area.

Figure 66
Lighting Plan of Danish Apartment scale 1:100
(Noskaitis, 2017)
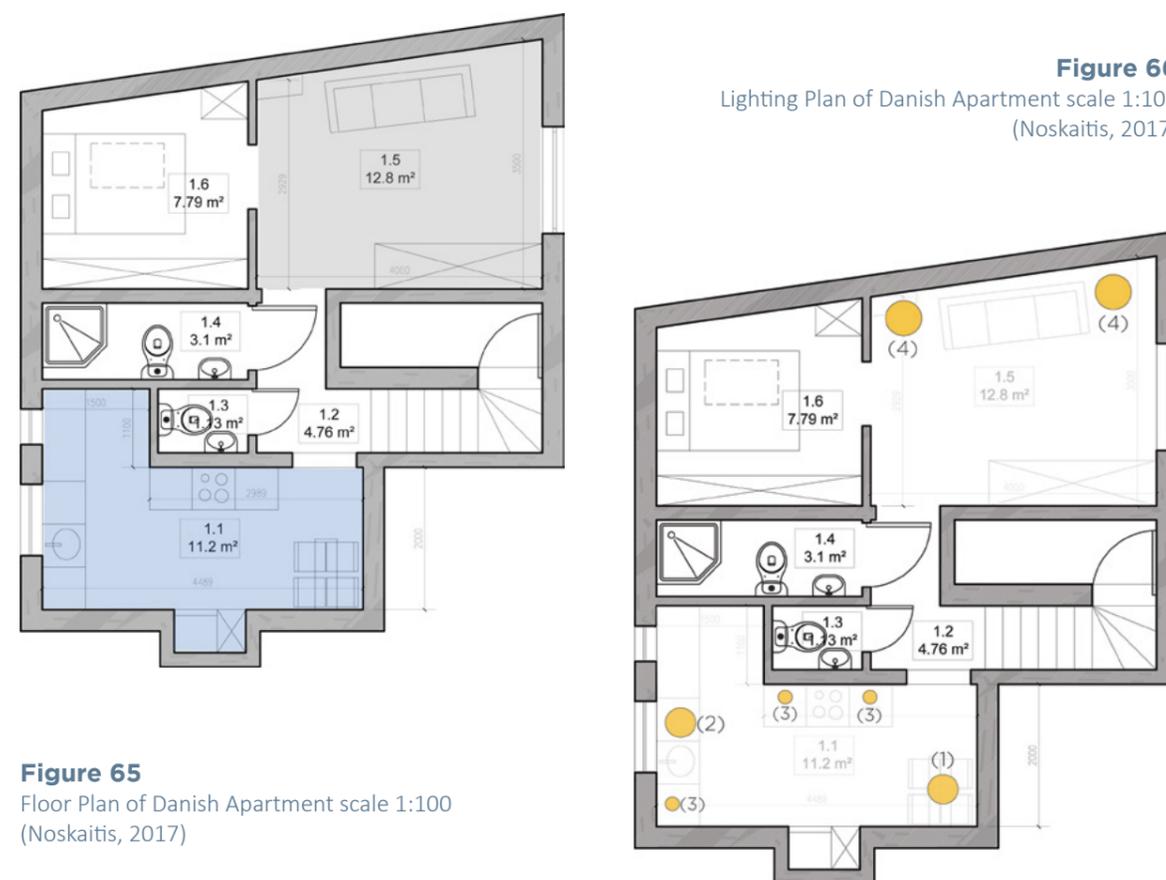
Figure 65
Floor Plan of Danish Apartment scale 1:100
(Noskaitis, 2017)

(1) Pendant lamp over the table
(2) Pendant lamp over the sink
(3) Spots light under the cupboard
(4) Table lamp

Figure 67
Lighting in the Kitchen. Denmark
(Noskaitis, 2017)

Figure 68
Lighting in the Kitchen. Denmark
(Noskaitis, 2017)

The size of the living room is 12.8 square meters. Space of the room is trapezium shape. The side wall, which has a window, is 3.5 meters and the longest wall is 4 meters. Figure 67 and Figure 68 shows the placement of the lighting fixtures inside the living room. It has two light sources which are table lamps placed on both sides of the sofa. The height of the fixtures is medium and low in the scale of the room's height. CCT is warm white, and both fixtures have shades on the light sources in order to avoid glare. Distribution of the light in the room is not even and creates brighter and darker spots around the room.

Figure 69
Lighting in the Living Room. Denmark
(Noskaitis, 2017)

Figure 70
Lighting in the Living Room. Denmark
(Noskaitis, 2017)

The size of the living room is 12.8 square meters. Space of the room is trapezium shape. The side wall, which has a window, is 3.5 meters and the longest wall is 4 meters. Figure 69 and Figure 70 shows the placement of the lighting fixtures inside the living room. It has two light sources which are table lamps placed on both sides of the sofa. The height of the fixtures is medium and low in the scale of the room's height. CCT is warm white, and both fixtures have shades on the light sources in order to avoid glare. Distribution of the light in the room is not even and creates brighter and darker spots around the room. All the points, described above, are illustrated in the Figure 71.

	KITCHEN		LIVING ROOM	
Size	11.2 m²		12.8 m²	
Windows	North		South	
Colours	Ceiling Walls Floor	White White Grey	Ceiling Walls Floor	White White Wood
Lights sources	5		2	
Type of fixture	Pendant Lamp Spots under the cupboard		Table lamps	

DENMARK

Figure 71
Table of apartment's analysis
(Seghi, 2017)

3.5.2 Lithuania

Another apartment to represent Northern region is located in Vilnius, Lithuania. The apartment is positioned on the top 9th floor of the building. The size of the flat is 64.35 square meters. Windows are facing east and west side. There is a living room, kitchen, three bedrooms, bathroom, toilet and corridor area. It is a typical suburb apartment in Vilnius, built during the Soviet occupation. As shown in Figure 72, all the rooms are isolated, the kitchen and the living room has a separate door. Mainly all the apartment, which has been built during the Soviet times in Vilnius, has separate kitchen and living room. An exception could be made for newly built apartments only.

The kitchen area is 7.5 square meters. The shape of the room is rectangular, and the length of the walls are 3 meters on 2.5 meters. The wall with the window is facing east side. Kitchen's counter is placed on the right side when entering the space. Opposite to that, fridge and dining table is situated. Figure 74 and Figure 75 shows the lighting in the kitchen. There are two different light sources: pendant lamp over the dining table and task lighting under the cupboards. The CCT of the pendant fixture is warm white while task lighting is cool white. Pendant fixture has a shade directing light distribution on the table and area around.
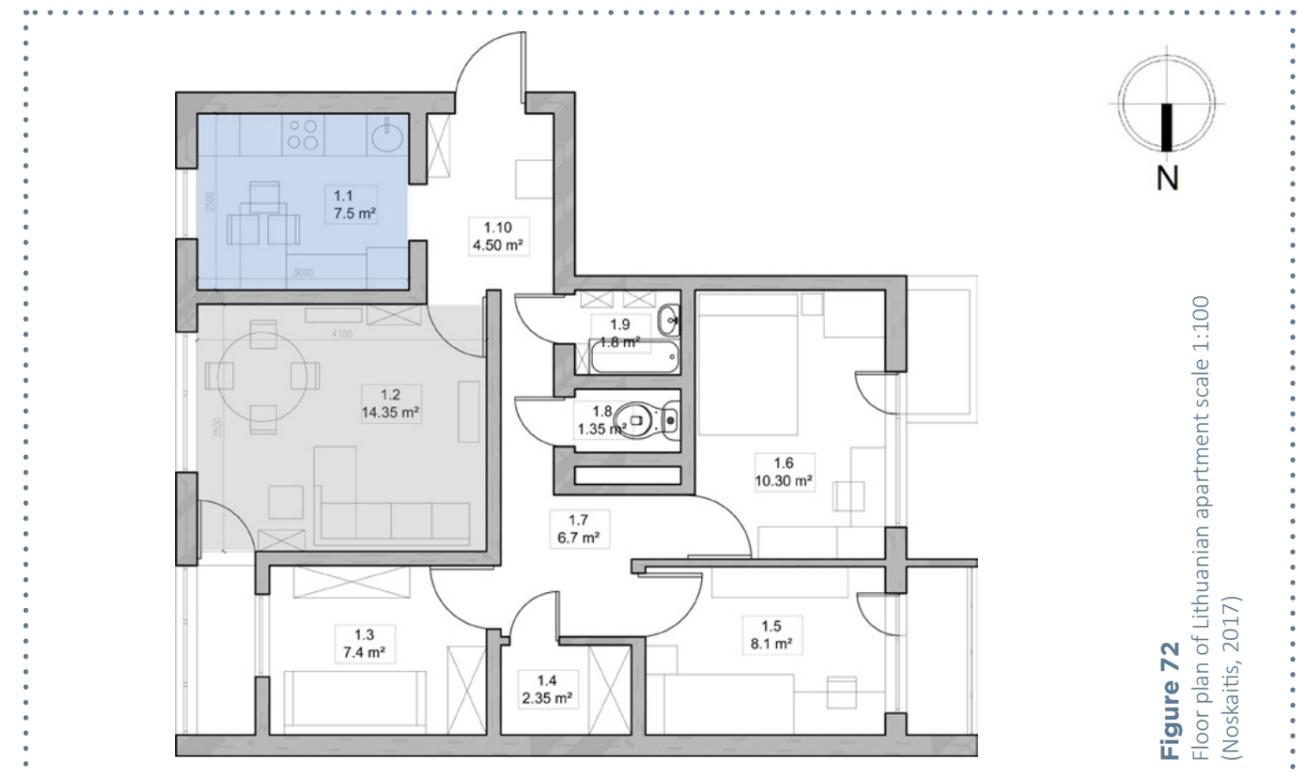
Figure 72
Floor plan of Lithuanian apartment scale 1:100
(Noskaitis, 2017)
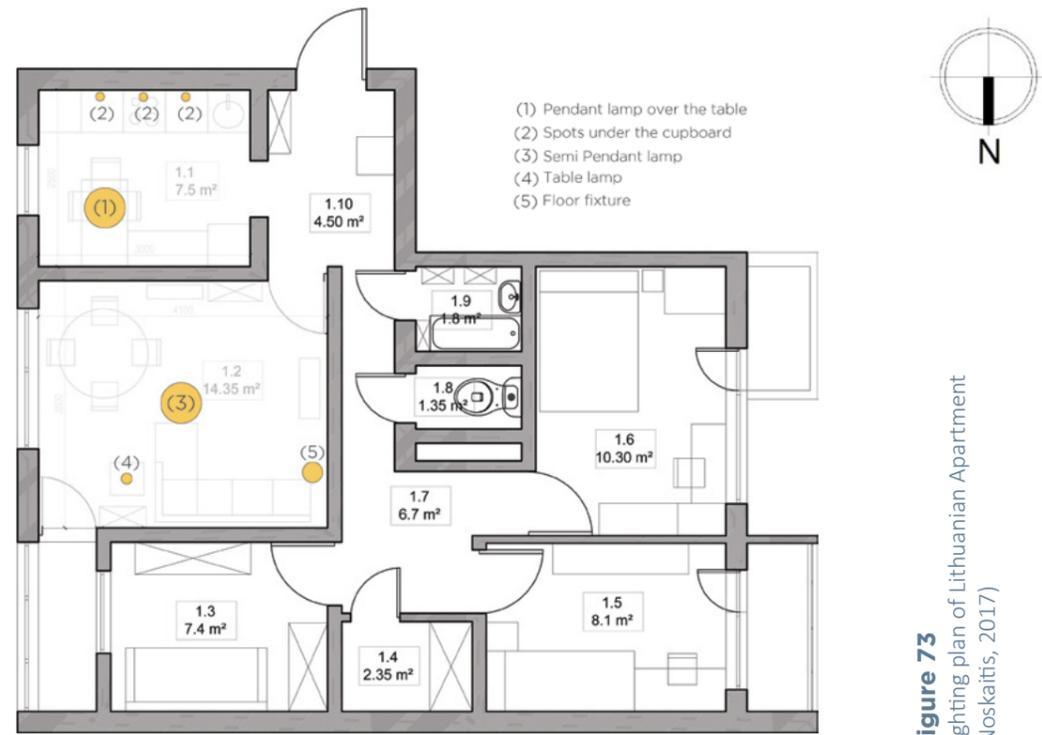
Figure 73
Lighting plan of Lithuanian Apartment
(Noskaitis, 2017)

Figure 74
Lighting in the Kitchen. Lithuania
(Noskaitis, 2017)

Figure 75
Lighting in the Kitchen. Lithuania
(Noskaitis, 2017)

Figure 76
Lighting in the Living Room. Lithuania
(Noskaitis, 2017)

Figure 77
Lighting in the Living Room. Lithuania
(Noskaitis, 2017)

The size of the living room is 14.35 square meters. Rectangular shape space with the windows facing east. The width of the room is 3.5 meters and length is 4.1 meter. Figure 73 shows the placement of the lighting fixtures inside the living room. It has three light sources which are the table lamp, semi-pendant ceiling fixture and floor fixture next to the sofa. The height of the floor fixture and table lamp is medium and low on the scale of the room's height. And the height of semi-pendant ceiling fixture is considered high. The floor fixture's and table lamp's CCT is warm white, and both fixtures have shades on the light sources in order to avoid glare. The CCT of the ceiling fixture is neutral white, and the diffusing shade creates general lighting in the space. All the points, described above, are illustrated in the Figure 78.

Figure 78
Table of apartment's analysis
(Seghi, 2017)

3.5.3 Greece

The first apartment to represent Southern region is located in Thessaloniki, Greece. The apartment is positioned on the 1st floor of the building. The size of the flat is 64.64 square meters. Windows in the flat facing north, south and west. There is a living room, kitchen, three bedrooms, bathroom, and corridor area. It is as common suburb apartment in Thessaloniki. As shown in Figure 79, kitchen and the living room are connected as one open space. The width of the space is 4.38 meters and length is 6 meters.

Figure 79
Floor plan of Greek Apartment
scale 1:100
(Noskaitis, 2017)

The kitchen area is 11.2 square meters. The wall with the windows is facing west side. Kitchen's counter is placed on the right side when entering the space. Opposite to that, the dining table is situated which separates the kitchen and the living room. Figure 81 and Figure 82 shows the lighting in the kitchen. There are two different light sources: ceiling recessed lamp over the dining table and task lighting under the cupboards. The CCT of the fixtures is cool white. The light distribution of the ceiling recessed fixture is wide and evenly lit space.
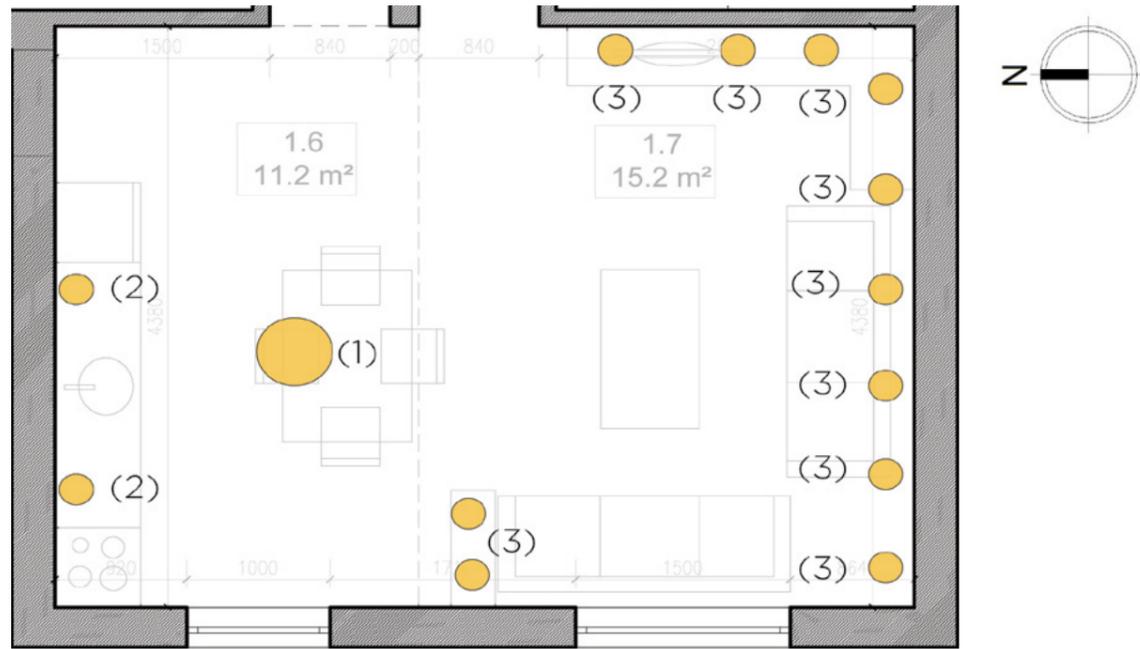
Figure 80
Lighting plan of Greek Apartment
scale 1:50
(Noskaitis, 2017)

(1) Ceiling recessed lamp
(2) Spots under the cupboard
(3) Ceiling mounted spot light

Figure 81
Lighting in the Kitchen. Greece
(Spanos, 2017)

Figure 82
Lighting in the Kitchen. Greece
(Spanos, 2017)

The size of the living room is 15.2 square meters. There are two sofas, coffee table and TV furniture in the living space. Figure 83 and Figure 84 shows the placement of the lighting fixtures inside the living room. There is only one type of spot lights placed around the perimeter of the living room, and it is a ceiling recessed spotlights. The CCT is cool white. Due to the position of the fixtures, spotlights works as a wall washer. All the points, described above, are illustrated in the Figure 85.

Figure 83
Lighting in the Living Room. Greece
(Spanos, 2017)

Figure 84
Lighting in the Living Room. Greece
(Spanos, 2017)

	KITCHEN		LIVING ROOM	
Size	11.2 m²		15.2 m²	
Windows	West		West	
Colours	Ceiling Walls Floor	White White Grey	Ceiling Walls Floor	White White Grey
Lights sources	3		11	
Type of fixture	Ceiling recessed lamp Spots under the cupboard		Ceiling recessed spot lights	

GREECE

Figure 85
Table of apartment's analysis
(Seghi, 2017)

3.5.4 Italy

The last apartment to represent Southern region is located in Rome, Italy. The apartment is positioned on the 3rd floor of the building. The size of the flat is 100 square meters. Windows are facing south side. There is a living room, kitchen, three bedrooms, two bathrooms and corridor area. It is one of the typical suburb apartment in Rome. As shown in Figure 86, almost all of the room are isolated. Only the kitchen has an opening towards the living room so it could be perceived as one open space.

The kitchen area is 6.22 square meters. The shape of the room is rectangular, and the size is quite small for the Italian kitchen. There are no windows in the kitchen's area, but as it has an opening connected to the living room, the windows from there serve its purpose. Kitchen's counter is positioned in front of the entrance. Opposite to that, the small cupboard is situated. Figure 87 shows the lighting in the kitchen. There are two different light sources: wall mounted lamp and task lighting under the cupboards. The CCT of the both fixtures is cool white. Wall mounted lamp has a shade, and the direction of the light is pointing up to the ceiling.

The size of the living room is 34.7 square meters. There is corner sofa, dining table and wall furniture with a TV set in the living space. Windows in the living room facing south side. Figure 90 shows the placement of the lighting fixtures inside the living room. There are two types of lighting fixtures in the living room: ceiling recessed spotlights and semi-pendant lamp over the dining table. The CCT is cool white of all the fixtures in the living room. The direction of the spot lights is towards the floor and due to the amount of the fixtures, distributions of light is evenly spread over the space. The semi-pendant lamp has a diffusing shade in order to avoid glare and the position of the fixture is medium in relation to the ceiling height. All the points, described above, are illustrated in the Figure 91.
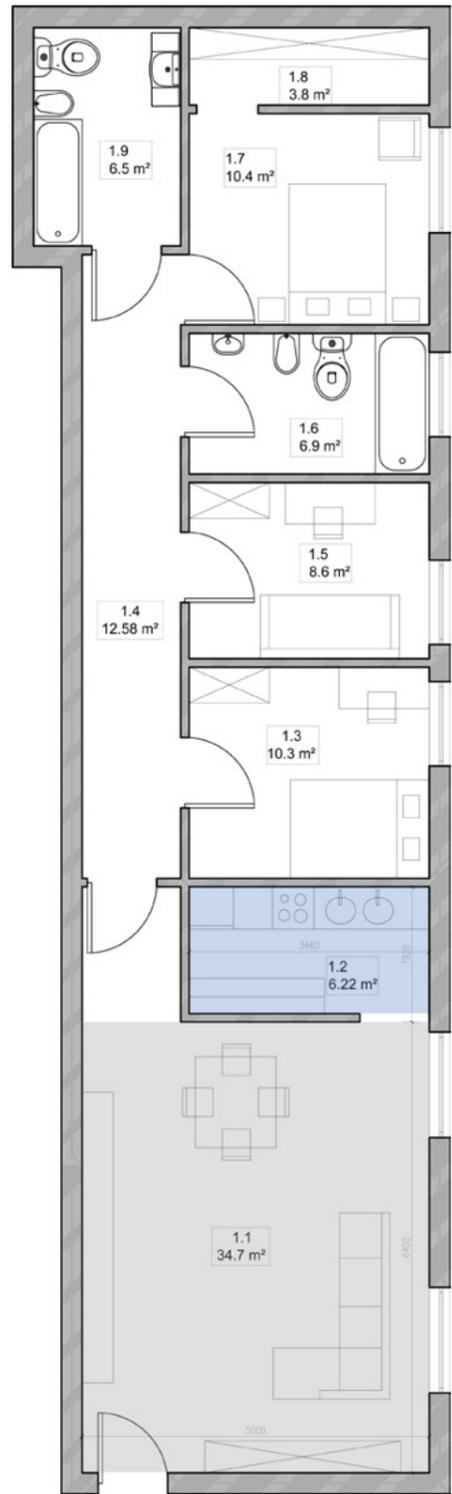
Figure 86
Floor plan of the Italian Apartment
Scale 1:100
(Noskaitis, 2017)

N

Figure 87
Lighting in the Kitchen. Italy
(Seghi, 2017)

Figure 88
Lighting in the Living Room. Italy
(Seghi, 2017)

Figure 89
Lighting in the Living Room. Italy
(Seghi, 2017)
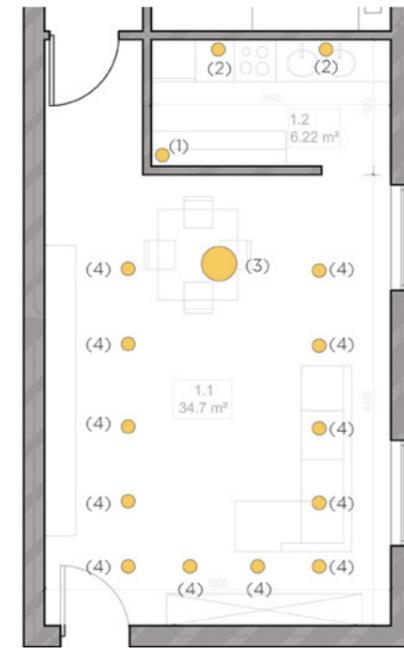
(1) Wall mounted lamp
(2) Spots under the cupboard
(3) Semi Pendant lamp
(4) Ceiling recessed spot light

Figure 90
Lighting plan of Italian Apartment scale 1:100
(Noskaitis, 2017)

	KITCHEN		LIVING ROOM	
Size	6.22 m²		34.7 m²	
Windows			South	
Colours	Ceiling Walls Floor	White White Wood	Ceiling Walls Floor	White White Wood
Lights sources	3		13	
Type of fixture	Wall mounted lamp Spots under the cupboard		Semi pendant lamp Ceiling recessed spot lights	
ITALY				

Figure 91
Table of Apartment's analysis
(Seghi, 2017)

3.5.5 Findings

As four different apartments in Denmark, Lithuania, Greece and Italy been analyzed, some similarities and differences between Northern and Southern regions could be extracted. First of all, when talking about the kitchen and living room in the apartments, Northern regions tend to have separate rooms than Southern ones. An open space such as connected kitchen with the living room are more common in Southern regions.

