Degree project in Architectural Lighting Design
Second cycle 15 credits

Fos Contemplative
Role of (day)light in creating a calming interior spatial atmosphere.

MARIA ZOI CHANTZOPOULOU
Fos contemplative

Role of (day)light in creating a calming interior spatial atmosphere.
Fos contemplative
Role of (day)light in creating a calming interior spatial atmosphere.

Author | Maria Zoi Chantzopoulou
Tutor | Diana Joels
Course Responsible | Federico Favero
Teacher | Foteini Kyriakidou
Programme director | Rodrigo Muro Avendano
Examiner | Ute Besenecker

*Pictures and illustrations belong to the author unless otherwise stated
Acknowledgements

This endeavor would not have been possible without Diana’s constant support, encouragement, and inspiring ideas.

I would also like to thank all the Master thesis for their invaluable knowledge and guidance throughout the Master. Finally a big thank you to my loved ones for the love and support through my journey so far.
Abstract

This thesis explores the light qualities that generally imbue a contemplative and calming atmosphere and in what extent these qualities can be adjusted and applied in an existing indoor space. Starting point of the thesis are the vigorous pace of everyday life and the necessity of temporary breaks for internal calmness and contemplation. In the present thesis contemplativeness is devoid of any religious connotations and embraces a more general state of calmness and introspection.

In terms of creating a (contemplative) spatial atmosphere the transitional nature of daylight subtly indicating the passage of time and seasons is indeed a pivotal factor. In search of the main contemplative factors a questionnaire was handed. Firstly, participants were asked about the spatial qualities of the spaces they choose to contemplate, and then they had to choose between a predefined selection of spaces. A second questionnaire was created to further explore these contemplative (day)light qualities. The results noted nature as an important element of contemplation along with the concepts of tranquility, orientation, and privacy among others, a toolbox which guided the project phase within an existing meditation space in KTH.

Finally, this thesis suggests that the outcome of the interplay between (day)light and nature offers an important insight in both the fields of light and architectural design and discusses how light qualities observed in nature can be adjusted to create the same contemplative feelings in indoor spaces.

Keywords: introspection | ambience | perception | daylight
1. Introduction

The starting point of this thesis is the consciousness that, the fast-paced life we are leading today, leaves minimum to no time for decompression and introspection. No doubt, ‘we live in a society that demands constant productivity’ (Hayes, 2022). ‘Sometimes, people say it’s just a matter of getting older, having more responsibilities or over-scheduling ourselves with too many activities. Some say technology has a whole lot to do with it’ (Nicolai, 2012). Similarly, to the rabbit in Alice in Wonderland, we are always running behind an unspoken, daily timeline. It is evident therefore, that sometimes a break, a small pause from this excessive pace, is necessary and much needed. To achieve this momentary pause, there are various places where people choose to go, like the beach, a church, or a park which often serve another use, far different from the space for introspection people can use them for.

Inspired by a recent conversation about cemeteries (figure 1) and churches being possible contemplative places, I started wondering what is the common factor between these seemingly different locations. Their architectural typologies vastly differ; thus, it can be suggested that the common factor between them can be an intangible element, which cannot be seen, yet it can be perceived. ‘Usually we see light merely as a medium of vision […] when, there is no true architectural experience without light. […] Light is the strongest conditioner of the atmosphere of place, the most comprehensive criteria of the character of space, place and setting’ (Palaasma, 2016). More often than not, light is taken for granted, it is not considered as an independent design element while in reality, every space, indoor or outdoor is experienced through it. ‘We still use ‘see’ to mean ‘understand’, and ‘understand’ carries all the implications of position, orientation, intent, foreground/background (importance/context), nuance, etc. that are the substance of visual perception’ (Steane, 2011). ‘Beevar and Blossom (2009) suggest light contributes to a composition of design elements and principles in the built environments’ (Dugar, 2016). It creates a visual hierarchy, directing the eye from one element to the other in a space, revealing textures and design elements. Of course, light is not a one-dimensional element which can be described only by the terms bright and dimmed. As Liljefors (1999) suggested, the light in a space can be evaluated through the 7 factors of V/P theory. It can therefore be suggested that in creating the ambience of the space, light is a pivotal factor.
Cemeteries are often used as contemplation spaces and retreats from strenuous daily rhythms. The silence of the landscape along with the reminiscence of the inevitable death creates a feeling of introspection and reflection.
1.1 Relevance and aim

In the words of Peter Zumthor ‘(day)light adds a layer of wonderful depth’ (Zumthor, 2006). Changes in light’s CCT, distribution and intensity can directly affect a space’s serenity or cheerfulness, tranquility, or tension. The unique atmosphere of each space is created through the interaction of light with the other architectural or natural elements. Nonetheless in the case of contemplative spaces, apart from “revealing” the main function of the space, light creates a second almost spiritual layer of light conditions that inspires reflection and introspection. More often than not, it appears that these places of contemplation are exterior. However, since easy access to the ideal outdoors contemplation space is not always possible the need for such interior spaces is eminent. Therefore, how are the light conditions that inspire introspection outside, interpreted and adjusted in an interior space? Combined with the etymological explanation of the Greek word ‘fos=light’, could it also be suggested that light already possesses an atmospheric quality?

fos, φως
[phos] | greek, noun

etymologically derives from the syllable φάος[phaos], and the verb φαω[phao] which means to illuminate, to shine.
alternatively,
Derives from verb φαίνω[pheno]=bring to light, reveal and p.v, φαίνομαι[phenome]=I am coming to light (Mandulides, 2009)

Figure 2: Etymology of the word “fos”.