Secondly, the CCT of lighting fixtures in North is between warm and neutral white, whereas in South people tend to use neutral and cold white. The position of the fixtures differ from place to place, but there is a tendency to use pendant and table lamps in North while ceiling recessed or mounted fixtures are found more often in South 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 region. Although, a wide distribution of light and evenly lit space is more frequent in the South. More dimmed environment stands for the North and way brighter spaces are for the South.

As the results can not be taken for granted that the different use of light is only common for the specific region, some differences stand as guidelines for the light use in the Northern and Southern countries. Figure 92 illustrates the findings.

		NORTH	SOUTH
1	Indoor space	Separate rooms	Open space (living room - kitchen)
2	CCT	Warm white - Neutral	Neutral - Cool white
3	Postion of the fixture	Pendant - Table lamp (medium - low)	Semi pendant - Ceiling (medium - high)
4	Direction	Direct	Direct - Indirect
5	Distribution	Narrow - Light layers	Wide - Evenly lit

Figure 92
Apartment's Analysis Findings
(Seghi, 2017)

3.6 Analysis Conclusion

After analyzing and presenting the data from three sources such as 3.2 Academic papers, 3.3 Lighting Designer Experience and 3.4 End User's preferences, findings are revealed. As it was stated from the beginning in the analysis chapter, the goal of investigating academic papers was to confirm the existence of different lighting cultures. In addition, to study how natural light affects the use of artificial light in North and South regions. Some of the papers were more scientific and related not only to the use of light in the apartments but the differences of natural light, colors and shadows as well. Other papers were directed through the anthropological approach. They were presenting the cultural background that could affect the choice of different lighting preferences. Diverse data were collected together, and elements related to the light were displayed. The elements are direction, CCT, the position of the fixture, distribution, intensity, colors of natural environment and shadows. Findings are illustrated in Figure 93.

The goal of analyzing the interviews of professional lighting designers was to investigate, how lighting experts deal with different lighting cultures and at the same time get some inspiration from their opinions. To conclude the findings from the interviews, lighting designers state that cultural background, the geographical position of the countries and religion are the factors that influence the choice of light use. Religion was excluded from the thesis scope. These findings strengthen the results from academic papers.

The aim of the last source was to get the end user's preferences of artificial light's use in the apartments. The survey's questions aimed to get the preferences based on five markers: direction, CCT, distribution, intensity and position of the fixtures in the living room and the kitchen and performed by a group of people. The analysis of four different apartments intended to show the results of different light use in different regions and at the same time validate the survey results. The differences are noticeable between the North and the South and are illustrated in Figure 94 and Figure 95.

Figure 93
Analysis General Conclusion
(Seghi, 2017)

Figure 94 Conclusion for Living Room (Seghi, 2017)

Figure 95 Conclusion for Kitchen (Seghi, 2017)

3.7 Final Problem Statement

To verify the initial problem statement by acknowledging the information presented in Section 3. Analysis the differences of lighting cultures between Northern and Southern European countries have been defined. The tendencies and use of artificial light in indoor living spaces have been exposed as well. The survey results have shown that end users do have different lighting preferences based on the social situation they are experiencing, their culture and their country of origin and residence. These preferences are changing every time the current social situation changes. The differences are not only spotted between South and North but also in between different occasions among people from the same region. For example, there are divergences on the lighting standards for people from the North based on a number of people they are socializing with. Of course, those inclinations happen mostly subconsciously as the average user lacks the scientific knowledge about light and therefore the choices being taken are mostly based on the feelings or the taste of the individual.

In addition, the group's members, through their research, found wise to contact lighting fixtures retailers and manufacturers and question them on the way they collect their data about the market needs. That conversation was carried out in the form of a friendly chat and not as part of scientific research. The reason for that was to make the sellers feel more comfortable without being afraid that they could expose their company in any way and this is why the transcripts of those conversations are not included in this thesis. The retailers responded that their main focus is the design of the fixture itself and have little or none knowledge about the preferences of the end user. It goes without saying that they do have a lot of experience on the market, by doing this job for some years, but none of this knowledge has been acquired by official researches. On the same page, the fixture manufacturers the authors contacted and interviewed stated that the design of the fixture, its final cost and consumption are their main priorities as the light bulb can be replaced and subsequently the CCT of the light. Modern day fixtures often offer the choice of a dimer where the intensity can be adjusted accordingly.

All in all, the survey, the author's life experience, the conversations with lighting fixtures retailers and manufacturers have proven one thing. From both sides, there is a significant lack of knowledge about the qualities of light which leads to an ignorance of the end user making him/her treat light as a supplementary medium for visual acuity during night time and nothing else. As a result, any technological breakthrough of the lighting industry is ill-fated to fail or succeed at a minimum level.

The group thinks that managing to connect these two sides (manufacturers retailers and end users) through knowledge could be beneficial for both sides. The way to do so is by using innovative technology, studying the choices of the end users and by creating various lighting scenarios and offering a wide selection of lighting presets from the two regions mentioned above, to engage and inspire people. The goal of this procedure and this thesis is to use these scenarios in a residential space, in order to create awareness to the average user about the numerous qualities and capabilities of light. This could lead to a better understanding and a closer relationship between people and light and all the benefits that could arise by such a connection. Also, if this thesis manages to achieve its purpose, it could be used as a guideline from the companies in the process they have to follow in order for their designs and products to be closer to the actual needs of the end user.

To do so, the group decided to use two markers-both quantitative and qualitative to test and prove people's opinions and reactions. As a result, the Final Problem Statement is:

> How can adjustable lighting scenarios improve the visual appearance of functions and enhance the quality of atmosphere in residential spaces according to the preferences and based on the cultural background of the end user?

To answer the final problem statement, the analyzed results of different lighting cultures will be implemented in residential environments. In further sections 4. Lighting Technique and 5. Design, the process of the possible results will be presented. Depending on the indoor living spaces and functions in those spaces, lighting scenarios will be created, in a combination of different lighting cultures.

04   Lighting Technique

idea generation

PERSONAL EXPERIENCE

VISION

NORTHERN LIGHTING CULTURE   SOUTHERN LIGHTING CULTURE

INITIAL PROBLEM STATEMENT

methods and analysis

ACADEMIC KNOWLEDGE   EXPERTS' OPINION   USER'S PREFERENCES
• papers •   • interviews •   • survey •

• Northern and Southern apartments •

FINAL PROBLEM STATEMENT

lighting technique

• **ORB** •

design and testing

LIGHTING SCENARIOS

CASE STUDY

conclusion

USER CENTERED DESIGN SOLUTION
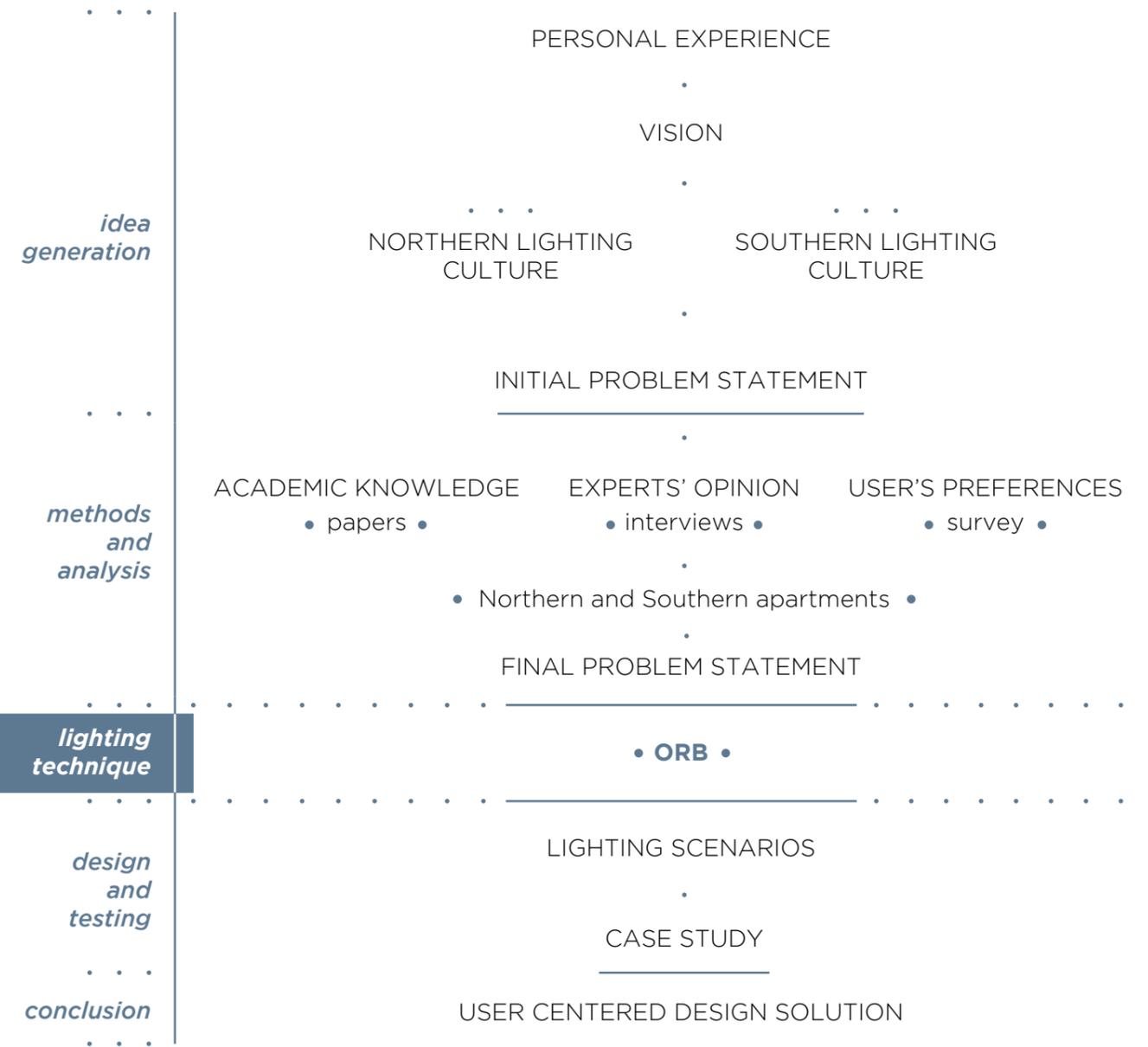
4. Lighting Technique

In order to combine all the recently acquired knowledge in a more understandable way, the group had to find a medium to communicate its findings and design a possible solution or a proposal. The way to do so was through a lighting design which would have all the characteristics of the modern human. In today's society, an average individual is a parent, a friend, a son/daughter, a husband/wife, an employer or an employee making him/her capable of playing at the same time many parts-thus a multitasker. In the very same way of thinking, that was precisely the group's aim for the design. A multitasking lighting design which could provide various sets of lighting scenarios covering successfully as many needs as possible. The only thing missing was the appropriate lighting fixture. Through a specific research about similar products, which will be further analyzed later, the authors found out that from all the recent technologies in lighting fixtures only one came up with a revolutionary idea and a complete design. That was the Orb by Shade, a Danish company located in Copenhagen, quite familiar with the Nordic light, showing a vivid interest in exploring the Southern lighting culture.

4.1 Lighting Technologies Investigation

A research of innovative and multitasking lighting fixtures had to take place in order to explore various design process approaches and several target groups, as well as lighting technologies and marketing strategies. The goal was to define the most suitable solution to pick as lighting design approach and tool for this particular project.
Different startup companies' fixtures like Orb, Holy Trinity, Fluxo, Aurora and Helios, as well as worldwide brands with their latest products such as Osram (Lightify), Philips (Hue) and Sony (Multifunctional light) were considered and analyzed (Figure 97).

The majority of those fixtures are user-centered and aim to provide an alternative way of lighting. They allow the user to alter the lighting conditions according to his/her will and escape the traditional on/off mode. They also suggest different positioning of the fixture and the ability for the user to choose the color of the light of his/her will

through an app on the phone or by touching the fixture itself. The success of the startups' projects and the sales from the already existing ones show that there is a significant part of the market for this kind of solutions and that more and more people realize that there is more than one way to illuminate a space revealing at the same time a more playful part of the light. From all the projects researched and as mentioned before, we chose to emphasize on one specific product: Orb, which will be completely unfolded in the next chapters. All the other companies and their products (Hue, Lightify, Yeelight and others) were based on a revolutionary idea but failed to present a strong design process in terms of user-centered lighting scenarios, being informative and create different directions of lighting.
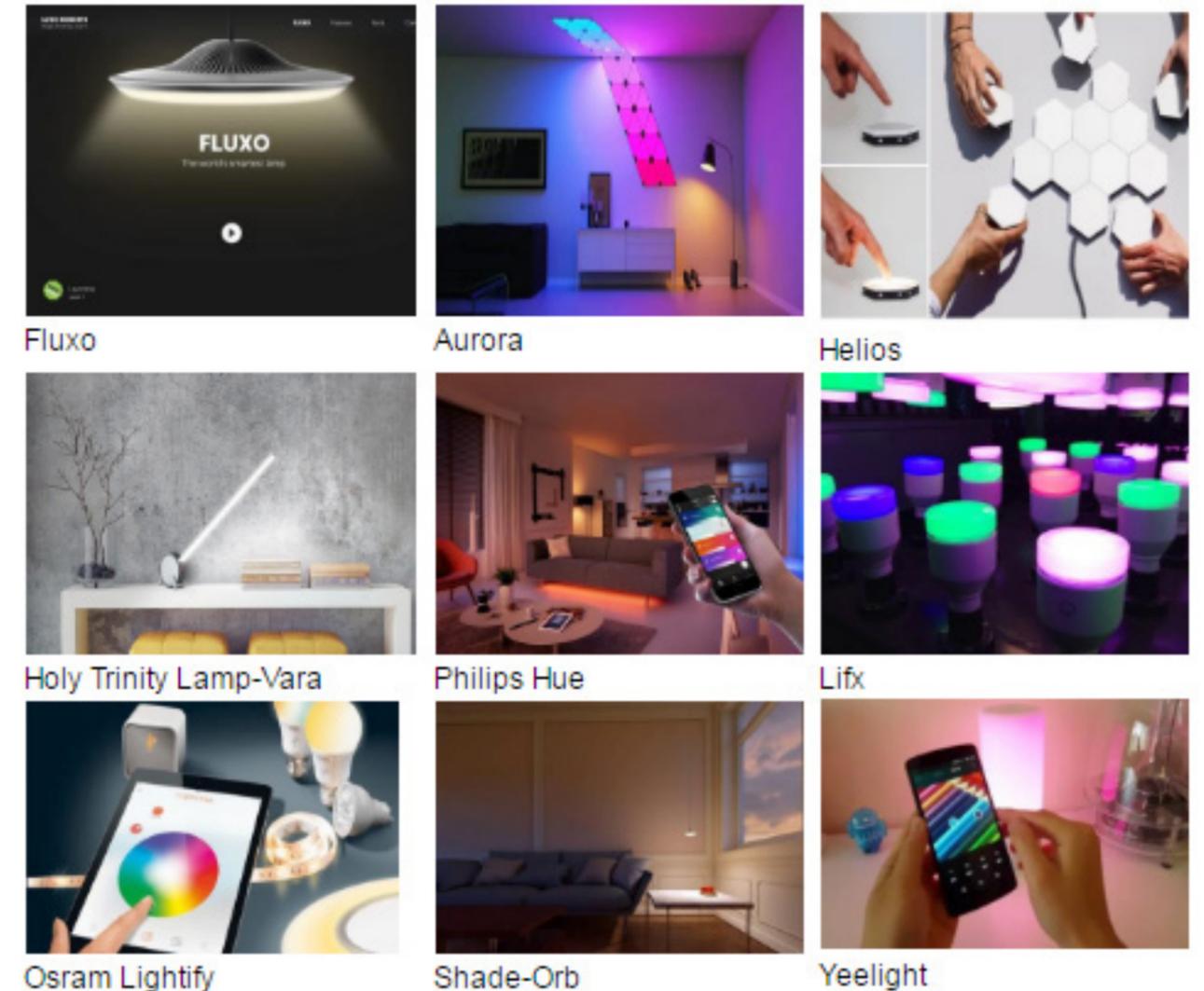
4.2 Shade and the Orb

Shade, as stated before, is a Copenhagen based startup company founded by Bo Puggaard Hansen and Mathias Christiansen (Figure 98), two engineers who wanted to change the way people interact with artificial lighting. Their team is consisted of 14 people, from product and graphic designers to sales and marketing experts, providing the multi-diversity that every creative team should have. Experienced professionals and young talents got mixed with one common cause, to change the way people light their homes. They have developed fully working prototypes and judging by their huge success in online platforms such as IndieGoGo and Kickstarter, people are responding positively. Their first product, Orb, is about to be launched into mass production in December 2017 after two years of hard work.

Bo Puggaard Hansen

Mathias Christiansen

One of the first things that Matthias told the group in their meeting is that people should consider Orb as a lighting bulb with various abilities. It could be used on its own, but in order to avoid possible discomfort glare, it should be better used in a combination with a shader. The company has already created one in collaboration with a famous product designer, Øivind Alexander Slaatto, which can also be adjusted and provide various ways of illumination. (Figure 99) The biggest advantage of Orb is that it provides different modes of illumination from different directions. It can emit light only from its top side providing ambient luminance-its bottom side-providing direct lighting, and it also has a middle section which can provide colored lighting either to be used on its own for setting an atmosphere or in combination with the other two sides for the unique feeling according to the occasion. The two parts, top and bottom, have 2500K-5600K high-quality adjustable LEDs where the middle section has full RGB spectrum high-quality white center LEDs.

DIRECT
This option is great for concentrating on light from the lower zones, since it opens up the source of the light and provides a great shadow effect through the S1.

NEUTRAL
This adjustment is perfect if you use the middle zone and want to concentrate on that. It also leaves enough room for the upper and middle zones to display light.

INDIRECT
This setting focuses on the usage of the Orb's upper zone and strengthens the light pointing towards the ceiling in order to create dramatic atmospheres.

4.2.1 Control via App

As almost as all the recent technologies in lighting fixtures today, Orb can be controlled through their developed app. By using that particular software, the user can monitor the direction, the intensity, and the color. It is also possible to create a combination of the above controlling systems if it is desired. Pre-sets of lighting scenarios will be installed by the company, but the user will be able to create his/her very own ones and store them in the memory for future using. If more than one orb is on the same network, the app provides the ability to control up to four fixtures individually or create smaller groups which will react as one. One of the biggest benefits is that the user can do all that without leaving the comfort of his/her chair or bed. Orb can also be turned off completely through that app. What makes this particular technology unique is that, compared to most of its competitors, it does not log into the internet or work through the Wi-Fi network of the house. Instead, it works on a Bluetooth LE network which will be seamless when someone opens the app.
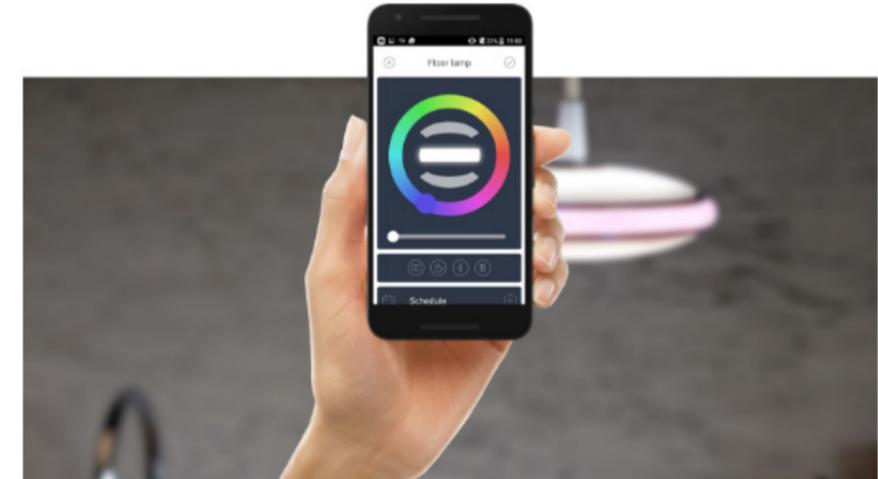
4.2.2 Company's Approach

During the interview, when Matthias got asked what the startup's basis for the lighting levels was he replied that even though he has tremendous respect for the European lighting standards, he finds that they lack innovation and flexibility. He believes that no matter how accurate the standards can be, the user will always adjust the lighting levels according to his/hers will or needs. The latter is a fact familiar to the group from the analysis and the personal life experiences. So instead of consulting the book, he went on with field tests where users got to interact with the fixture and adjust the levels to a point they found comfortable. In addition, some Orbs were given to a testing house where a family of four is living, and they were able to collect valuable data. As Matthias explained, they believe that good light is a very objective matter especially when it comes to residential areas. It depends on the age, the gender, the geographical position, the orientation and the functions. People should be able to control the standards on their own, a possibility that Orb provides, through its technology, adequately.

Of course, not all the data came from field tests. Shade consulted with a lot of experts from different areas and tried to apply their knowledge in the product development. Experts with innovative thinking, big experience, out of the box solutions-their very own Steve Jobs as he called them played a significant part of the final design. An anthropologist, an experienced interior lighting designer, an architect with an academical background in light and a Master's student are among the people who participated, proving that design success comes through multiversity.

4.2.3 Lighting Scenarios

Besides the opportunity for people to create their own atmosphere, Shade will provide some lighting scenarios with the form of established presets in order to help and inspire the user. These scenarios so far have been based upon the functions inside the apartment and not the professional knowledge about light. For example, even though there is a lighting scenario for reading, it is not based on the recommendation from the standard for 300 lux. Also, their

approach is solely based on habits that people have mostly in Denmark like providing Hygge light for relaxation or direct warm light for dinner. Two scenarios that will probably not be so successful in the Southern countries.

The company has also implemented some engaging features. A sunrise and a nightfall feature, where the fixture gets dimmed up and down slowly in order to help the user to adjust peacefully to those two situations. It also provides the potentiality of analyzing the user's daily use and make suggestions and adjustments on its own. One of the most interesting features though, especially for countries with elevated criminal rate, is the vacation mode which after analyzing your daily use, imitates it even when you are not at home, making the apartment less of a target for potential burglars.

Reading   Watching a movie   Having Dinner
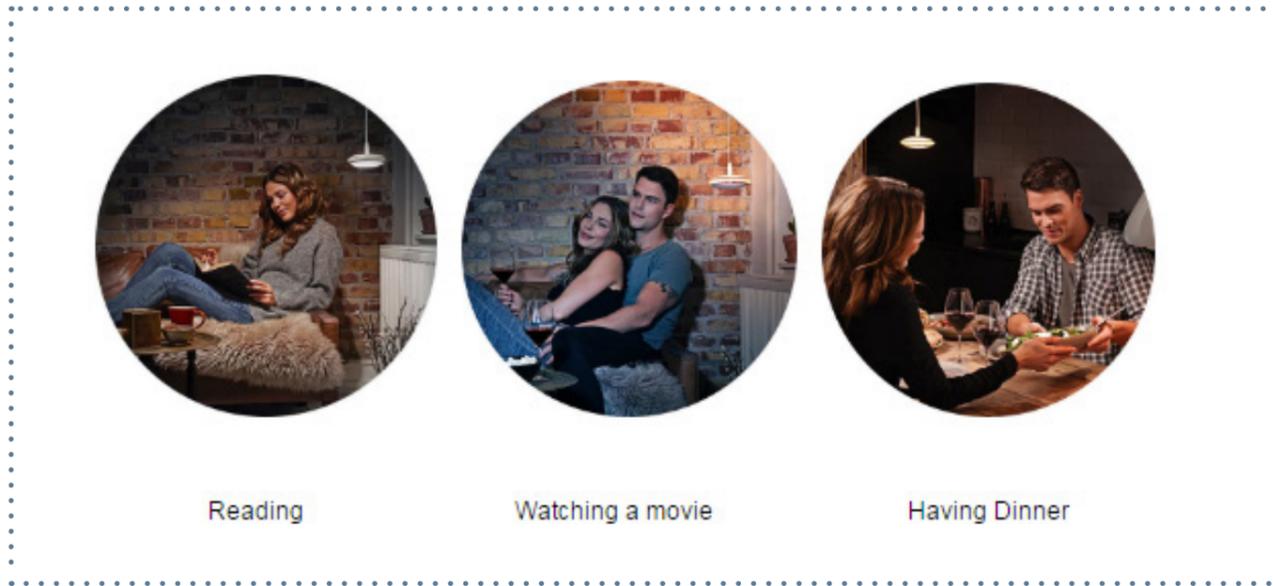
4.2.4 Market Analysis

The company gathered its funds through crowd funding online platforms like IndieGoGo. An excellent idea for a startup company because not only it does not have to rely on one single investor and the problems he/she could create, but also it is a very efficient way to check a product's acceptance from the public. As for the last matter, people's reactions were far better than the startup ever expected as the co-founder Matthias admitted. To be more precise Orb managed to gather 668% more funds than the initial target. According to the data kindly provided by the company to the thesis authors and illustrated by the charts below, the interest from individual buyers was worldwide with more emphasis on the North European countries and especially Denmark.
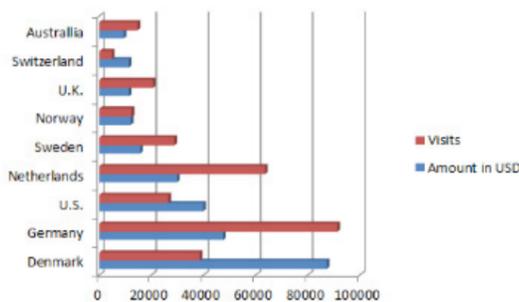
Figure 103
Visits per country and amount of USD
(Spanos, 2017)
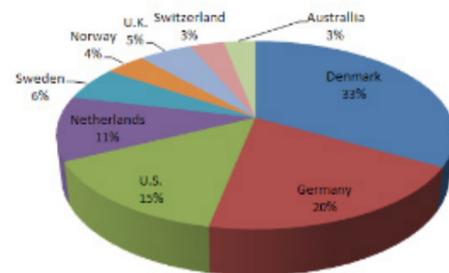
Due to the worldwide participation even from far away countries like Guatemala and Bangladesh, only the top ten countries are presented in the charts. The first three are no surprise as the company is Danish, and Denmark has strong commercial relations with Germany and the United States of America. On the same page, Norway and Sweden were expected to have active participation as the whole concept is based on the Nordic lighting culture. What is really surprising, is the vast amount of money invested by people living in the Netherlands and Australia. Especially for the latter because not only it is quite far away geographically but also because it is a Southern country very close to the Equator with a lot of natural daylight and an entirely different mentality than the one in Denmark. It worth mentioning that among the rest of the major investors are people from France, Iceland, Austria, Ireland, Canada, Israel, Luxembourg, Japan, Thailand, Faroe Islands, Finland, Belgium, Greenland, and Singapore. These are all countries with people who have invested more than 1.000 USD in total.

4.2.5 Disadvantages and Possible Setbacks

As significant and innovative a product Orb might be it does have some disadvantages. The company was kind enough to provide the group with two of the prototypes in order to experiment and test them. One of the very first problems the team spotted was that the direct light (bottom side) could create some discomfort glare on its full intensity. That, of course, could be prevented with the purchase of a lampshade, something that Shade has already created, but it is not included in the original package, and it increases the cost. In addition, Orb is a pendant bulb, and it is static. That means that in order to achieve the various lighting scenarios the company suggests, a consumer has to buy multiple bulbs.The standards for the lighting levels in the scenarios proposed by the company are solely based on field tests and the objectivity of the participants. There is no or very little scientific base in their justification, and there is a possibility to give the users the wrong impression. Light does have a playful side but it also has to be treated with respect and that is why a further research should probably take place. If the interaction is only with the colors of the light or the intensity without being at some point informative and engaging most probably the user will feel bored after some time and treat Orb as a usual lighting fixture.

Figure 104
Contribution per percentage
(Spanos, 2017)

05   Design

idea generation

PERSONAL EXPERIENCE

VISION

NORTHERN LIGHTING CULTURE   SOUTHERN LIGHTING CULTURE

INITIAL PROBLEM STATEMENT

methods and analysis

ACADEMIC KNOWLEDGE   EXPERTS' OPINION   USER'S PREFERENCES
• papers •   • interviews •   • survey •

• Northern and Southern apartments •

FINAL PROBLEM STATEMENT

lighting technique

• ORB •

design and testing

LIGHTING SCENARIOS

CASE STUDY

conclusion   USER CENTERED DESIGN SOLUTION

5. Design
.

5.1 Introduction

In this chapter, the authors will present their attempt to transform the so far collected knowledge into lighting design in accordance with the end user's preferences. At this point, a crucial fact needs to be stressed. Even though four lighting scenarios have been defined and will be presented below, in relation to the educational requirements of this thesis, the authors believe that their biggest creation is the design of the approach that needs to be followed in order to bring the manufacturer closer to the end user. In more simple words, it is the group's belief that if this process is being used, the people who create lighting fixtures will have a better understanding of the needs of an average individual and by designing accordingly, they will manage to raise awareness on the matter and possibly educate the future users. Nevertheless, on the upcoming sections, the followed structure will be analyzed leading to the final design. At first, the success criteria have to be defined, both quantitative and qualitative. Later on, at the lighting scenarios part, all the collected data will be analyzed, and the first approach to various lighting scenarios will be attempted. At the case study part, the place of the testing and details of the final design will be presented. The difficulties of the actual testing and a detailed description of the parameters of it will be bestowed at the pre-testing part. Following, the testing part will illustrate the procedure followed on the day of the testing and its results finishing with an overall conclusion for the design part.

5.2 Success Criteria

Through the following section, success criteria have been developed and unfolded. The goal is to achieve a lighting design solution for indoor living spaces that will represent and express Northern and Southern Lighting Cultures, being inspired by all the studies conducted in chapter 3.Analysis. To be able to consider and judging different elements in the final design proposal, the group has developed two different success criteria, in which various design elements as well as social and cultural habits, will be included, with the aim of creating a holistic final lighting proposal. To introduce the two criteria, Figure 105 has been elaborated.

Figure 105
Success Criteria
(Seghi, 2017)

The first success criterion is the quantitative one and will be called in the thesis "visual appearance of functions", meaning that in each chosen space only the ability to perform a specific function will be evaluated. Based on this statement, the group will evaluate the lighting conditions proposed for the "socializing" function in the living room and the "eating" activity in the kitchen. For each space and related function, three factors will be considered: illuminance level, glare, and CCT. The second criterion can be described as the qualitative one and is named "visual comfort: quality of the atmosphere," meaning that in each space a high level of comfort in the environment needs to be achieved for every lighting scenario.

To meet these different criterion elements, affecting the atmospheres, have to be considered, such as position of the fixture, direction and distribution of light, CCT. People's opinion, cultural background, and habits are very important factors to examine when judging the lighting design following the qualitative criterion. The CCT is part of both criteria as it is both quantitative and qualitative. It is a parameter that can be measured to an exact point, but it is also a huge factor in setting an atmosphere. As a result, lighting experts usually refer to it measured in Kelvin when average users usually characterize it as warm or cool. The latter is the terms that the authors are going to use for the design as it is based on the preferences of the end user and because it was their decision to work in a more qualitative way. For a better and quicker understanding of the different elements considered to meet each criterion, as well as the process followed by the designers, Figure 106 has been elaborated. The two criteria are equally important and serve as the essential measures to be met in fulfilling the final design solution.
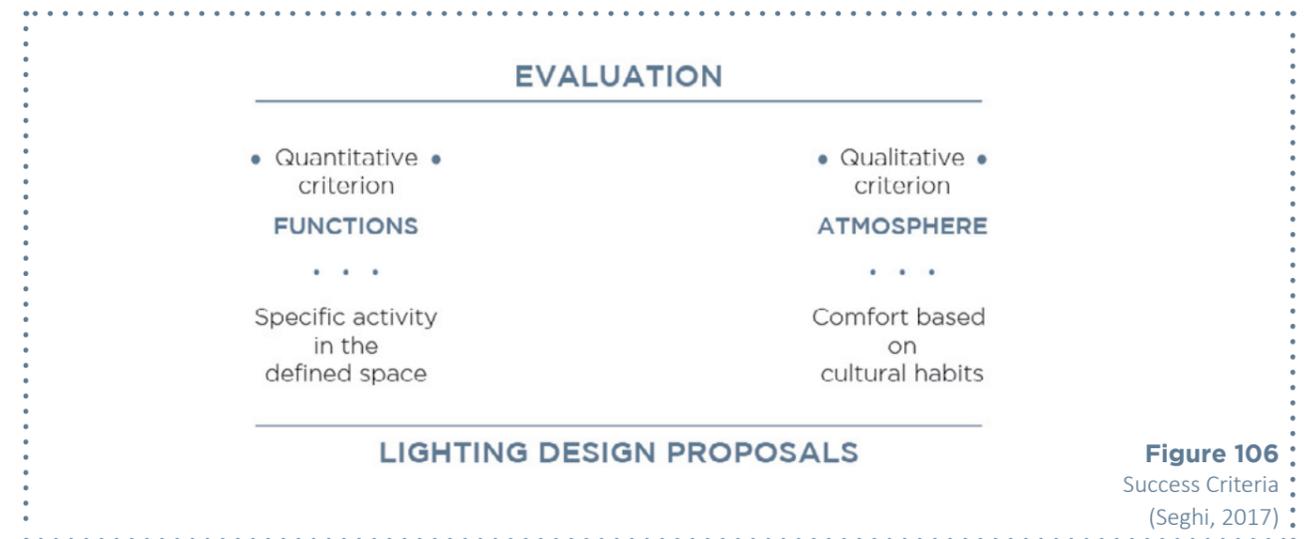
Figure 106
Success Criteria
(Seghi, 2017)

5.3 Lighting Scenarios

In this paragraph the authors describe the process followed which led them to the generation of the final design proposal. The acquired knowledge is summed up, with a particular focus on the most relevant findings used to develop several design proposals. A detailed description of the process followed by the group in the design approach is illustrated and evaluated in the next sections.

5.3.1 Introduction and General Findings

Based on the knowledge gathered from different sources, as explained in Chapter 3.Analysis, the group produced a table of important findings, which represents the general conclusions of the research phase and the most relevant data to elaborate a set of design proposals. The various sources had equal importance for the authors to understand and select the most important factors in order to create different lighting scenarios. The academic papers were used to explore which data have an impact on people's choice and perception of artificial light in the living space. Lighting Designers' experience was studied to investigate the way scientific knowledge can be translated into actual projects

all over the world. The user preferences, found through an online survey as described in subchapter 3.4 End User's Preferences, had significant relevance to understanding the differences in the use of artificial light in indoor living spaces in Northern and Southern regions of Europe. The lighting scenarios will be proposed accordingly considering all the findings summed up in Figure 93. All the data presented in the previous table are strictly related and influenced by each other. Every information, listed in the figure and representing the general conclusion, is affected in Northern and Southern countries of Europe by various factors such as: natural light, social and cultural habits, as explained in chapters 1.Introduction and 3.Analysis

5.3.2 Initial Lighting Proposals

Here the group shows and explains the design approach and the process followed to select the suitable spaces and functions, as the base for the final design proposal. Two rooms in the indoor living space were selected. Exploring Northern and Southern European apartments, as well as people habits and their different cultural backgrounds, the students decided to propose various scenarios for the living room and the kitchen. This choice comes from the analysis of different apartments in Southern and Northern regions, concerning the personal experience of the writers, which is used in this phase as evidence to prove the way each space is lived in their country of residence. The result of this step showed that the most relevant rooms to take into consideration were the living room and the kitchen, which are the spaces where the user can perform several functions, alone or with guests.

Since the design goal is to propose a user-centered solution to answer the final problem statement, and the whole development of the thesis is to take into consideration people's preferences and cultural background as a major factor, the students decided to exclude the spaces that are not addressable to "group activities" from the design proposal and testing. The first idea was to include several lighting scenarios for each activity in every room, to explore the differences regarding social habits in North and South European regions, and demonstrate how appropriate lighting settings can support and underline each particular culture. Figure 107 has been elaborated to quickly show the analytical process followed by the authors to define and select various spaces and functions.

For the two spaces in the apartment a single function was selected, and for every activity, the group wanted to propose three different scenarios for each region and three diverse settings for each scenario. Since the number of users in each room can affect people's way of using the artificial light, the lighting proposals for North and South will be related to a single user, two users, or a group of people. w Thanks to the results of the online survey, showed in section 3.4 End User's Preferences, the group understood that there were almost no differences in the way people use artificial light in Northern and Southern countries when they are alone or with a close friend. Based on this finding the writers decided to narrow down the lighting proposals focusing on the group scenarios, both in the kitchen and the living room.

5.3.2 Final Lighting Proposals

As concluded in the previous section, the final lighting proposals are two different lighting scenarios for the kitchen, and two for the living room. Each lighting design choice was based on the knowledge gathered throughout the thesis development, considering the most relevant cultural differences between Northern and Southern European countries. A total of four different lighting scenarios were created as final proposals.

The first two lighting scenarios were designed for a group of people socializing in the living room. They were created adjusting the position of the fixture, the CCT, the direction of the light, the intensity and the distribution. The other two lighting scenarios were designed for a group of people eating in the kitchen. They were also created by adjusting the position of the fixture, the CCT, the direction of the light, the intensity and the distribution. Figure 108 was created to visually show the space and functions the authors considered to be relevant for the final lighting proposals-scenarios. For a more particular understanding and more precise guidelines to follow during the design and testing stages, two more tables of relevant findings will be presented in the next chapters: one summarizing the results for the Northern countries and one for the Southern countries. Those two tables show the guidelines to create each lighting scenario.

A testing phase will follow to validate the relevance of various lighting settings and how they can change people's perception of the surrounding space, representing at the same time different lighting cultures. Participants response and evaluation to the proposed scenarios will lead the group to answer the final problem statement.

Figure 107
12 Initial Lighting Design Proposals
(Seghi, 2017)

Figure 108
4 Final Lighting Design Proposals
(Seghi, 2017)

5.4 Case Study

5.4.1 Site Analysis

As explained in section 3.7 Final Problem Statement, a case study is selected by the authors to confirm the final problem statement. The purpose of it is to clarify, how the design proposals (Section 5.3 Lighting Scenarios) by using the lighting fixture Orb, could be implemented in a real world situation and tested on site by the end user. For this reason, the chosen space is a real apartment located in Amagerbro district in Copenhagen. Thus, having a genuine environment does not require recreation costs and is adequate for the participants of the test. The apartment, in which the case study was conducted, consists of living room, kitchen, bedroom, bathroom and the corridor. Due to the functions "socializing" and "eating" which were defined by the authors, only the living room and the kitchen are analyzed and presented.

The living room area is 14 square meters size. The length of the room is 4 meters, the width is 3.5 meters, and the height is 2.75 meters. The room has a window facing west side, and the width of it it is 1.6 meters. The furniture in the room is arranged between AB, BC and CD corners mainly (Figure 109). Furniture consists of corner sofa, coffee table, and an armchair. Opposite to that TV set and the bookshelf is arranged.
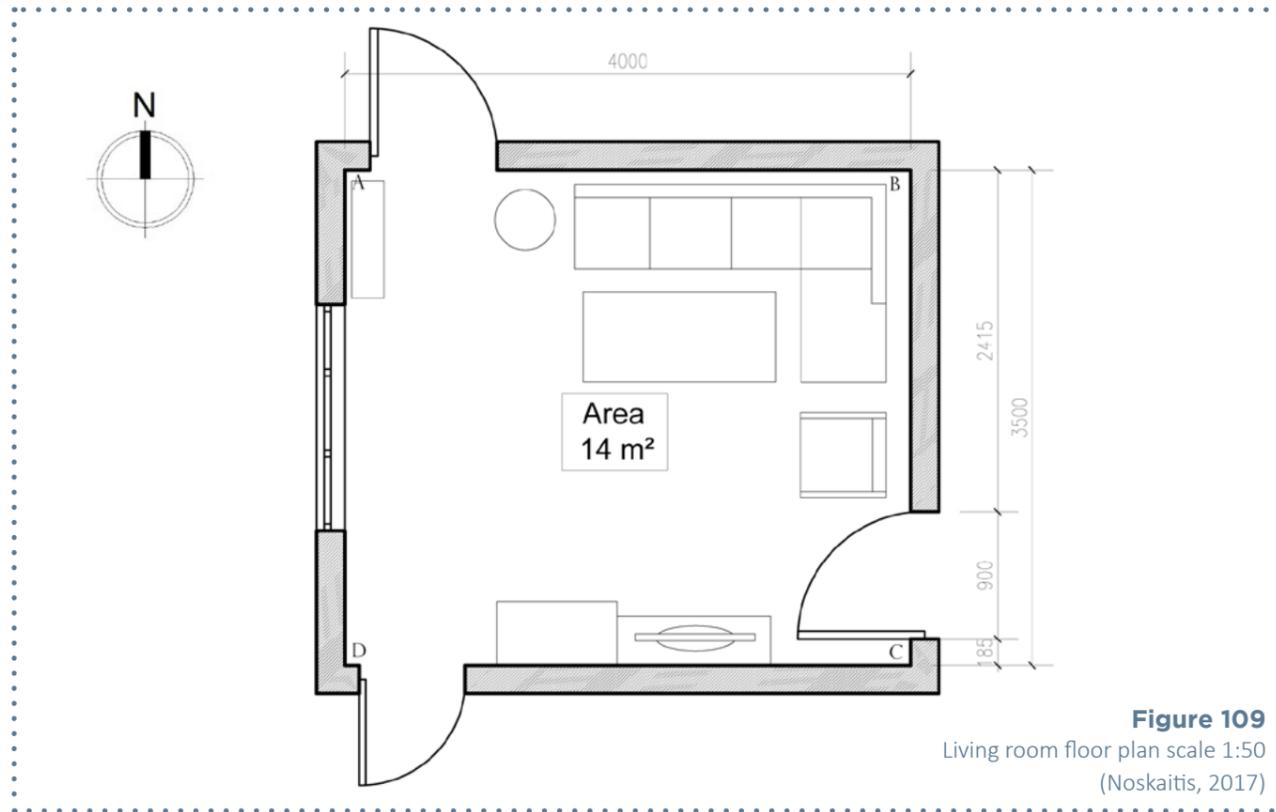
Figure 109
Living room floor plan scale 1:50
(Noskaitis, 2017)
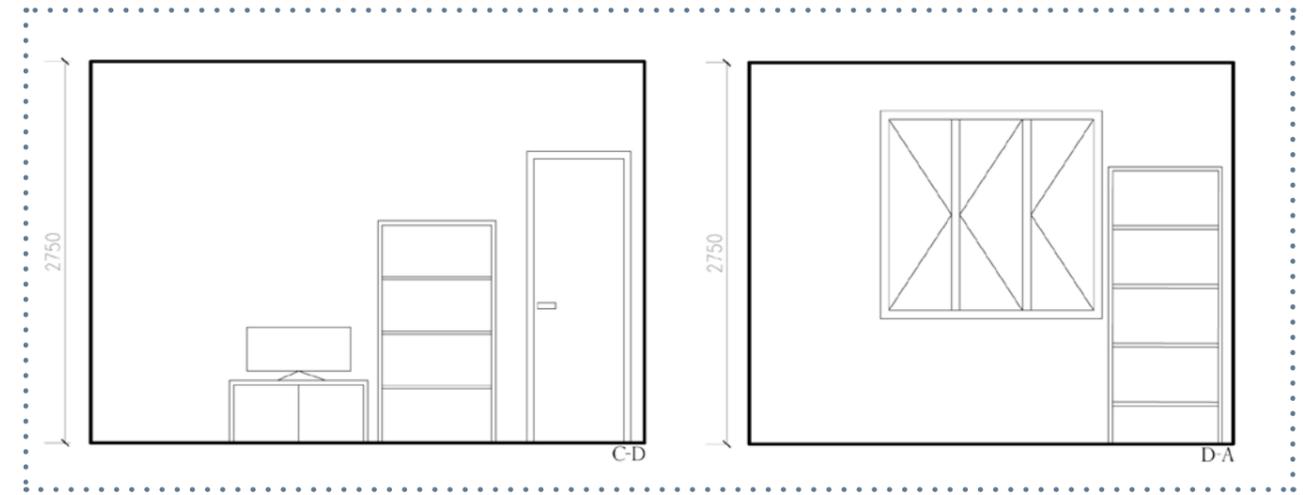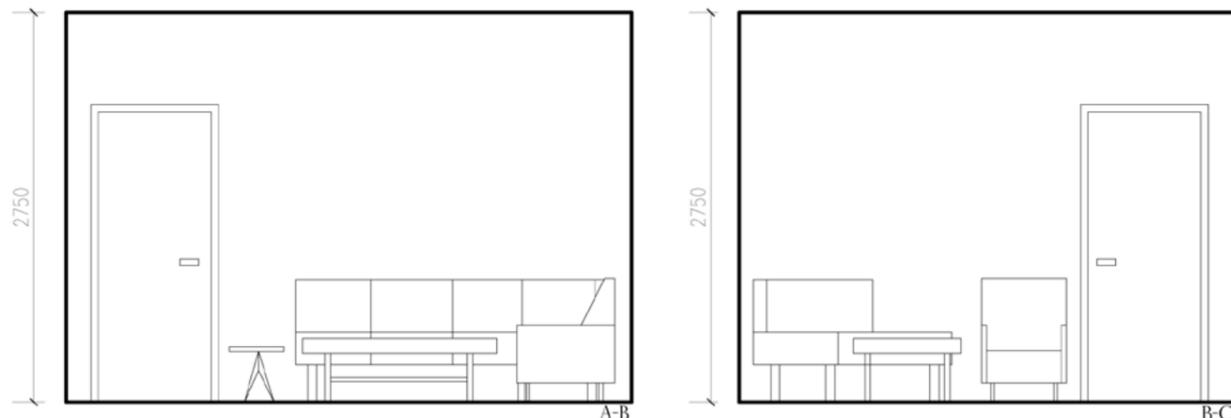
Figure 110
Living room wall projections scale 1:50
(Noskaitis, 2017)

Figure 111
Living room
(Spanos, 2017)

Figure 112
Living room
(Spanos, 2017)

The size of the kitchen is 6.3 square meters. The width of the space is 2.1 meters and length is 3 meters. Existing window in the kitchen is facing east and the size of it is 0.9 meters on 1.6 meters. The kitchen counter is situated on the left side of the kitchen (D-A wall corners), and dining table with chairs are placed on the right (B-C wall corners). The height of the kitchen space is the same as in the living room and is 2.75 meters.
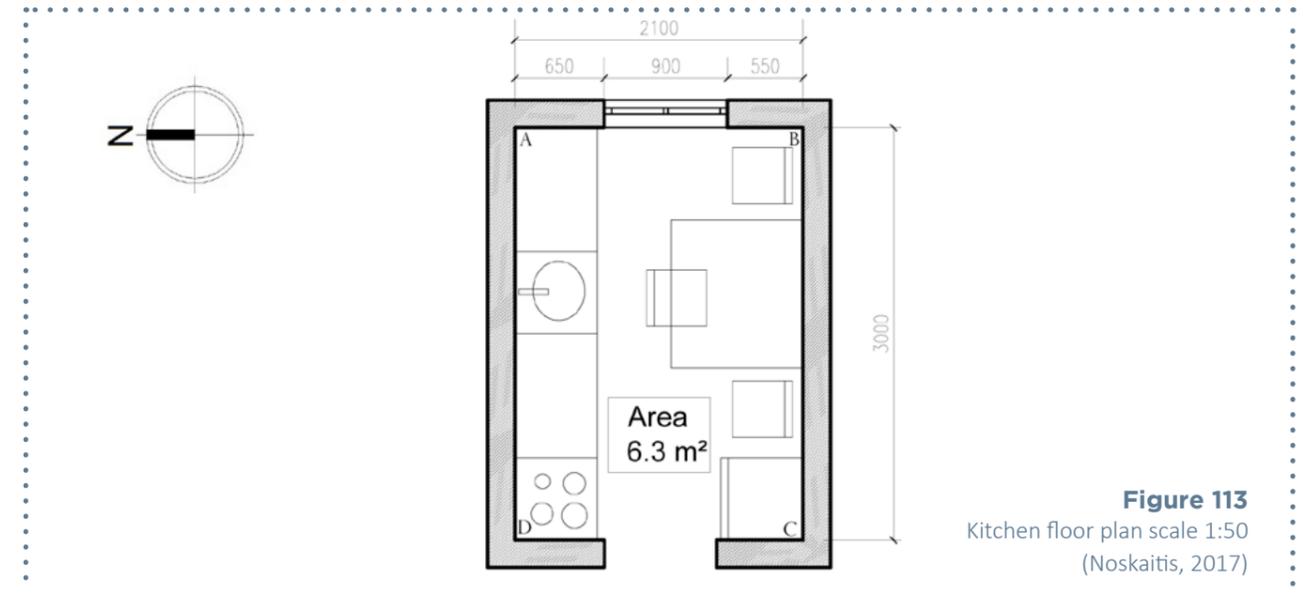
Figure 113
Kitchen floor plan scale 1:50
(Noskaitis, 2017)
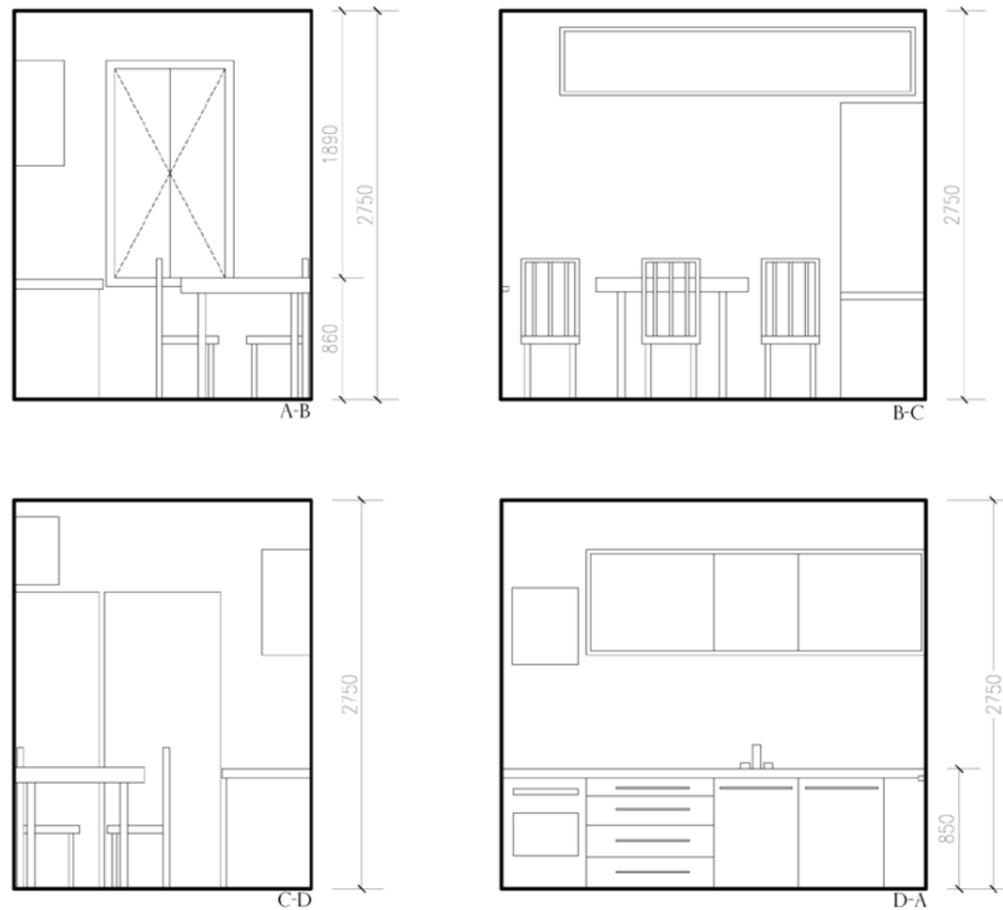
Figure 114
Kitchen wall projections scale 1:50
(Noskaitis, 2017)

Figure 115
Kitchen
(Spanos, 2017)

5.4.2 Implementation of final lighting proposals

In this chapter, the design of the final lighting proposals will be implemented. As the results from the academic papers, lighting designers interviews and users' preferences were extracted and concluded in the chapter 3.6 Analysis Conclusion, the findings are displayed in the Figure 94 and Figure 95. The results are taken into consideration in order to create lighting scenarios for two different spaces such as the kitchen and the living room and two different functions like eating and socializing. Initially, the idea of the final lighting proposals is to incorporate lighting scenarios defined by the authors and try to achieve the results with the multitasking lighting fixture Orb (4. Lighting Technique) in the real apartment (5.4.1 Site Analysis).

		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

Figure 94
Conclusion for Living Room
(Seghi, 2017)

		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

Figure 95
Conclusion for Kitchen
(Seghi, 2017)

NORTH & SOUTH · · · — **APARTMENT** · · · — **LIGHTING FIXTURE** · · ·

Spaces and Functions

FOUR SCENARIOS • **CASE STUDY** • **ORB**

Implementation

Figure 116
Scenarios+Case Study+Orb
(Seghi, 2017)

Four lighting scenarios have been defined in the section 5.3.3 Final Lighting Proposals. First two are performed in the living room and another two in the kitchen area. One of the settings represented Northern and the other Southern lighting culture and repeated in both spaces. Findings that were considered creating the configuration for the lighting scenarios are the direction of the light, CCT, distribution, intensity and position of the light sources.

First scenario: Northern lighting in the living room.

Two Orb fixtures were used for this lighting setup. The position of the lamps is displayed in Figure 118. It is a pendant lamp over the coffee table and a table lamp next to the sofa Figure 117. The CCT is warm white and direction of 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. All presets are presented in Figure 119.

Second scenario: Southern lighting in the living room

Two Orb fixtures were used for the Southern scenario as well as for the Northern one. The difference is the position of the lamps. As it is displayed in Figure 120, it is two semi-pendant lamps over the coffee table. The CCT is cool white and direction of the light is both direct downlight and indirect uplight. The distribution of the light is wide. The combination of two lighting fixtures hanged closer to the ceiling and with the option of up and down light together creates brighter and evenly lit space. The intensity used is higher than an average of Orb's maximum level. All presets are presented in Figure 122.

Figure 117
Sketch of Lighting Fixtures North Scenario. Living Room
(Noskaitis, 2017)
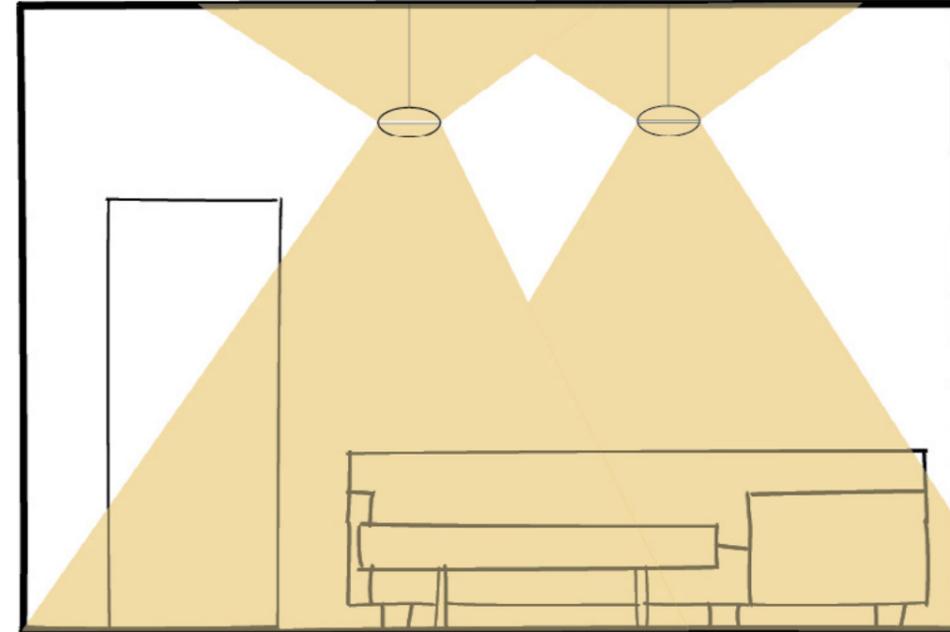
Figure 120
Sketch of Lighting Fixtures South Scenario. Living Room
(Noskaitis, 2017)

CCT	Warm white
Position	Pendant lamp over the table (medium) Table lamp next to the sofa (low)
Direction	Direct downlight
Distribution	Narrow distribution
Intensity	Average

NORTHERN LIVING ROOM

CCT	Cool white
Position	Two semi pendant lamps over the table (high)
Direction	Direct downlight - Indirect uplight
Distribution	Wide distribution - Evenly lit
Intensity	Higher than average

SOUTHERN LIVING ROOM

Figure 119
Lighting presets for Northern scenario. Kitchen
(Noskaitis, 2017)

Figure 118
Sketch of Lighting Plan North. Living Room
(Noskaitis, 2017)

Figure 122
Lighting presets for Southern scenario. Living Room
(Noskaitis, 2017)

Figure 121
Sketch of Lighting Plan South Living Room
(Noskaitis, 2017)

Third scenario: Northern lighting in the kitchen

One Orb fixture was used for this lighting setup. The position of the lamp is displayed in Figure 124. It is a semi-pendant lamp over the dining table Figure 123. The CCT is neutral and cool white and direction of the light is direct downlight. 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. All presets are presented in Figure 125.
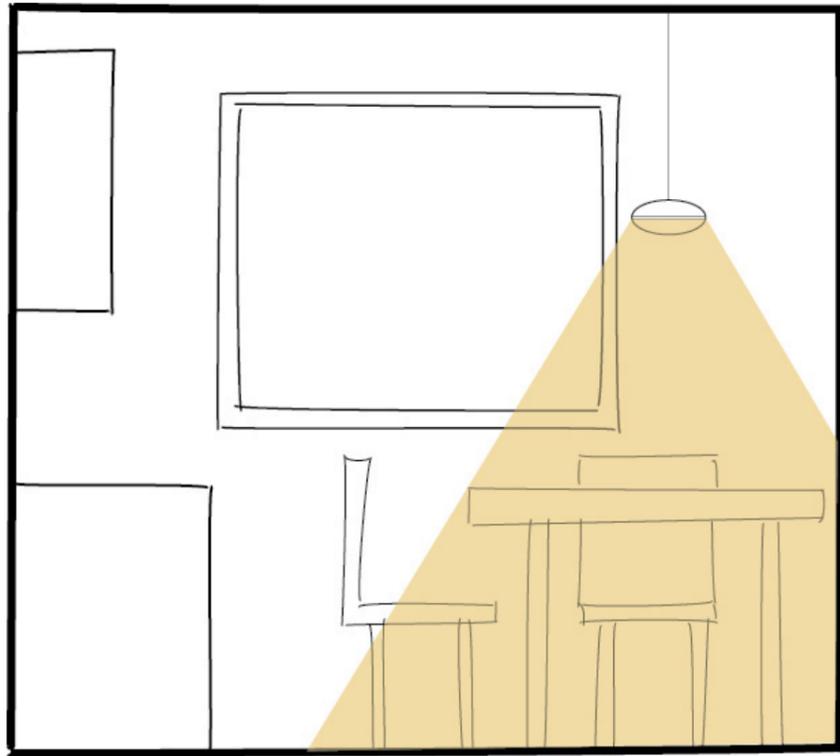
Figure 123
Sketch of Lighting Fixtures North Scenario. Kitchen
(Noskaitis, 2017)

CCT	Neutral to cool white
Position	Semi pendant lamp over the table (high)
Direction	Direct downlight
Distribution	Narrow distribution
Intensity	Average

NORTHERN KITCHEN

Figure 125
Lighting presets for Northern scenario. Kitchen
(Noskaitis, 2017)
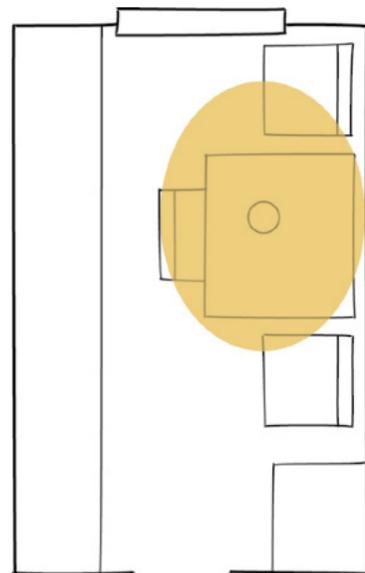
Figure 124
Sketch of Lighting Plan North. Kitchen
(Noskaitis, 2017)

Fourth scenario: Southern lighting in the kitchen

One Orb fixture was used for this lighting setup. The position of the lamp is displayed in Figure 127. It is a semi-pendant lamp over the dining table Figure 126. The CCT is neutral and warm white and the direction of the light is direct downlight. The distribution of the light 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. All presets are presented in Figure 128.

Figure 126
Sketch of Lighting Fixtures South Scenario. Kitchen
(Noskaitis, 2017)

|	
CCT	Neutral to warm white
Position	Semi pendant lamp over the table (high)
Direction	Direct downlight
Distribution	Wide distribution
Intensity	Higher than average

SOUTHERN KITCHEN

Figure 128
Lighting presets for Southern scenario. Kitchen
(Noskaitis, 2017)
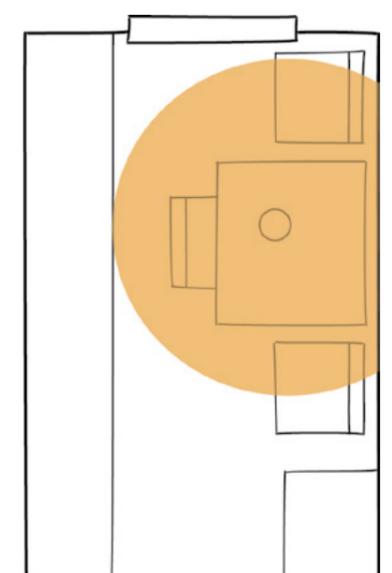
Figure 127
Sketch of Lighting Plan South. Kitchen
(Noskaitis, 2017)

5.5 Pre-Testing

In order for the writers to decide upon the ideal parameters for the appropriate scenarios, various trials took place. Those experiments led the authors to have a better understanding of the end user's needs, as they were described in the results of the survey. The alternations were focused on the following parameters as illustrated in the pictures below: Positioning, CCT and direction.

Figure 129
Pre-Testing Living Room
(Seghi, 2017)

Figure 130
Pre-Testing Kitchen
(Seghi, 2017)

5.6 Testing

5.6.1 Preparation and challenges

The preparation for the testing day presented various setbacks. Since the resources were minimum and space was a rented apartment occupied and subjected to several rules by the owner, the authors had to improvise a lot and accept several solutions as the ideal ones. To begin with, the positioning of the fixtures created some trouble. Since the four scenarios had different positioning and under no circumstances, holes could be drilled in order to hang the fixtures, the authors had to come up with a practical idea. The solution came by using two broomsticks and adjusting the orbs on them, allowing the persons handling them to move them at will and with ease (Figure 133). Another issue was the natural light. The testing took place during May in Denmark where there is plenty of daylight till 9:30 in the evening. The problem became bigger especially in the living room where there is a window of 160 cm. width and a glass balcony door. Black, nontransparent garbage bags, blankets and duvet cases were used to block the daylight (Figure 131). The biggest setback though was orb itself. Since the two fixtures, the company kindly lent to the group were prototypes along with the app, more than often they "crashed" losing all the existing settings and leading the group's members to readjust everything.
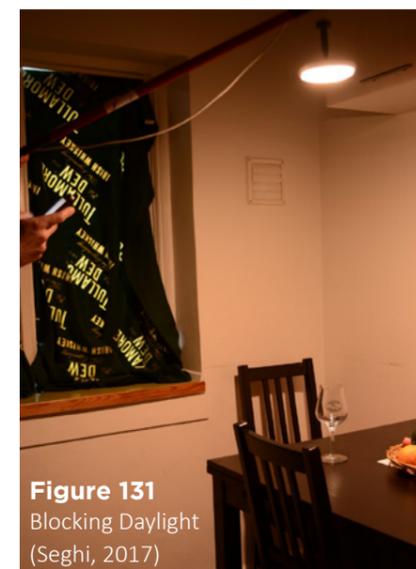
Figure 131
Blocking Daylight
(Seghi, 2017)

Figure 132
Hang Solution
(Noskaitis, 2017)
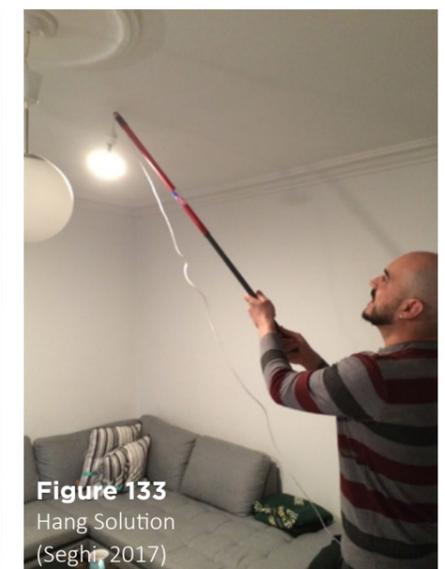
Figure 133
Hang Solution
(Seghi, 2017)

5.6.2 Introduction to the testing

In order to validate and evaluate the design a decision of conducting a field test was taken. The place was an apartment in Denmark as it has been analyzed in the section 5.3.1 Site analysis. A total of 10 people participated, 6 from South regions of Europe and 4 from the North regions. The aim of the test was for the group to examine how accurate was the design of the appropriate scenario for each region and to see if the goal of creating awareness by using various lighting presets in indoors living space, could be achieved. In addition, the test could be a great opportunity for the authors to check how valid is the correlation between the so far collected knowledge and data, about the preferable lighting standards depending on the origin of the people, and the actual preferences of the end user. Subsequently, the hypotheses for this field test were the following three:

a) Participants from the two different regions of Europe will choose the presets addressable to the lighting culture of their region.

b) By showing various lighting settings, participants will choose the one created by the designers as the most representative of their region.

c) After experiencing various lighting presets, participants would feel more inspired and engaged and a general awareness about the qualities of light in indoors living spaces could be achieved.

The rooms selected for the test were the living room and the kitchen and the scenarios were socializing or eating with a group of people. As explained in the part 3.4 End user's preferences, these were the two scenarios that presented the biggest differences between the regions, according to the survey. The procedure was simple; the participants were introduced, one at a time, firstly in the living room and then in the kitchen. At each place, they were shown various lighting presets and asked a series of questions. The origin of each lighting preset (North or South) was kept secret as there was the chance to influence the answers and alternate the results. In order to avoid possible bias and to extract safer data, the participants selected, had none or little knowledge about the qualities of light.

5.6.3 Questionnaires

As stated before, the participants had to answer a line of simple questions based on their observations about the lightings presets on that particular moment. In order for them to be more concentrated, the questionnaire was in the hands of one of the group's member. A fact of importance is that the participants had no idea which presets were the South ones and which were the North ones. Additionally, they were asked to answer based on their own life experience in the country of origin and not in the country they currently reside to. The latter is the fact that influences people and could lead to false results. The questionnaires for the living room and the kitchen were almost the same and had the form illustrated below.

TESTING
living room

1. Where are you from?
In the following set of questions the participant will be asked to evaluate the lighting scenario proposed, in relation to the specific function to perform in it. The participant will be asked to evaluate the different settings based on his/her own experience in the country of origin. Lighting scenario and function were previously defined by the authors.

Settings: A-Northern lighting scenario B-Southern lighting scenario
Scenarios: 1,2,3 will be different variations on each scenario,with 1 being our proposal for the ideal lighting settings.

---

2. Which lighting setting do you prefer:
   A   B

3. Which scenario do you prefer:
   1   2   3

On a scale from 1 to 5, being 1=not satisfied, 2=little satisfied, 3=satisfied, 4=very satisfied and 5=completely satisfied

4. Illuminance level or Brightness:
   Based on the visibility of the face of the person you are socializing with/of the food, how satisfied you are with the   light?
   1   2   3   4   5

5. Glare:
   How satisfied you are with the glare you are experiencing?
   1   2   3   4   5

6. Direction of light:
   How satisfied are you?
   1   2   3   4   5

7. Position of fixtures:
   How satisfied are you?
   1   2   3   4   5

In the following set of questions, the participant will be asked to evaluate different elements in the room when comparing scenario A and B.

8. Did room appear bigger or smaller when changing the lighting scenarios?
   Yes   No

9. Did the shadows of the objects change?
   Yes   No

10. Did colours look different?
    Yes   No

In the following set of questions, the participant will be asked to evaluate his own knowledge/awareness about perception of light before and after the test. A personal opinion will be asked.

11. Were you aware of different lighting settings can create differences on the perception of the space?
    Yes   No

12. Are you aware now?
    Yes   No

13. By having the ability to control different lighting settings at home, would you feel more engaged and inspired?
    Yes   No

14. Would you be interested in having a fixture with these characteristics?
    Yes   No

In the beginning, the participants were asked to state their country of origin. At question number 2 the participants were shown the two lighting scenarios the group has defined as the most appropriate for this particular function in the living room (Figure 134 and Figure 135). As mentioned before, the scenarios were not named, just shown. These two questions were used to answer the first hypothesis, showing the correlation between the country of origin and the preferable lighting scenario.

**Figure 134**
North Living Room
(Seghi, 2017)

Figure 135
South Living Room
(Seghi, 2017)

Figure 136
North Kitchen
(Seghi, 2017)

Figure 137
South Kitchen
(Seghi, 2017)

On question number 3 the participants were shown different variations on the intensity of the scenario they chose in the previous question and were asked which one is closer to the lighting standards they have back home (Figure 138). The replies to this question will be used both as feedback for the author's and as a response to the second hypothesis.

Figure 138
Different Lighting Variations.Living Room
(Seghi, 2017)

Questions 5, 6 and 7 were used in order for the group to evaluate the scenario they designed as most appropriate based on the visibility of the face or the food, the glare, the direction of the light and the position of the fixture. The answers to these questions will be used as feedback for the re-design phase. At this point and in order to prepare the participants for the final questions the group felt that it would be helpful to prepare and in a way to educate the participants for the different qualities of light. For that reason at questions 8. 9 and 10 people were asked if they could see some differences in the size of the room, the shadows and the colors of the room while switching from South scenarios to North and vice versa. The final questions were far more direct in order for the group to make clear if the participants were aware of these qualities of light before the test if they are after if they feel more inspired and engaged and finally if they would be interested in investing in a fixture with such abilities. To be more specific, the final four questions were strictly related to the third hypothesis as well as the initial and final problem statement and the main goal of this thesis.

5.6.4 Results

Five out of six people from the South and three out of four people from the North chose on the second question the scenario designed for them accordingly. However, there was one person from the South who chose the north scenario and one from the North who chose the south one (a male from Portugal and a female from Lithuania). An important fact though is that these two had the same preference-north for the Portuguese and South for the Lithuanian-at the kitchen as well, showing consistency in their choices. At the third question and for the North scenarios 2 people chose the group's suggestion and two replied positively in a more bright environment. For the South, in the living room, 3 people chose the group's proposal and 3 also chose a more bright environment. For the kitchen, though there was a bigger variation. Only 1 participant chose the group's proposal, 4 stated that they prefer a brighter environment and 1 chose a much dimmed down and relaxing environment. For the questions 5-7 the answers are being illustrated in the charts below Figure 139 and Figure 140:


Figure 139
Testing Chart North
(Spanos, 2017)

Figure 140
Testing Chart South
(Spanos, 2017)

At the questions 8-10 for the South in the living room, 4 people answered that the room does look bigger or smaller and they do see a change in the shadow and two replied negatively to both questions. All of them though noticed that the colors look different when changing scenarios.For the North in the living room, 3 participants stated that the room seems the same and two noticed no changes in the shadows. One answered that the room looks bigger and two that the shadows are changing. All of them noticed an alternation in the colors. For the kitchen, though things were more clear. All of them said that the room looks bigger or smaller and that the colors are changing and 2 saw some difference in the shadows when also two did not see any.

At the final questions(11-14) there was no variety in the answers between North and South. Almost all the participants replied in a positive way at all of the questions.Only one from the South stated that does not feel engaged and inspired and has no interest in investing in a fixture with such characteristics.

5.6.5 Discussion and Evaluation

The testing phase was designed carefully in order to provide the authors with valuable feedback about their research and educated them more on the demands and needs of the end user. Even though it was an evaluation procedure and not a scientific test, the structure was quite strict and the group's members were very careful with the process in order to avoid possibly biased results. One of the most interesting feedback, even though they are not included in this thesis, were the comments on each occasion by the participants. The reason these comments are not included is that even though the authors were quite focused on the procedure, they allowed the participants to be more relaxed and feel as calm as possible since the scenario being tested was them being at their home and welcoming their guests. As a result, it would have been difficult to write down those comments and it might make them feel uncomfortable and careful about their sayings. Through those comments and the results of the test, the group noticed that there is a tendency from the end users towards brighter environments even in a residential space no matter the region of origin. This comes in coherence with the author's both life and educational experience as it is one of the biggest challenges they will have to face as future lighting designers. Also, a cultural difference that caught the group by surprise was in the living room and the glare. North people, when socializing they tend to lean back on the couch exposing their faces and their eyes fully to the lighting fixture whereas South people have a more "aggressive" body posture.
They either sit with the backs in a vertical position or they lean forward as to show that they pay attention to their company. This fact was not fully illustrated in the results of the testing, but it is a parameter that needs to be considered in the future.
When analyzed, the proposed scenarios managed to score satisfactory results. For the North and the living room, all the participants were satisfied and above and the only problems were with the direction of the light and the position of the fixture. Likewise in the kitchen, a fact quite expected by the authors as 3 out of 4 participants were from Denmark where people, in general, prefer the fixture a few centimeters above the eye level. For the South also

the vast majority was 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 secret lighting, a possibility that the group could not offer with the orb.

5.6.6 Test Conclusion

Through the testing, the authors were able to extract some valuable information that could help them not only in the redesign phase but also in the general understanding of the end user. Of course, it would have been much more beneficial if the testing had more participants and far better-structured premises. The pressure of the time, the minimum resources and the fact that both the orb and its app are prototypes and not fully working, made that option impossible. Nevertheless, the group was able to answer all of the three hypothesis and especially the third one, which is also part of this thesis aim. People felt much more aware of the qualities of light after the test and were interested in investing in a fixture with such characteristics. In addition, the fact that the group needs to make some minor adjustments on the scenarios that proposed and especially in the positioning of the fixtures and the directionality of the light, proves the uniqueness of the individuality of the end user and the amount of attention that needs be drawn at that fact, in order for the manufacturers to have a closer relationship with their customers.

5.7 Design Conclusion

Through the design phase the authors attempted to translate the data, collected by the three sources and especially the survey, into a lighting proposal designed accordingly to the users from each region. The success criteria were both qualitative and quantitative and the structure followed started from the general preferences of the people about light in their apartments and got narrowed down to four lighting scenarios for two activities. Afterwards, some experiments and a final testing with actual participants were conducted in order to validate the design. Through that process a few things became clear to the writers. Firstly, there is a lot of ground to be covered in educating both sides, manufacturers and users. From the one side, the people who design and create lighting fixtures, need to investigate the needs of their customers and their origin and their cultural background. For the other side, end users need to be inspired and engaged to light in order to gain some awareness about the quality of the latter and improve their living conditions. Secondly, it is very hard to create an ideal scenario for the end user as it is his/hers individuality, based on the so-far life experience and origin, that can complicate the matter. That became clear through the testing, when a person from Portugal chose the North scenario and a person from Lithuania the South. Lastly, people showed a vivid interest when they had the choice to adjust the positioning of the fixture, the CCT, the directionality and the intensity of the light. To sum up, even though the proposed by the group scenarios, according to the test results, needs to be improved they manage to achieve their purpose. Judging by the reactions of the participants, the vast majority chose the scenario designed for their region, they stayed mostly satisfied by the lighting standards and at the end they did feel more interested and far more aware of the qualities of light. The latter is of high significance as it is the main purpose of this thesis.
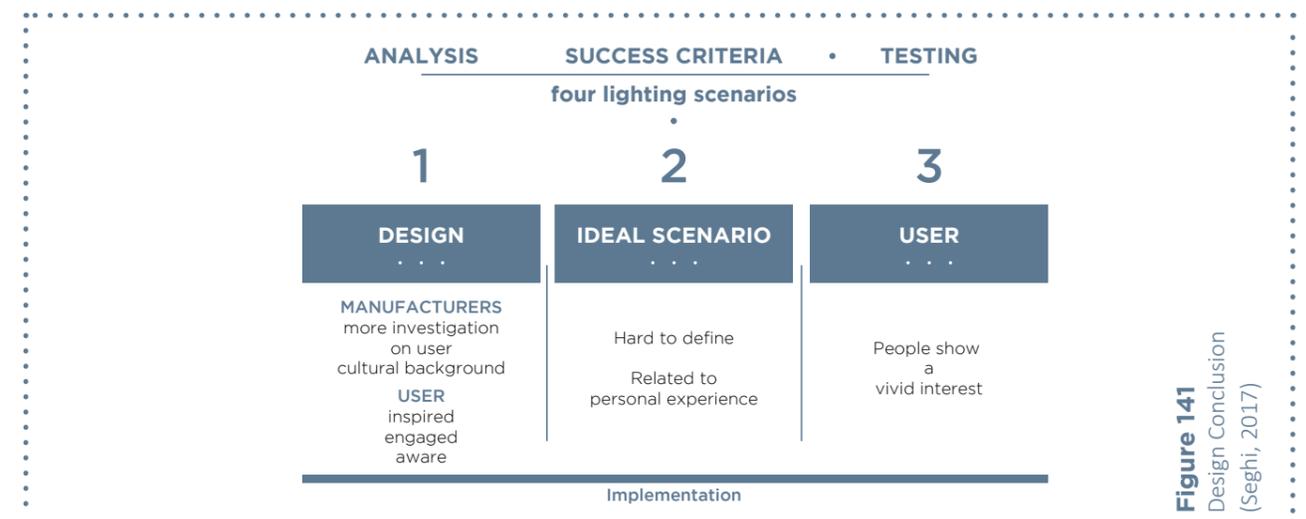

Figure 141
Design Conclusion
(Seghi, 2017)

06   Challenges

6. Challenges

This chapter is an insight into the specific challenges that have been found during the thesis' development. The goal of the whole project is to communicate the importance of light as a powerful tool that can shape the space around us, making people from different European countries to experience various lighting scenarios related to north and south European Lighting Cultures. In the following picture and in-depth investigation the authors will explain how and why, the main issue lies in the thesis topic itself arguing, starting from the beginning of the thesis, where did they find the major obstacles and how did they solve them. For a better understanding of this chapter, a visual approach has been developed and proposed in Figure 142. A detailed discussion can be found in the text following the picture

		CHALLENGE	SOLUTION
1	Introduction	Definition of new or unexplored concepts: Lighting Culture Southern lighting	Refer to personal experience. Define them through comparison with similar or opposite existing concepts
2	Analysis	Find references related to European Lighing Culture	Interviews in european countries. Address experts' opinion from all over the world to Europe.
3	Design	Propose the appropriate lighting solution using a multitasking fixture: Orb	Collect user's preferences and relate them with the personal experience. On-site testing.
4	Testing	Ask people living in Denmark to evaluate a lighting scenario based on the cultural habits in their country of origin	On-site testing. Guide the participant during the test. Create the right environment not only using light.

Figure 142
Challenges Conclusion
(Seghi, 2017)

The first challenge the authors met in the thesis development was the definition of the concept of "Lighting Culture". Even though there are several studies about the topic of lighting preferences in different regions or countries of the world and some of them are linked to sociological and anthropological studies, there is no paper, research or book properly defining this concept. The lighting habits of people in different countries are rarely analyzed in depth and almost never compared with each other. The majority of the sources found by the group is related to outdoor lighting, just a few of them analyses light as a cultural and social factor and powerful tool.

After a proper investigation of different sources and the use of various methods in the research process, the authors defined "Lighting Culture" referring to the personal experience and the main goal to achieve in the thesis. In the same section, another relevant challenge has been found: the lack of sources investigating and defining the Southern European Lighting characteristics. While it is plenty of studies centered on the Northern European Lighting, completely unfolding it from different points of view, there are no academic sources examining natural and artificial light in the South of Europe. The group's solution to this issue was to define the main characteristics of Southern Lighting Culture in relation and opposition to the definition of the Northern one.

In the analysis step of the paper, another challenge was found: only a few of the studies related to Lighting Cultures were relevant for European countries. After defining the concept of Lighting Culture and unfolding it through various methods, the group had to face a second issue. While the majority of the academic studies were referring to Europe, the book collecting interview from lighting designers all over the world, was mainly from countries outside Europe. The students' solution to this challenge was to refer the studies, projects, and interviews, to the smaller scale of Europe, only considering the examples that they could relate to their personal experience in different countries, as well as the projects and interview more addressable and relevant for the thesis topic and goal.

During the design development, the writers had to face one more obstacle. In the pre-testing process, the authors explored the possibilities of Orb, the lighting fixture presented in chapter 4. Lighting Technique, that was used to run the final test of the design solution in the particular environment of the case study. The goal was to generate on-site visual documentation, to understand possible specific issues, as well as experience the space when proposing different lighting settings, to define few final ones. It quickly appeared that the lighting fixture itself could be easily adjusted to different lighting settings, resulting in an endless range of possibilities to explore and propose. The group's solution to this issue was to analyze with particular attention the user's preferences in different countries, as explained in section 3. Methods and 4. Analysis, using them to extract the main characteristics affecting people's perception of light in indoor spaces and use them as the main tool for the scenarios' design. This design process leads them to the choice of an on-site test, so that the participants from different European countries, could experience different lighting scenarios, at the same time being guided through the test performance and evaluation.

Since the design proposals were tested with participants from Northern and Southern European countries in the common environment represented by Denmark, the group encountered other challenges in the testing phase of the thesis development. Even if the participants were almost equally mixed, coming from Northern and Southern European countries, they had something in common: all of them were living in Denmark since two years at least. This could just seem a detail of minor relevance, but during the conduction of the test, it represented a big challenge. Living abroad for such a long time could affect and shape the preferences of the end user, at the same time having a strong impact on its memory. People could find difficult to evaluate an environment based on the memories they have of their country of residence, their parents house, a culture they are not anymore surrounded by in the daily routine. There are several solutions offered by the group to solve the problem. First of all the testing method: performing an on-site testing means that the participant can experience and perceive different lighting settings, without the need of imagining anything. During the testing each participant was guided through a questionnaire from a member of the team, meaning that nobody had to focus on paper to fill in while experiencing differing scenarios and answering the questions. The participants were only asked to focus on the environment proposed trying to remember the atmosphere they were used to when living in their country of origin. During the pre-set testing, the writers found out that the experience of the final design proposal needed to be taken into consideration. Other factors, the luminous environment, and not only the lighting settings addressable to each European culture: the group made a special effort in creating a general and standard environment, trying to avoid elements and colors that could have been addressed to specific countries or cultures.

As presented in this chapter, no major problems were found in the technical realization of the design and testing. Every challenge described, presents various elements related to the precise description and definition of the thesis topic and the end user cultural background.

07 Evaluation and Discussion

7. Evaluation and Discussion

In this chapter, the writers will describe their whole process, discuss their methods and actions and evaluate their findings based on a chronological order. The idea of this thesis was conceived during a conversation the authors had about light. Since all of them are from different countries(Greece, Italy, and Lithuania) but have a similar educational background (Interior design, Industrial design and Architecture) they were all caught by surprise when they started describing the way people use light in their countries of origin. It was their life experience that fueled this research from the beginning and the fact that they currently reside in Denmark, a country with a vivid interest in lighting design. Through further conversations and based on their multidiversity as a group the idea of an existence of two different lighting cultures, North and South was generated. Additionally, certain similarities among countries from the same region were spotted, a fact that reinforced this idea. At first, the authors attempted to create a lighting analysis in order to define these two cultures and to understand the reasons for their presence. After a first approach, they found out that the geographical position of the country and its natural conditions have a certain impact on people's perception of light. Simply, the quantity and the quality of natural light is in strong relation with how people use the artificial light. Later on, research for what is a lighting culture and how it could be described for the purposes of this thesis was pursued. So by saying Lighting Cultures, the authors defined the relation between Natural and Artificial light, in detail the way natural light affects the use of artificial light in indoor living spaces based on different geographical positions and social habits. Through that initial process, the authors had the opportunity to conversate with a lot of people about the use of light in their apartments and combined with their own experience they came to a realization. Even though, people do use artificial light in a specific way they do not have a valid justification for the reasons they are using in this way. In addition, only a small percentage of them knew about lighting conditions and habits in other countries. In general, they lacked knowledge about the possibilities and the qualities of light even when it had to do with illuminating their own apartments. At that point the group came up with their initial problem statement:

"How can Northern and Southern lighting culture be combined to create awareness about the importance and potentials of the quality of light in indoor living spaces."

After the defining of the problem statement, the authors had to create their approach and select the methods they were about to use. At first, a deep investigation into relevant academic papers took place. The challenge they had to face is that for the Southern regions of Europe there were not so many as lighting design as a concept is not as developed there as it is of the Northern ones. The natural light at the South is rich and constant for almost nine months of the year leading the inhabitants there to use light as a supplementary medium for illumination and thus, not paying so much attention to it. Nevertheless, for the North the group found numerous academic papers analyzing the use and perception of light not only in public spaces but residential areas as well. Among them there were some with a more anthropological approach, a fact of great significance as light can also be used as a way of communicating with other or even as a way for someone to feel comfort and safeness. The papers verified the group's initial assumptions and stated clearly that in the North people usually prefer a warmer light coming from various sources indirectly when in the South people prefer a more cool light coming directly from one source. The reason for that is in strict relation with daylight and the phenomena of dusk and dawn. Due to their geographical position and the angle of the sun, the Northern countries experience longer periods of dusk and dawn, experiencing several nuances of the color yellow and blue in the sky. On the contrary at the South countries, this transition happens in a much shorter amount of time, shifting fast from day to night.

Later on, the authors found and went through the book "Light and Emotions, exploring lighting cultures/conversations with lighting designers" by Vincent Laganier and Jasmine van der Pol. The latter is a collection of interviews with 49 lighting designers around the world talking about light and the various setbacks they face during their work. From these interviews, parts related to our problem statement were isolated and investigated in order for relevant results to be excluded. Several professionals verified the fact that the preferences for light variate according to the geographical position of the country and that light has a cultural background. In addition, they stated that religion plays a significant part on these preferences, a fact that was excluded as it was out of the scope of this thesis. The interviews came in coherence with the data collected from the papers as the designers stated clearly that people

from the North prefer in general more warm light and people from the South cooler. The only problem with these findings is that the book included interviews from all around the world, the results were not confined to the region of Europe, where the differences among countries are not so vast. After the academic papers and the knowledge collected by the interviews with lighting designers, the authors wanted to investigate the end user's preferences. After all, one of the initial ideas for this thesis, and later on ambition, was to create a user-centered lighting design which will try to satisfy the individuality of the user as far as possible. For that reason, the method of creating an online survey was selected targeting people from Italy, Greece, Lithuania and Denmark, countries which the authors can relate to. A total of 300 participants were asked about their preferences on lighting in different occasions(alone, with a spouse or with multiple people) in different places of the apartment. The rooms selected initially were the kitchen, the living room and the bedroom. The latter was excluded later because sleeping and lighting have a more scientific relation in order to be beneficiary for the people's health. The results from the survey were in accordance with the data collected by the interviews and the papers, but the differences were not that big except the scenario of socializing with multiple people both in the kitchen and the living room. It was for that sole reason that the group chose to design and test only four lighting scenarios (two for each room, North and South) instead of more. On top of all the pre-mentioned sources, the group felt that an analysis of a typical apartment in the four countries had to take place in order to define the variations in the interiors and the placement of the fixtures. The analysis of those spaces came as a validation of all the knowledge the group had extruded so far along with some new findings. In the South regions is more often to find a kitchen connected with the living room and the CCT of light is cool coming from a ceiling recessed fixture. On the contrary, various lighting layers of warm light with a narrow distribution and separate spaces are more common in the North. It goes without saying that through their life experience the authors had knowledge about much more apartments but for reasons of economy and convenience, only four were presented.

After completing a far more scientific approach on the matter, the group had to redefine their problem statement to a final one and make the goal of this thesis quite clear. After some thoughts and discussions and with certain determination the authors came up with their new and Final Problem Statement:

"How can adjustable lighting scenarios improve the visual appearance of functions and enhance the quality of atmosphere in residential spaces according to the preferences and based on the cultural background of the end user"

The writers had worked so far starting from general knowledge and trying hard to narrow it down to a targeted and functional lighting design. The pre-mentioned target was not the aesthetics of some public space, as most of the papers studied and the interviews from the book were dedicated to, but the end user himself/herself. The way was by using adjustable lighting scenarios and qualitative and quantitative markers as the visual appearance of functions and the quality of the atmosphere, to engage and inspire the average user in order to create awareness by his/hers side towards the qualities of light. The key point was that those scenarios had to be based on the preferences and the cultural background of the user and that is just one of the reasons that the scenarios had to be adjustable.

At that point, the authors had all the data needed to move forward to the design phase. They had the general knowledge from the papers and the book, they defined and proved the existence of two different lighting cultures and they had isolated the preferences of the end user for each room, each scenario and each region. The only thing missing was the fixture or fixtures they had to use to implement their design. It was the group's decision from the beginning not to use a combination of different fixtures but only one that could provide several variations in CCT, directionality, positioning and intensity. Naturally, the group was looking for a fixture that can complete various tasks, thus a multitasking lighting fixture. After an extensive research of the new technologies the one product that managed to satisfy all the pre-mentioned criteria came from a Danish startup company named Shade, and it was called the Orb. That particular fixture could satisfy the group's needs in different CCT's, both direct and indirect light, adjustable intensity and because of the fact that it is a hanging fixture, the positioning could be adjusted. After contacting the owners of the company, they were kind enough to supply the group with two of their functional prototypes and their controlling app.

At first, the success criteria for the design had to be defined. As mentioned before, the markers for the problem

statement were the visual appearance of functions (quantitative) and the quality of the atmosphere (qualitative). The criteria were as well both quantitative-illuminance level, glare and CCT-and qualitative position of the fixture, direction of the light and CCT. The scenarios were four in total, two for the living room North and South and two for the kitchen. The occasion was the same, socializing or eating with multiple people. Following mainly the results of the survey and along with the life experience of the members and the collected knowledge, the group designed the pre-mentioned scenarios carefully with the characteristics that have been analyzed in the thesis. To evaluate and validate them an on site test was decided. Since the authors had two fixtures(Orbs), it would be a great opportunity to pick an apartment, close to the ones described above, and conduct a test with participants from both of the regions. The apartment chosen was one of the group's members residence and is a typical Danish apartment with no surprises in its interior. The orientation of the apartment was not important as all of the windows were covered in order to block out the natural light. Participants were chosen carefully in order to avoid possible bias. As a result, all of the participants were uneducated about light and unaware of its qualities and they were coming either from Italy, Greece, Lithuania or Denmark in order to maintain consistency with the survey. For the testing, three hypotheses were defined: one about the choice of the right scenario according to with the participant's origin, one for the evaluation of the scenario that the group proposed as ideal and one about the creation of awareness to the people after the completion of the test. In addition, before the day of the testing, the authors had gathered several times in that flat, experimenting and trying to find the right combinations among the CCT, the positioning, the direction and the intensity for the scenarios. As Orb is a multitasking fixture, the latter was very hard as the combinations are numerous. Nevertheless, the group after various attempts and working in a qualitative way, trying to set an atmosphere, managed to create the ideal scenarios for each function for each user. The testing day went smoothly with no surprises and the participants answered the questions the group had prepared for them providing the group with several useful comments for feedback and findings. Through those findings and by the evaluation process of the scenarios that was implemented in the questionnaire the authors summed out i) people did choose the scenario that was designed for their region proving once more the existence of two different lighting cultures ii) The proposed ideal scenarios satisfied the participants but not completely. Some extra focus needs to be paid on the intensity mostly, and iii) All of the participants, from both regions, felt really inspired and engaged with the different lighting scenarios and after finishing the test they felt much more aware of the qualities of light and the effects the latter can have in their residential spaces.

All in all, the group felt that managed to create a solid process to work properly in order to understand the needs of the end user, design accordingly and create awareness about the qualities of light which was the aim of this thesis. Additionally, the vast percentage of the participants replied that they would be really interested in investing in a fixture with the abilities of Orb, showing that with the proper education and by informing the consumers, possibly the time of static fixtures with no adjudications in their intensity or their CCT, will soon come to an end.

08 Conclusion

idea
generation

PERSONAL EXPERIENCE

VISION

NORTHERN LIGHTING
CULTURE

SOUTHERN LIGHTING
CULTURE

INITIAL PROBLEM STATEMENT

methods
and
analysis

ACADEMIC KNOWLEDGE
• papers •

EXPERTS' OPINION
• interviews •

USER'S PREFERENCES
• survey •

• Northern and Southern apartments •

FINAL PROBLEM STATEMENT

lighting
technique

• ORB •

design
and
testing

LIGHTING SCENARIOS

CASE STUDY

conclusion

USER CENTERED DESIGN SOLUTION

8. Conclusion

As a conclusion for this thesis the group decided to use the Process model as a reference, elaborated in section 2. Process Model and showed in Figure 27.

IDEA GENERATION — **PROBLEM ANALYSIS AND SOLUTION** — **DESIGN** — **IMPLEMENTATION**

TRANSFER
Personal experience
Vision
Initial P.S.

TRANSLATE
Methods
Analysis
Final P.S.

TRANSFORM
Design
Case Study
Testing

CREATE
Evaluation
New design
approach
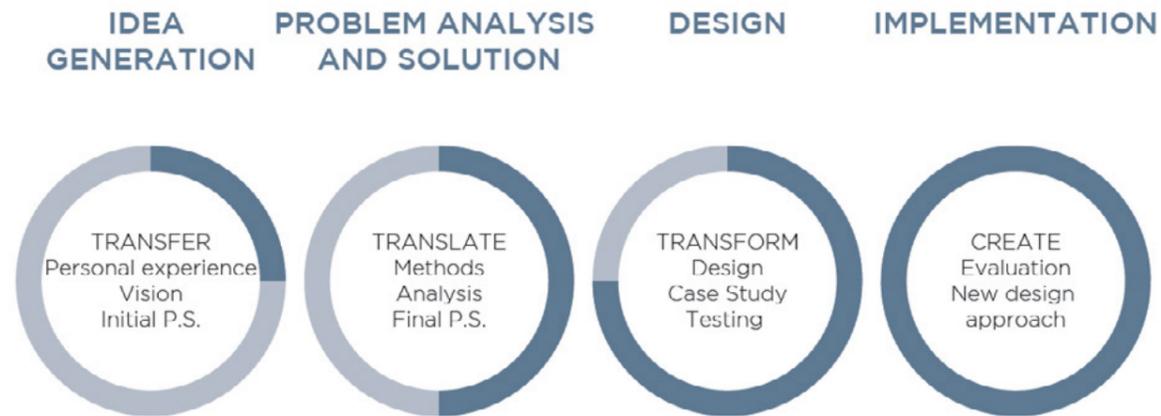
Figure 27
Process Model
(Seghi, 2017)

In the "Idea Generation" step, the authors used their personal experience from different countries to create a common vision. The concept was related to a different use of light in various regions of Europe. This was followed by the preliminary investigation on the existence of lighting cultures. As a result to that, this knowledge was transferred to the initial problem statement, formulated and introduced in chapter 1.3 Initial Problem Statement:

How can Northern and Southern lighting cultures be combined to create awareness about the importance and potentials of the quality of light in indoor living spaces?

To answer this question, the second stage of the process model "Problem Analysis and Solution" was introduced. Here the authors used three different sources as methods to investigate the lighting cultures in Northern and Southern regions. A theoretical approach was followed in this section using the academic papers, lighting designers' interviews, and end users' preferences. At the same time, on-site analysis of different apartments was presented. The knowledge and findings gathered from the analysis stage led the authors to the final problem statement:

How can adjustable lighting scenarios improve the visual appearance of functions and enhance the quality of atmosphere in residential spaces according to the preferences and based on the cultural background of the end user?

Following upon that, the third stage of the process model "Design" was established. In this phase, design success criteria were presented in order to have a touchstone for the design testing. In reaction to that, initial lighting scenarios were brought on a table. Different options of using the artificial light at home were suggested. The case study was made and followed by the initial design proposal. At this point, the finest lighting schemes were defined by authors based on the findings in the living room and the kitchen. This led authors to reach the testing phase, where final lighting proposals were tested with participants and hypothesis was explored. The outcome derived from the experiment was resolved and accomplished in 5.7 Design Conclusion.

The last stage "Implementation" of the Process Model is considering the steps of evaluation and new

design approach. Chapter 6. Challenges were introduced where issues of the thesis been brought up. The paragraph argues and makes suggestions how the problems could be solved. As the goal of the thesis is to communicate the importance of light in the indoor living spaces, to create awareness of light's quality and introduce the Northern and Southern lighting cultures, 7. Evaluation and Discussion section answers the questions and reveals the goal of the thesis.

Authors think that is safe to state that the goal of the thesis was achieved. As the first step was to justify any existence of lighting cultures, writers validated it through the scientific papers in the introduction chapter. Following upon that, the definition of Lighting Cultures was described. The second step was to combine the different lighting cultures, not at the same time and by doing that, create an awareness of the importance of light in indoor living spaces. The analysis of various sources, such as academic papers, lighting experts' interviews, and end user's preferences, led to the final problem statement. It arose the question, how lighting scenarios can improve and enhance the quality of atmosphere in residential spaces. As the final lighting scenarios were proposed, the testing took part. The hypotheses of the experiment were operated to validate the design. The results from the testing and participants' answers showed that it is possible to communicate the importance of light in indoor living space. Furthermore, it is feasible to create awareness of light's quality and introduce the Northern and Southern lighting cultures.

09 Future Work

9. Future Work

Despite the hard efforts, there were several aspects of this thesis that never got completed or were left aside deliberately. Nevertheless, the authors feel that a future expansion of this research should include them and for that reason are mentioned in this section. Firstly, is the crucial issue of religion. Especially in the southern regions religion has a huge impact on the culture of the people and up to certain extend alternates their perspective of light. On the attempt of defining lighting cultures, religions should definitely be considered. On a similar note, the group excluded an analysis upon daylight and the importance of it in shaping the lighting cultures of a region. Certain values of daylight were analyzed in this thesis but only as a part of the geographical position of the country. Natural light does changes not only the perception of artificial light but also has a huge impact on the architecture and the lifestyle of a country.

The scientific values of light in relation to the health of the user were also excluded. The authors felt that it was more important to define the lighting cultures and target the end user's preferences instead of using lighting standards and scientific evidence in order to answer their problem statement. Still, some lighting scenarios based on scientific values like the circadian rhythm could be much more beneficial for the end user than his/hers own choices. In addition, they could be used as a recommendations/suggestions for the Orb, in order to improve its significance and its value.

On the matter of testing the effectiveness of their lighting scenarios, the authors would like to test them with other fixtures as well. At the beginning with other multitasking fixtures, as they were described in the section 4.1 lighting technologies investigation, and afterward with various combinations of simple, everyday fixtures. Also, a fact of great interest would be to conduct the testing phase in a Southern country and then compare the results and see if there are any alterations. Lastly, a much deeper investigation including more countries from both the North and the South regions could provide the group with different results and a far better understanding of the use of light in various countries.

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11   Appendix

Please state your gender.

Answered: 108   Skipped: 2
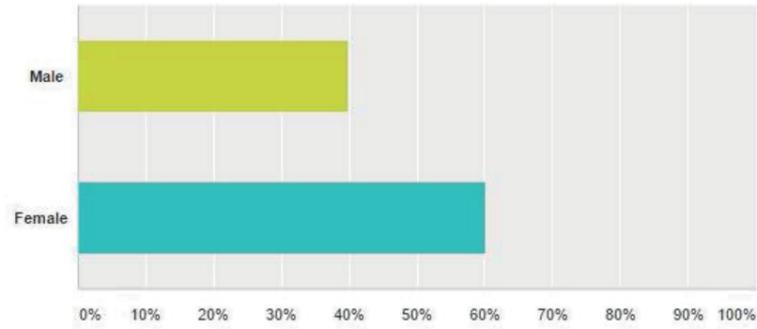
Answer Choices		Responses	
▾	Male	39.81%	43
▾	Female	60.19%	65
Total			108

Please state your nationality

Answered: 110   Skipped: 0
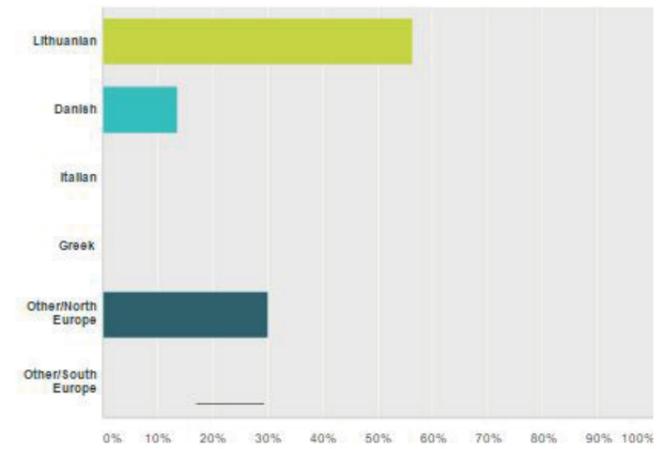
Answer Choices		Responses	
▾	Lithuanian	56.36%	62
▾	Danish	13.64%	15
▾	Italian	0.00%	0
▾	Greek	0.00%	0
▾	Other/North Europe	30.00%	33
▾	Other/South Europe	0.00%	0
Total			110

Please state your age group.

Answered: 110   Skipped: 0
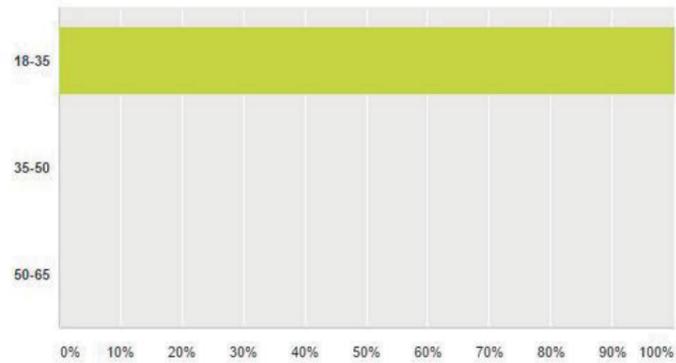
Answer Choices		Responses	
▾	18-35	100.00%	110
▾	35-50	0.00%	0
▾	50-65	0.00%	0
Total			110

Please state your country of residence

Answered: 110   Skipped: 0
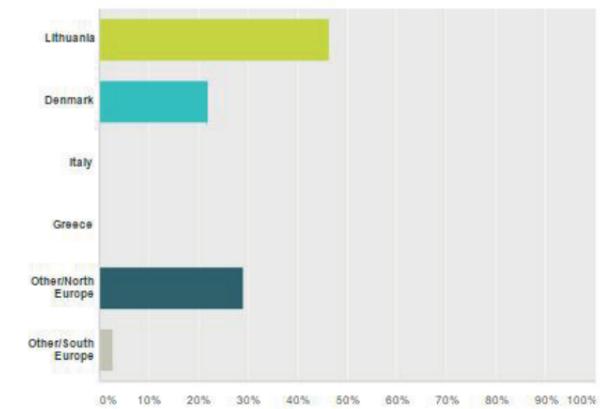
Answer Choices		Responses	
▾	Lithuania	46.36%	51
▾	Denmark	21.82%	24
▾	Italy	0.00%	0
▾	Greece	0.00%	0
▾	Other/North Europe	29.09%	32
▾	Other/South Europe	2.73%	3
Total			110

Northern Countries

How many people are living in your apartment now(including yourself)?

Answered: 110   Skipped: 0
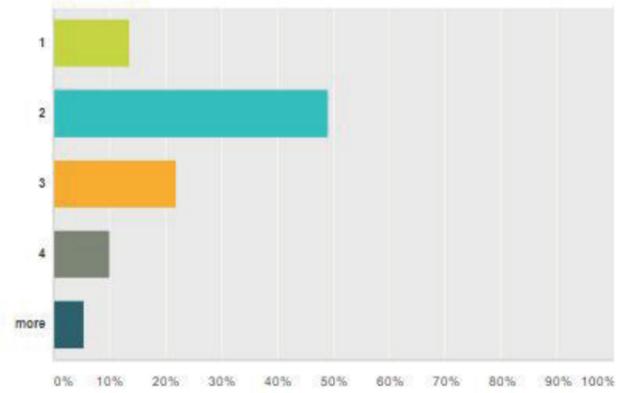
Answer Choices	Responses	
1	13.64%	15
2	49.09%	54
3	21.82%	24
4	10.00%	11
more	5.45%	6
Total		110

Is your kitchen openly connected with your living room?

Answered: 109   Skipped: 1
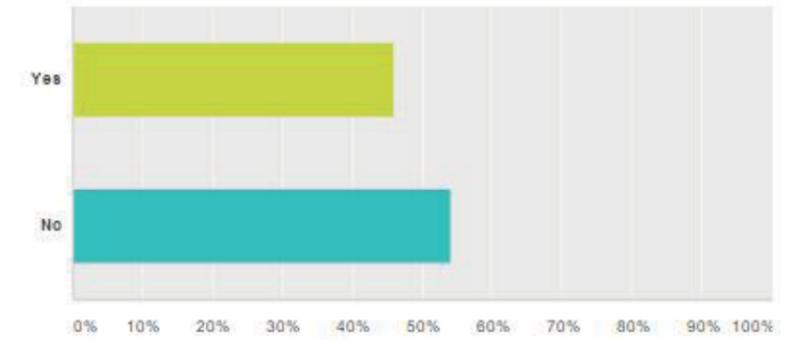
Answer Choices	Responses	
Yes	45.87%	50
No	54.13%	59
Total		109

In which room of your apartment do you spend most of your time?

Answered: 110   Skipped: 0
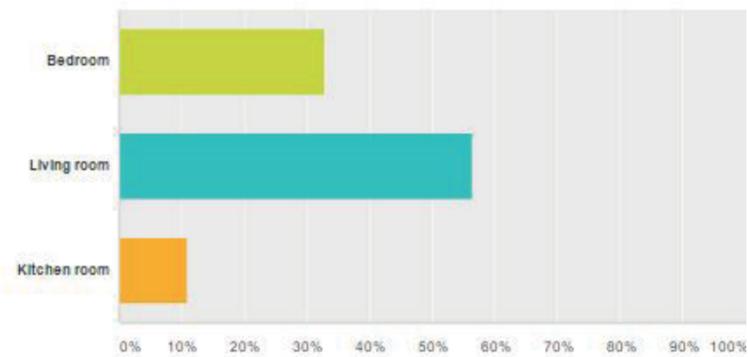
Answer Choices	Responses	
Bedroom	32.73%	36
Living room	56.36%	62
Kitchen room	10.91%	12
Total		110

Do you have a dinning table in your kitchen?
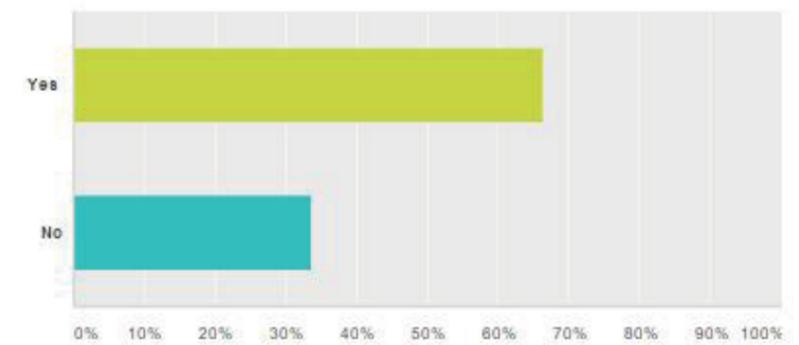
Answered: 110   Skipped: 0

Answer Choices	Responses	
Yes	66.36%	73
No	33.64%	37
Total		110

Do you have a different dinning table for special occasions?

Answered: 110   Skipped: 0
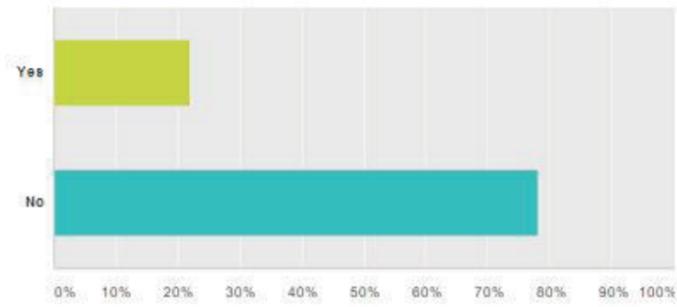
Answer Choices		Responses	
▼	Yes	21.82%	24
▼	No	78.18%	86
Total			110

What kind of fixture do you use the most in the living room?

Answered: 105   Skipped: 1
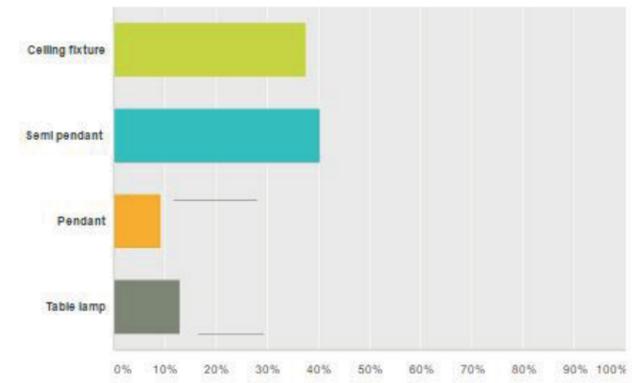
Answer Choices		Responses	
▼	Ceiling fixture	37.61%	41
▼	Semi pendant	40.37%	44
▼	Pendant	9.17%	10
▼	Table lamp	12.84%	14
Total			109

What kind of lighting fixture do you use the most in the kitchen?

Answered: 110   Skipped: 0
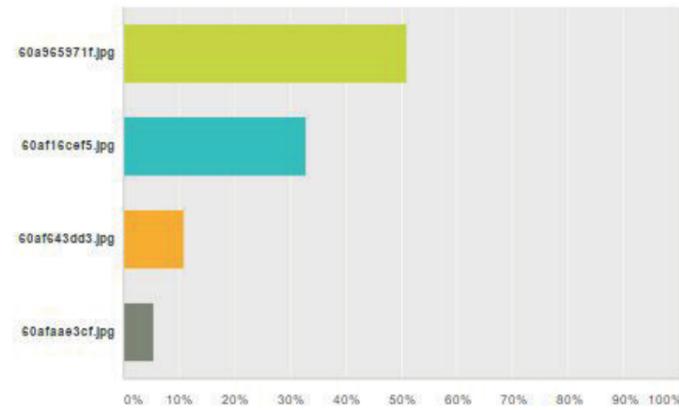
Answer Choices		Responses	
	60a965971f.jpg	50.91%	56
	60af16cef5.jpg	32.73%	36
	60af643dd3.jpg	10.91%	12
	60afaae3cf.jpg	5.45%	6
Total			110

What kind of fixture do you use the most in the bedroom?

Answered: 108   Skipped: 2
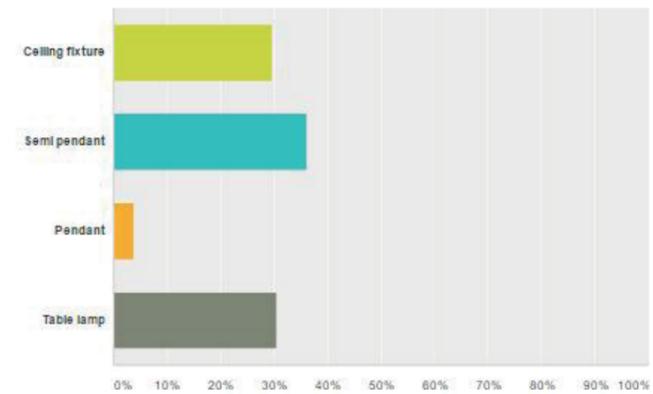
Answer Choices		Responses	
▼	Ceiling fixture	29.63%	32
▼	Semi pendant	36.11%	39
▼	Pendant	3.70%	4
▼	Table lamp	30.56%	33
Total			108

According to the picture, what light color temperature do you use in your kitchen? State your answers approximately.

Answered: 110   Skipped: 0
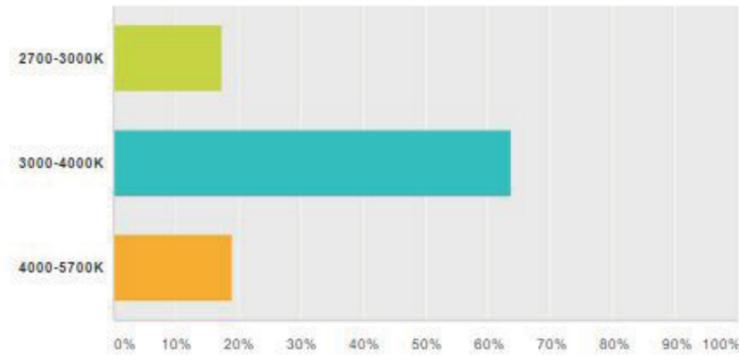
Answer Choices	Responses	
2700-3000K	17.27%	19
3000-4000K	63.64%	70
4000-5700K	19.09%	21
Total		110

According to the picture, what light color temperature do you use in your bedroom? State your answers approximately.

Answered: 109   Skipped: 1
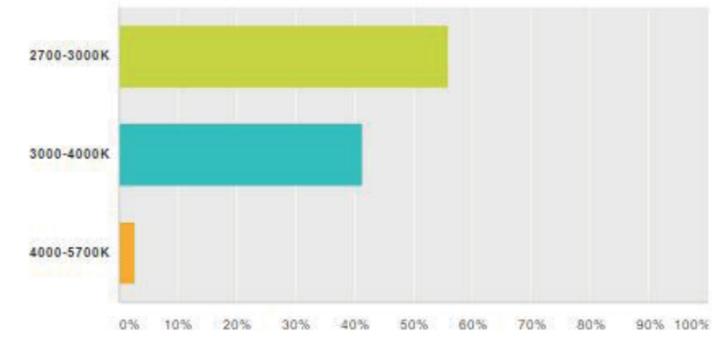
Answer Choices	Responses	
2700-3000K	55.96%	61
3000-4000K	41.28%	45
4000-5700K	2.75%	3
Total		109

According to the picture, what light color temperature do you use in your living room? State your answers approximately.

Answered: 110   Skipped: 0
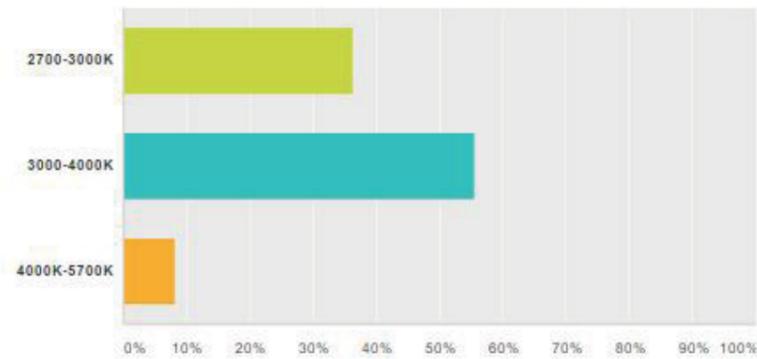
Answer Choices	Responses	
2700-3000K	36.36%	40
3000-4000K	55.45%	61
4000K-5700K	8.18%	9
Total		110

Do you leave any source of light on when you sleep?

Answered: 110   Skipped: 0
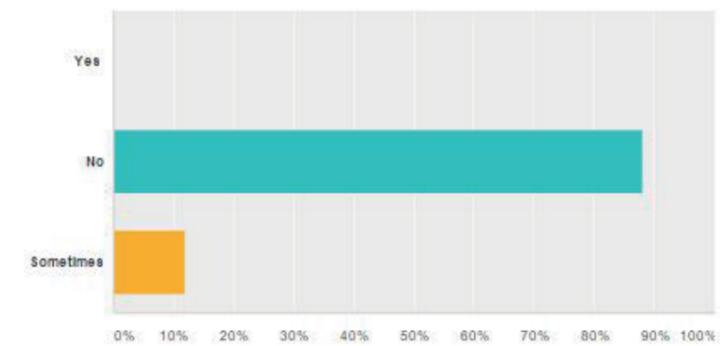
Answer Choices	Responses	
Yes	0.00%	0
No	88.18%	97
Sometimes	11.82%	13
Total		110

When you eat alone, what kind of light intensity you prefer?

Answered: 110   Skipped: 0
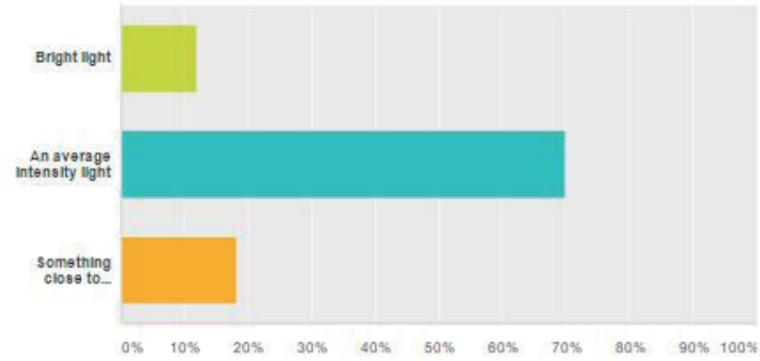
Answer Choices		Responses	
▼	Bright light	11.82%	13
▼	An average intensity light	70.00%	77
▼	Something close to candlelight	18.18%	20
Total			110

When you have a dinner with guests, what kind of light you prefer?

Answered: 109   Skipped: 1
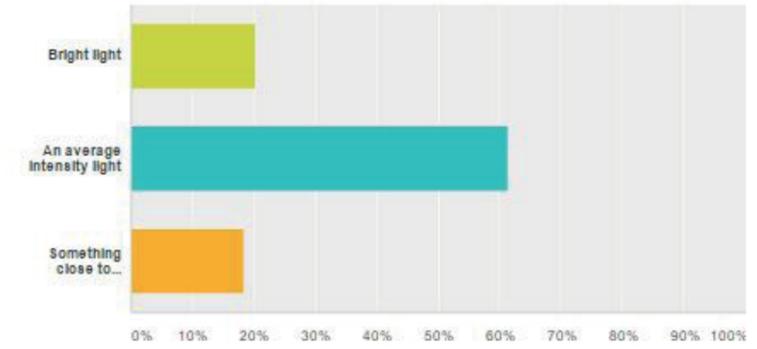
Answer Choices		Responses	
▼	Bright light	20.18%	22
▼	An average intensity light	61.47%	67
▼	Something close to candlelight	18.35%	20
Total			109

When you eat with your family/spouse, what kind of light intensity you prefer?

Answered: 110   Skipped: 0
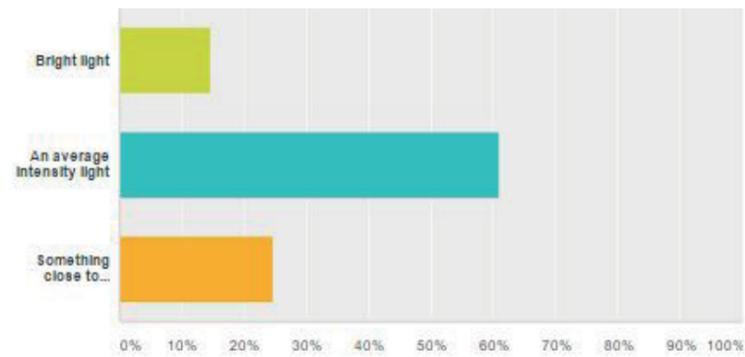
Answer Choices		Responses	
▼	Bright light	14.55%	16
▼	An average intensity light	60.91%	67
▼	Something close to candlelight	24.55%	27
Total			110

When you are by yourself in your living room(using your laptop or watching TV), what intensity of light do you prefer?

Answered: 110   Skipped: 0
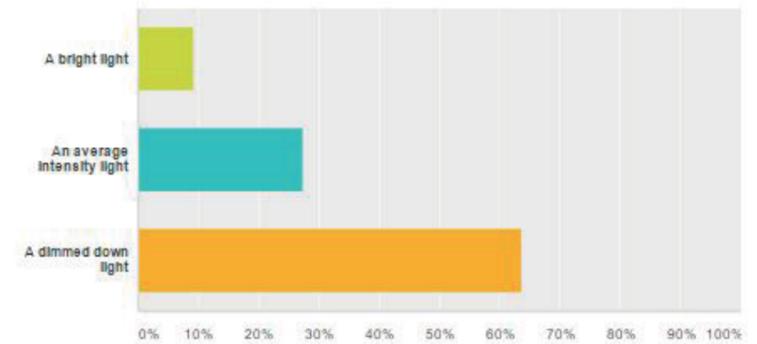
Answer Choices		Responses	
▼	A bright light	9.09%	10
▼	An average intensity light	27.27%	30
▼	A dimmed down light	63.64%	70
Total			110

How many lighting fixtures do you have turned on?

Answered: 110   Skipped: 0
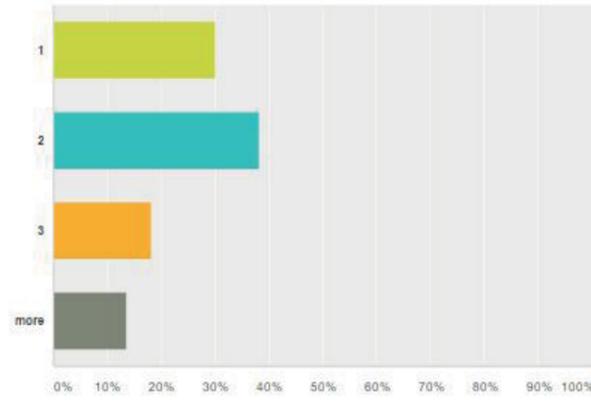
Answer Choices		Responses	
▼	1	30.00%	33
▼	2	38.18%	42
▼	3	18.18%	20
▼	more	13.64%	15
Total			110

When you are socialising with a close friend (face to face) in your living room, What intensity of light do you use?

Answered: 109   Skipped: 1
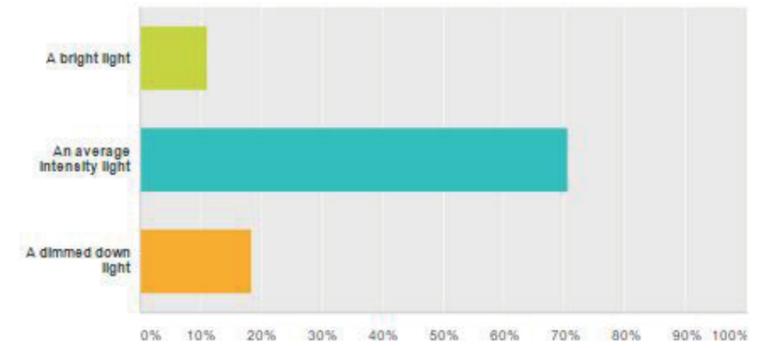
Answer Choices		Responses	
▼	A bright light	11.01%	12
▼	An average intensity light	70.64%	77
▼	A dimmed down light	18.35%	20
Total			109

Do you prefer direct or indirect lighting?

Answered: 110   Skipped: 0
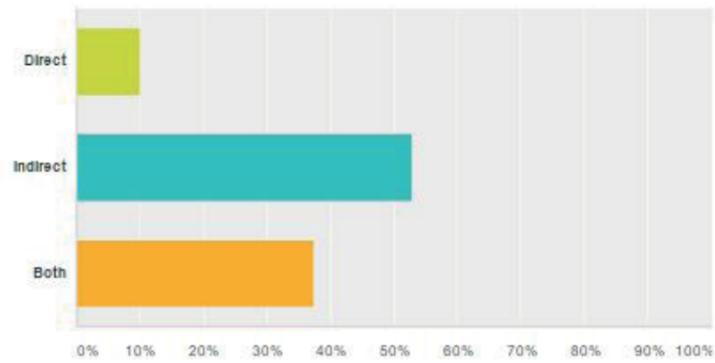
Answer Choices		Responses	
▼	Direct	10.00%	11
▼	Indirect	52.73%	58
▼	Both	37.27%	41
Total			110

How many lighting fixtures do you have on?

Answered: 110   Skipped: 0
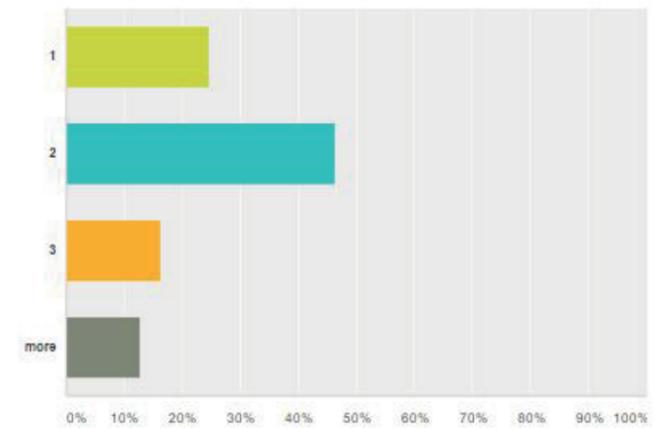
Answer Choices		Responses	
▼	1	24.55%	27
▼	2	46.36%	51
▼	3	16.36%	18
▼	more	12.73%	14
Total			110

Do you prefer direct or indirect lighting?

Answered: 110   Skipped: 0
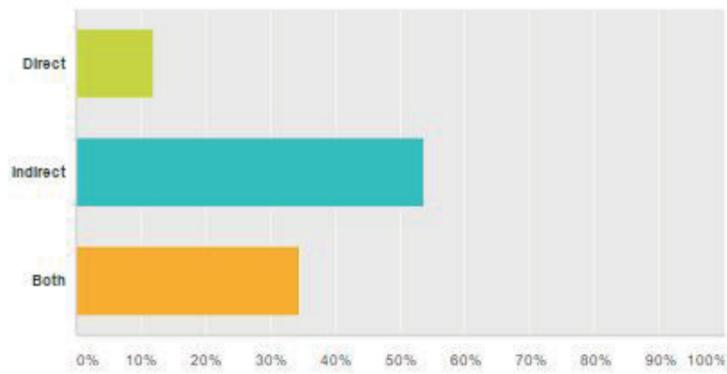
Answer Choices	Responses	
Direct	11.82%	13
Indirect	53.64%	59
Both	34.55%	38
Total		110

How many lighting fixtures do you have on?

Answered: 110   Skipped: 0
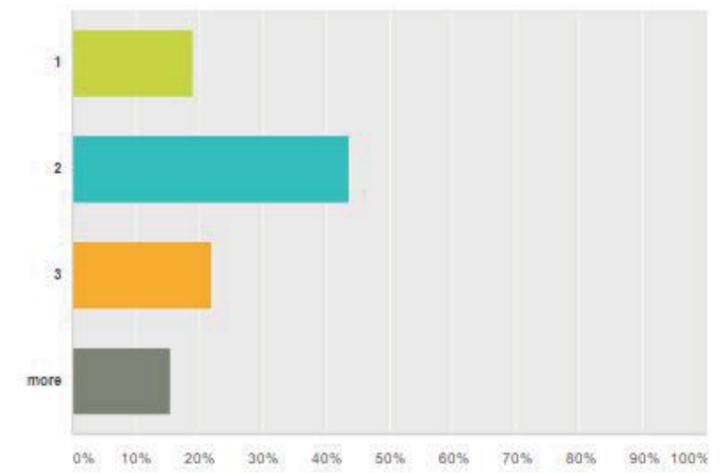
Answer Choices	Responses	
1	19.09%	21
2	43.64%	48
3	21.82%	24
more	15.45%	17
Total		110

When you are socialising with a close group of people in your living room, what intensity of light do you use?

Answered: 110   Skipped: 0
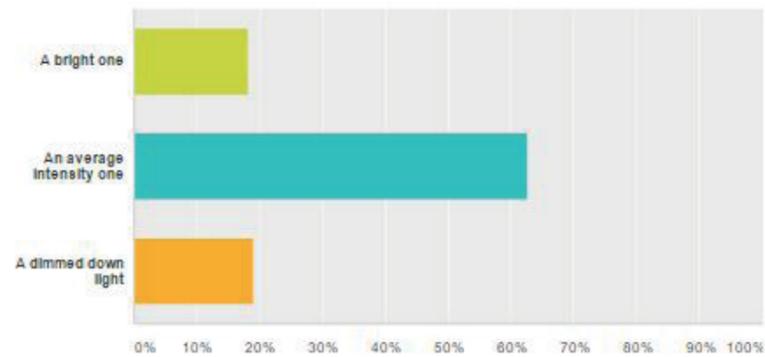
Answer Choices	Responses	
A bright one	18.18%	20
An average intensity one	62.73%	69
A dimmed down light	19.09%	21
Total		110

Do you prefer direct or indirect lighting?

Answered: 110   Skipped: 0
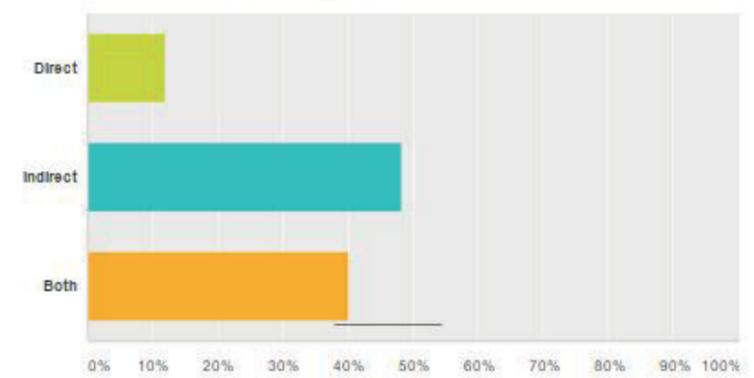
Answer Choices	Responses	
Direct	11.82%	13
Indirect	48.18%	53
Both	40.00%	44
Total		110

Please state your gender.

Answered: 138   Skipped: 1
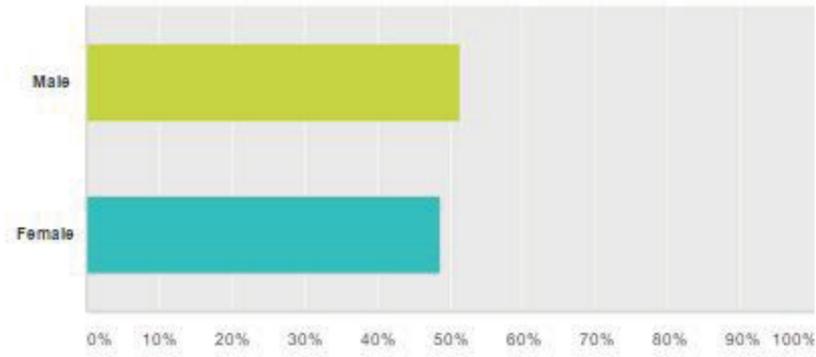
Answer Choices		Responses	
▾	Male	51.45%	71
▾	Female	48.55%	67
Total			138

Please state your nationality

Answered: 139   Skipped: 0
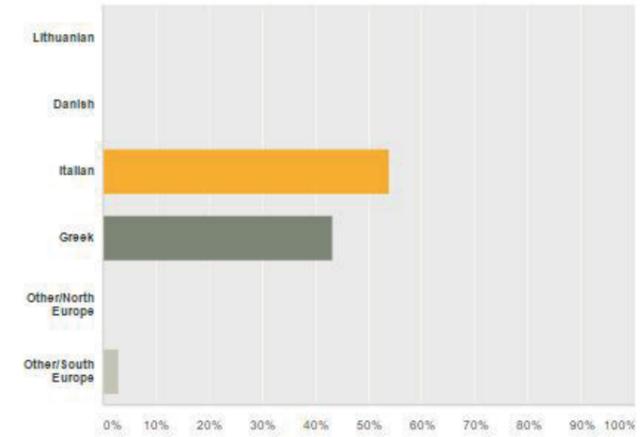
Answer Choices		Responses	
▾	Lithuanian	0.00%	0
▾	Danish	0.00%	0
▾	Italian	53.96%	75
▾	Greek	43.17%	60
▾	Other/North Europe	0.00%	0
▾	Other/South Europe	2.88%	4
Total			139

Please state your age group.

Answered: 139   Skipped: 0
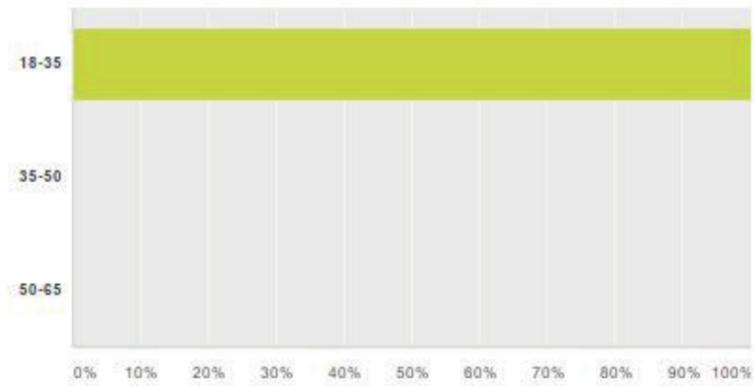
Answer Choices		Responses	
▾	18-35	100.00%	139
▾	35-50	0.00%	0
▾	50-65	0.00%	0
Total			139

Please state your country of residence

Answered: 139   Skipped: 0
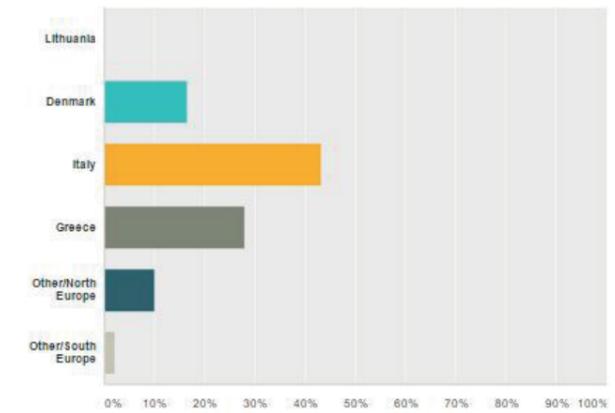
Answer Choices		Responses	
▾	Lithuania	0.00%	0
▾	Denmark	16.55%	23
▾	Italy	43.17%	60
▾	Greece	28.06%	39
▾	Other/North Europe	10.07%	14
▾	Other/South Europe	2.16%	3
Total			139

Southern Countries

How many people are living in your apartment now(including yourself)?

Answered: 139   Skipped: 0
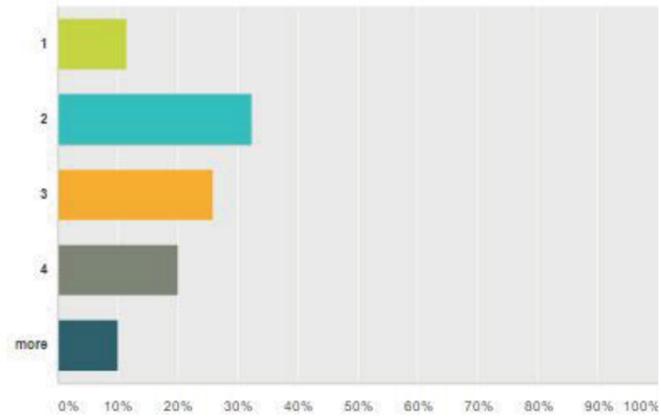
Answer Choices	Responses	
1	11.51%	16
2	32.37%	45
3	25.90%	36
4	20.14%	28
more	10.07%	14
Total		139

Is your kitchen openly connected with your living room?

Answered: 139   Skipped: 0
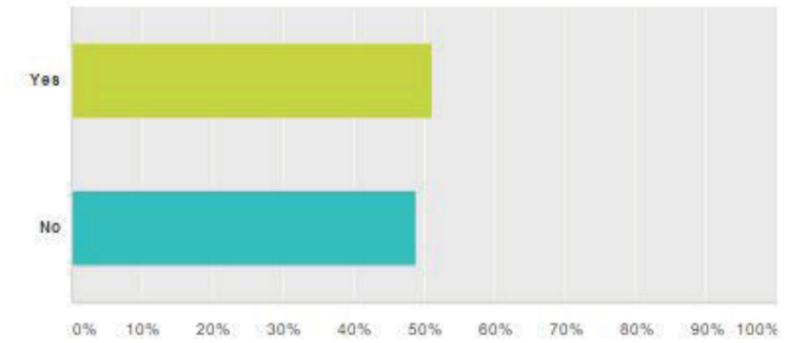
Answer Choices	Responses	
Yes	51.08%	71
No	48.92%	68
Total		139

In which room of your apartment do you spend most of your time?

Answered: 139   Skipped: 0
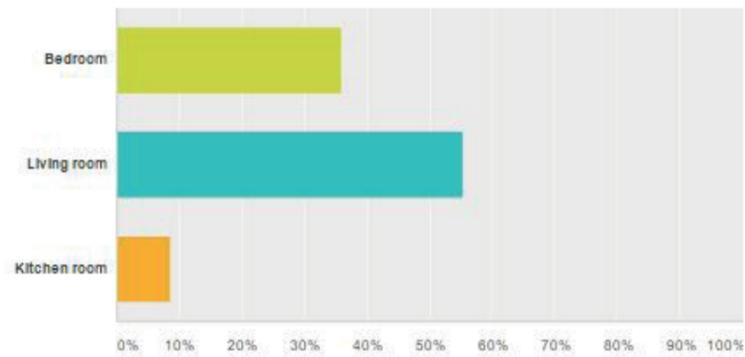
Answer Choices	Responses	
Bedroom	35.97%	50
Living room	55.40%	77
Kitchen room	8.63%	12
Total		139

Do you have a dinning table in your kitchen?
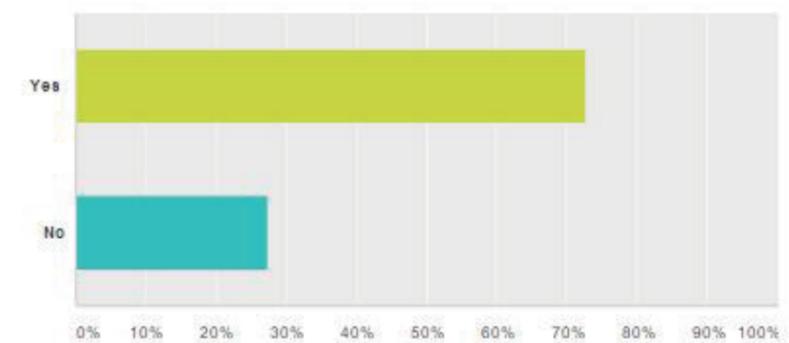
Answered: 139   Skipped: 0

Answer Choices	Responses	
Yes	72.66%	101
No	27.34%	38
Total		139

Do you have a different dinning table for special occasions?

Answered: 138 Skipped: 1
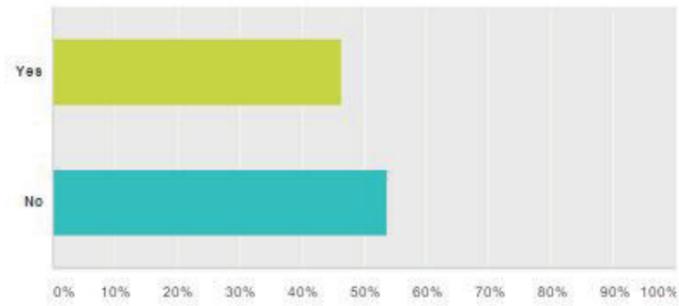
Answer Choices		Responses	
▼	Yes	46.38%	64
▼	No	53.62%	74
Total			138

What kind of fixture do you use the most in the living room?

Answered: 135 Skipped: 4
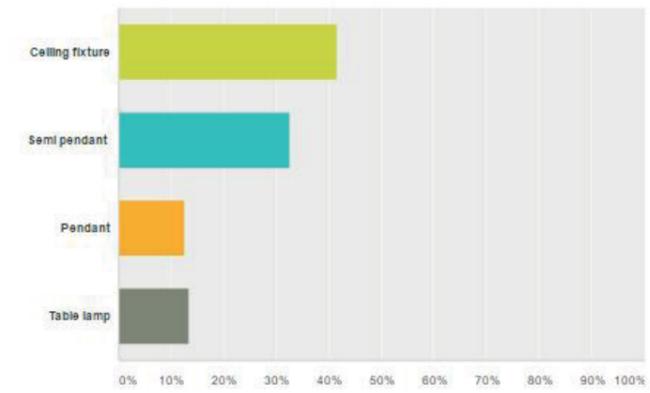
Answer Choices		Responses	
▼	Ceiling fixture	41.48%	56
▼	Semi pendant	32.59%	44
▼	Pendant	12.59%	17
▼	Table lamp	13.33%	18
Total			135

What kind of lighting fixture do you use the most in the kitchen?
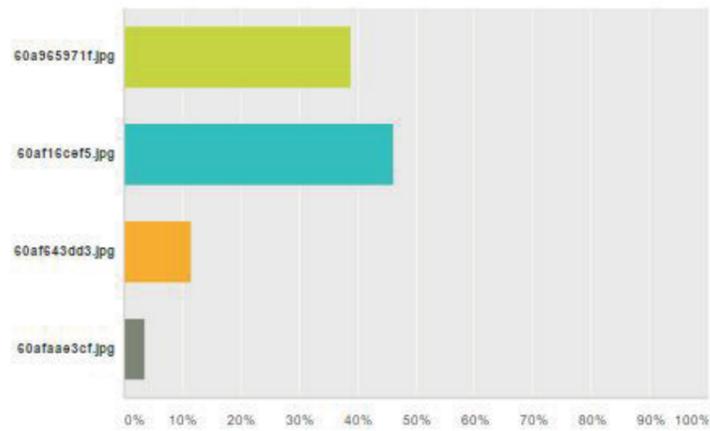
Answered: 139 Skipped: 0

Answer Choices		Responses	
▼		38.85%	54
▼		46.04%	64
▼		11.51%	16
▼		3.60%	5
Total			139

What kind of fixture do you use the most in the bedroom?

Answered: 137 Skipped: 2
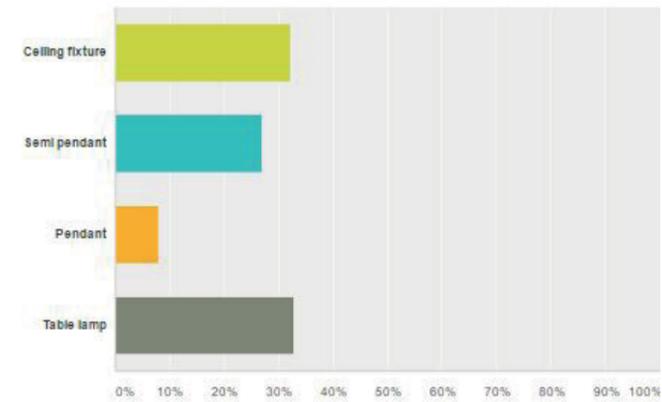
Answer Choices		Responses	
▼	Ceiling fixture	32.12%	44
▼	Semi pendant	27.01%	37
▼	Pendant	8.03%	11
▼	Table lamp	32.85%	45
Total			137

According to the picture, what light color temperature do you use in your kitchen? State your answers approximately.
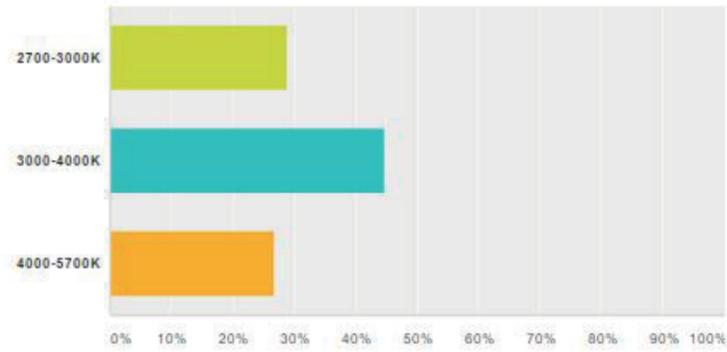
Answered: 139   Skipped: 0

Answer Choices	Responses	
2700-3000K	28.78%	40
3000-4000K	44.60%	62
4000-5700K	26.62%	37
Total		139

According to the picture, what light color temperature do you use in your bedroom? State your answers approximately.
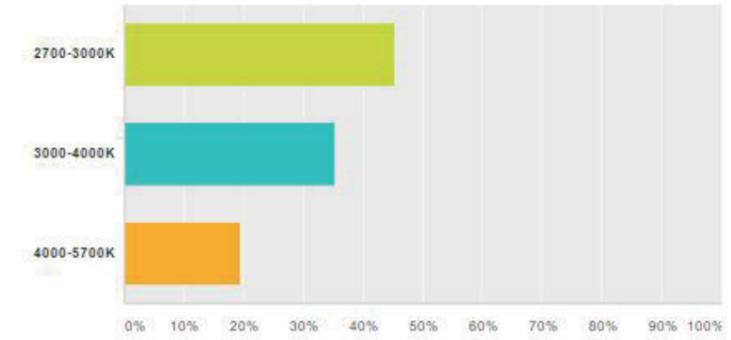
Answered: 139   Skipped: 0

Answer Choices	Responses	
2700-3000K	45.32%	63
3000-4000K	35.25%	49
4000-5700K	19.42%	27
Total		139

According to the picture, what light color temperature do you use in your living room? State your answers approximately.

Answered: 138   Skipped: 1
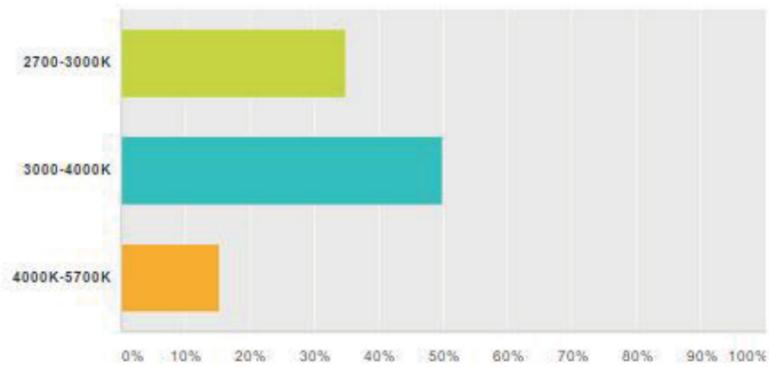
Answer Choices	Responses	
2700-3000K	34.78%	48
3000-4000K	50.00%	69
4000K-5700K	15.22%	21
Total		138

Do you leave any source of light on when you sleep?

Answered: 139   Skipped: 0
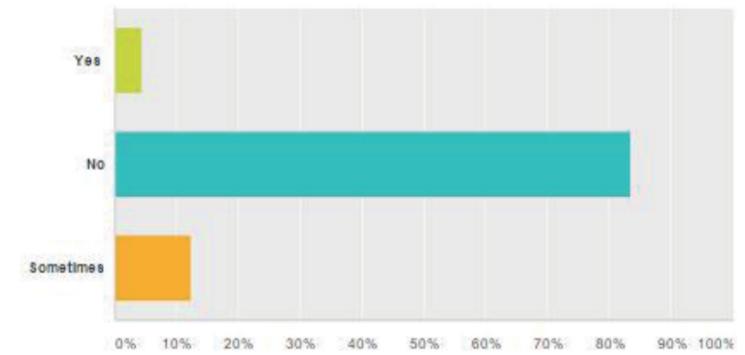
Answer Choices	Responses	
Yes	4.32%	6
No	83.45%	116
Sometimes	12.23%	17
Total		139

When you eat alone, what kind of light intensity you prefer?

Answered: 139 Skipped: 0
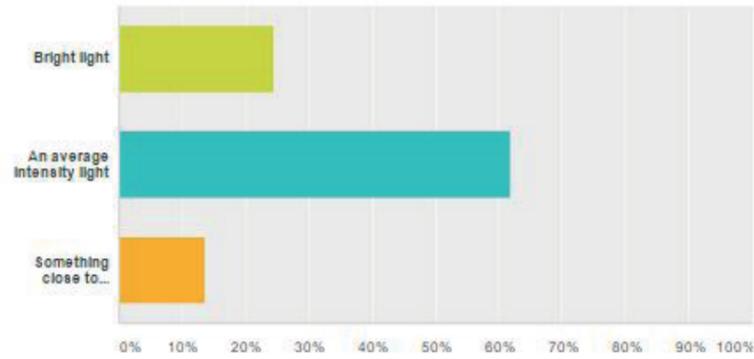
Answer Choices	Responses	
Bright light	24.46%	34
An average intensity light	61.87%	86
Something close to candlelight	13.67%	19
Total		139

When you have a dinner with guests, what kind of light you prefer?

Answered: 138 Skipped: 1
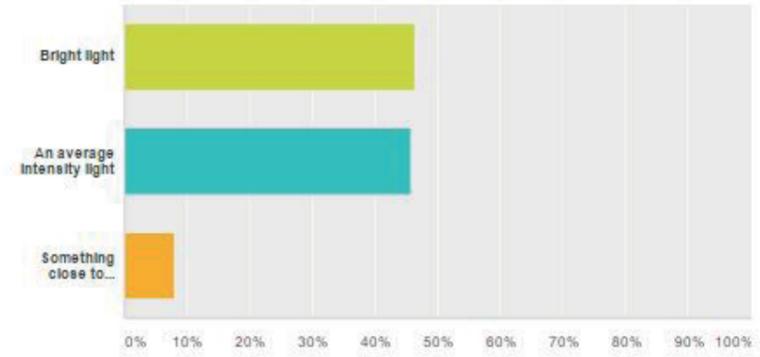
Answer Choices	Responses	
Bright light	46.38%	64
An average intensity light	45.65%	63
Something close to candlelight	7.97%	11
Total		138

When you eat with your family/spouse, what kind of light intensity you prefer?

Answered: 137 Skipped: 2
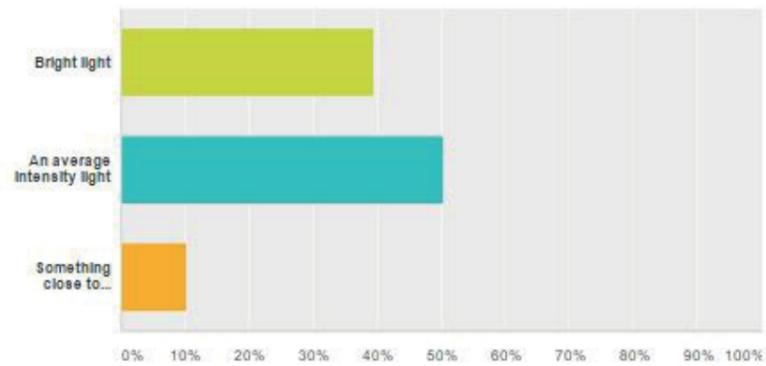
Answer Choices	Responses	
Bright light	39.42%	54
An average intensity light	50.36%	69
Something close to candlelight	10.22%	14
Total		137

When you are by yourself in your living room(using your laptop or watching TV), what intensity of light do you prefer?

Answered: 139 Skipped: 0
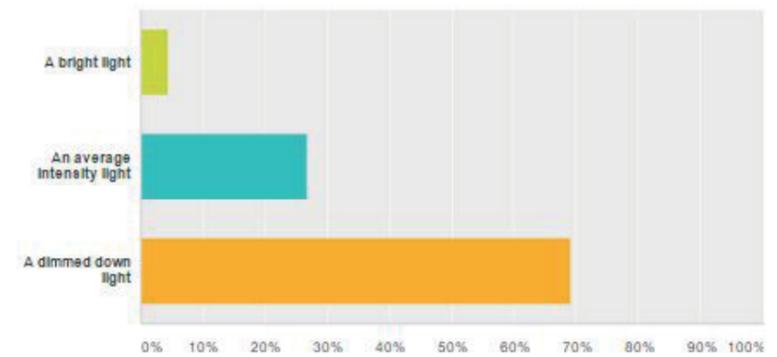
Answer Choices	Responses	
A bright light	4.32%	6
An average intensity light	26.62%	37
A dimmed down light	69.06%	96
Total		139

How many lighting fixtures do you have turned on?

Answered: 139   Skipped: 0
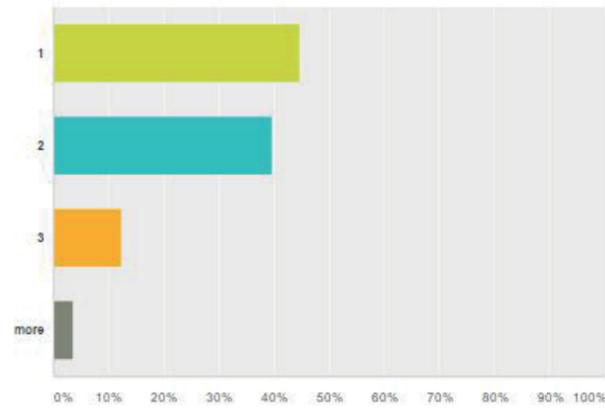
Answer Choices		Responses	
	1	44.60%	62
	2	39.57%	55
	3	12.23%	17
	more	3.60%	5
Total			139

When you are socialising with a close friend (face to face) in your living room, What intensity of light do you use?
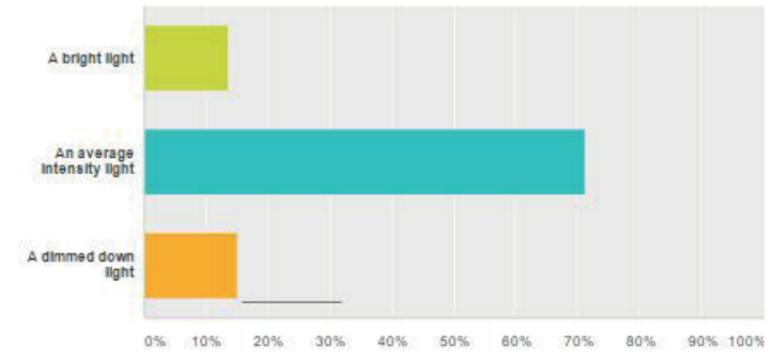
Answered: 139   Skipped: 0

Answer Choices		Responses	
	A bright light	13.67%	19
	An average intensity light	71.22%	99
	A dimmed down light	15.11%	21
Total			139

Do you prefer direct or indirect lighting?
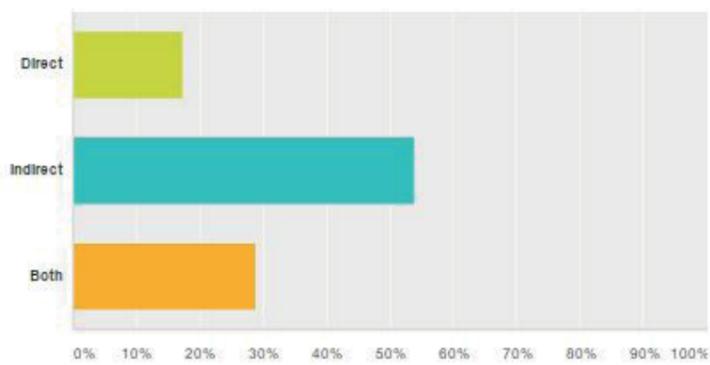
Answered: 139   Skipped: 0

Answer Choices		Responses	
	Direct	17.27%	24
	Indirect	53.96%	75
	Both	28.78%	40
Total			139

How many lighting fixtures do you have on?
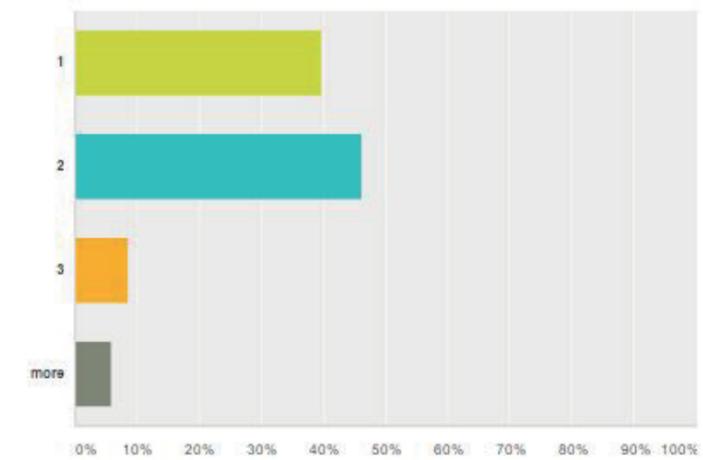
Answered: 139   Skipped: 0

Answer Choices		Responses	
	1	39.57%	55
	2	46.04%	64
	3	8.63%	12
	more	5.76%	8
Total			139

Do you prefer direct or indirect lighting?

Answered: 139   Skipped: 0
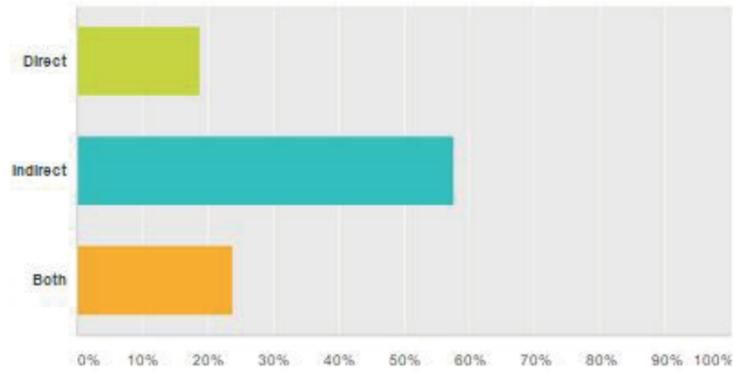
Answer Choices		Responses	
▾	Direct	18.71%	26
▾	Indirect	57.55%	80
▾	Both	23.74%	33
Total			139

How many lighting fixtures do you have on?

Answered: 139   Skipped: 0
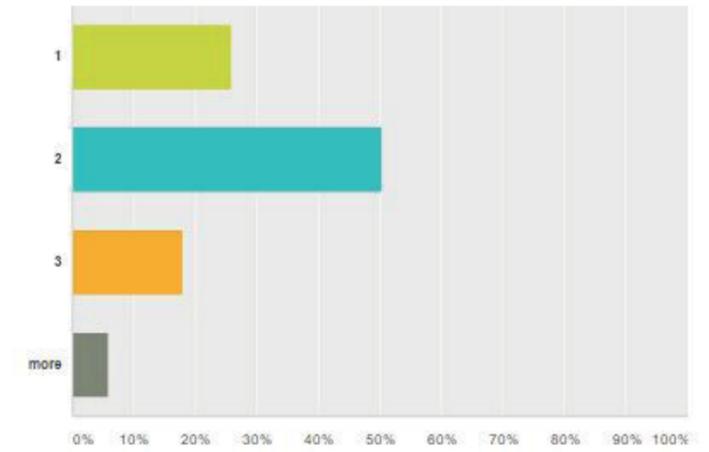
Answer Choices		Responses	
▾	1	25.90%	36
▾	2	50.36%	70
▾	3	17.99%	25
▾	more	5.76%	8
Total			139

When you are socialising with a close group of people in your living room, what intensity of light do you use?

Answered: 139   Skipped: 0
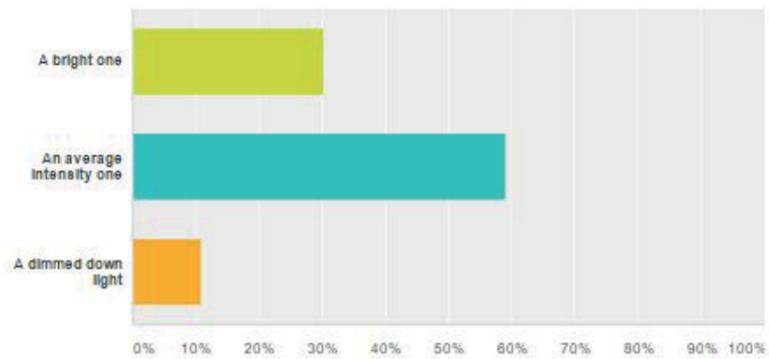
Answer Choices		Responses	
▾	A bright one	30.22%	42
▾	An average intensity one	58.99%	82
▾	A dimmed down light	10.79%	15
Total			139

Do you prefer direct or indirect lighting?

Answered: 139   Skipped: 0
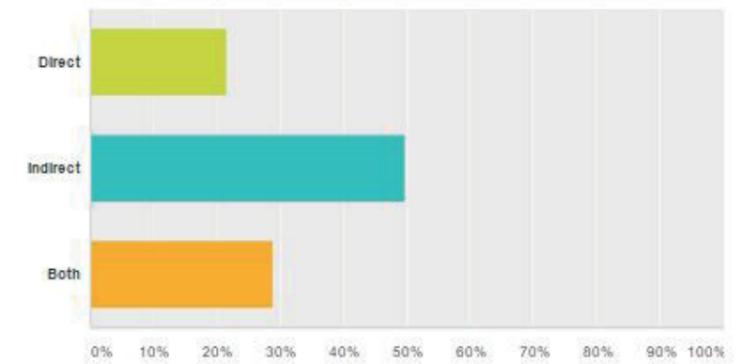
Answer Choices		Responses	
▾	Direct	21.58%	30
▾	Indirect	49.64%	69
▾	Both	28.78%	40
Total			139

Interview with Mikkel Bille

After the intrductions and a brief explanation of the thesis concept the questions begin:

Mikkel - So with what would you like to begin with?

Group - We read some of your papers and the anthropological perspective of light and we have some questions to ask. From your opinion can you define the different lighting cultures? Do you see the lighting cultures as a different subject, or do you perceive the d
various countries?

Mikkel - One of the things that i sometimes discuss, especially with architects and lighting designers is that they have this idea of Nordic lighting, and i have no problem with that
they are often making is that because we are all the way up north we have this kind of cossy lighting and further south you have shorter nights and shorter transition time and thats why you have this kind of light. What im saying is that i understand the arquement but i just dont completelly agree you take Copenahgen the sun sets the same way as in Norway and they have the same latitude as Eastern European countries but they have different kind of lighting in Scotland or in Riga
that the light is determined by the geographical position of the country is almost right but not completelly right. There is something more to it.

Secondly i would say that i think its very problematic to say that there is a national lighting cultur
That, for example, danish lighting stops at the borders of Germany and the germans l
from the border have a different taste in lighting. What happens is that some nations or some cities take strong appreciation of the light that they are having. In Denmark we talk a lot about lighting and even though in Sweden they may have the same light they dont talk that much about it. In the same way you have cities like St.Petesburg where they have white nights and they talk a lot about it but the neighbouring cities also have the same white nights but they just dont talk so much about it.

So the idea of having italian lighting or danish lighting culture, i dont think that it
I think there is a need of a way of saying the idea of a national lighting
often see is lighting practises that are related to something like social class. If you are upper class in Denmark for instance, you have a certain type of lamp which shows some certain kind of light and if you are lower class you would have other kind of light. Basically
important also to look at things like social class or whether is someone living at an urban area or at the countryside. So the concept of having one lighting culture is tempting but i also think its a bit problematic.

It is also very important to see what kind of meanings are these lights part of. I've heard of a presenation once about lighting in Athens, Greece where they have this economic crisis and you would suppose that people turn off lights and they were, but in some of the more rich areas there were people who were lighting up their places to demonstrate the fact
the way of illuminating a house is not only based on the abillity to see but it is also a way of showing off. Additional meaning to thats is that they feel more safe, more spiritual things if they are religious etc. The green lighting in Jordan for example is part of a more religious thing

> **- At this point, unfortunately, the group experienced some technical problems that went unnoticed and as a result a big part of the interview's recording is missing**

Interview