1.2 Main research question

Main research question:

1. what is the (day)light’s contribution in creating a contemplative atmosphere in an interior space intended for self-reflection?

Secondary questions:

1. in a space already designed for contemplative purposes, what qualities of daylight are/should be taken into account?
2. which aspects of the interaction between light and other elements (textures, nature) inspire contemplation?
1.3 Sustainability statement

In general, ‘good health is fundamental to enabling people to achieve their full potential and contribute to the development of society’ (‘Goal 3: Good health and well-being’, 2015). The term ‘health’ refers to both physical and mental health. Several studies have shown that, during and after the COVID pandemic, mental disorder rates have steeply increased and as a result a greater care for people’s mental health is important (Public Health Agency of Sweden, 2022). This thesis’s primary focus therefore will revolve around goal no.3 good health and well-being. Of course it can indirectly affect other goals such as no.10- reduced inequalities, by providing flexible solutions to users, so they can achieve their desired atmosphere and no.12 sustainable production and consumption since the thesis’s main focus will be natural light and artificial light will have a complimenting role.

Figure 3: Sustainability goals
2. Methodology

The main aim of this thesis is to explore the potential of light as a contemplative element and then use these findings to enhance the atmospheric quality of an existing contemplation space. Although research and case study focus will be mainly based on a room, findings are not expected to be limited to a space, but rather be part of a greater toolbox for the design of such places for reflection.

The first part of the thesis consists of a short literature review and a questionnaire (check Appendix A) regarding contemplation spaces. The literature review intends to set the foundation regarding the contemplative power of (day)light as well as to define important terms that will be used throughout the thesis. Turning now to the questionnaire, it is used to understand any tendencies that exist between spaces chosen for contemplation. It was given to people of different professional and demographical backgrounds to attain a wider range of answers. The first part of the questionnaire consists of both qualitative and quantitative questions. Concerning the qualitative questions, they are mostly open questions, regarding personal preferences for contemplation and introspection. The quantitative ones are natural light focused and use a 5- or 6-point Likert scale. Their goal is to check and/or anticipate some assumptions about some light qualities of contemplation spaces which will serve as guidelines in the project phase of the thesis. The second section is a choice between pairs of potential contemplative spaces. Following the completion of the questionnaire, analysis of the results will follow, and the main contemplation guidelines and elements will emerge. Continuing in the project phase, the first step is the evaluation-analysis of KTH Kontemplationsrum. The choice of this space was made mostly because it is already used as a contemplation space thus, it will be interesting to see in what extend it complies with the theoretical analysis results. Moving on, with the use of the contemplation guidelines and the feedback from the interviews, there will be some experimentation to enhance the contemplative atmosphere in the KTH Kontemplationsrum.

2.1 Limitations

This thesis is unable to encompass both natural and artificial light due to the 10 weeks timespan. Therefore, in order to produce more complete results, the main focus will be given in the (day)light part. Nevertheless, since the chosen space for experimentation is situated in Sweden characterized by long periods of darkness during autumn and winter months, artificial light will be considered as a complementary element. Nevertheless, although the main task of this thesis is not to primarily examine the contemplative power of artificial light, any proposals given will remain in a conceptual level.
(day)light as a contemplation stimulus

Questionnaire I.
participants from different demographical and professional backgrounds—wider range of answers

Questionnaire II.
Further analysis of questionnaire I conclusions—understanding lighting conditions in an outdoor space

Studying questionnaire results
important contemplation elements | tendencies
contemplative factors
evaluation of the room (V/P theory + these factors)

space | KTH silent room
analysis of the room
daylight qualities—orientation | views | materials
light zones | V/P theory evaluation | daylight hours |
shadow analysis | Contemplation factors from the questionnaires
what does and what doesn’t work sketches, plans etc

Project time
Proposal
Discussion
Results
Next steps
(probably brief stating in the thesis)
if timeframe allows it

Figure 4: Methodology process diagram
3. Background

3.1 Definitions

The term (day)light will be used in this thesis with the parenthesis. This is because, although this thesis’s main focus will be on daylight, the light conditions in a space change throughout the day. As Geddes suggests, ‘absence of natural light signifies a distortion of the perception of time’ (Geddes, 2019). There is an emotional input in light and a direct connection between light and how we perceive the passage of time, seasons, and the transition of weather. In that sense, artificial light rather compliments than dominates daylight as the transition from day to night is gradual and subtle. Thus, regarding them as two sides of the same coin, (day)light will be used, trying to encompass this transitional nature of light.

Before going any further, it also is necessary to clarify exactly what is meant by the term “contemplative space”, based on a literature review as well as my personal intake. In the present thesis, a “contemplative space” is defined as atmospheric, spiritual space provoking a sense of ephemeral detachment from the hustling everyday life. Although spiritual is usually linked with sacredness, in this thesis it is used in its broadest sense to include an internal, intangible process of re-orientating one’s self. ‘Here, contemplative space is considered as a space where nothing is trying to coax you away, where you can simply be’ (Zumthor, 2006) (figure 5), a space for reflection and introspection. This definition is close to this of Corr (2018) who describes the “contemplative experience” as ‘the physical, psychological or spiritual experience of an individual which transcends modes of routine behavior, thought and perception, prompting a state of reflection upon and recognition of the profound, the liminal or the sublime aspects of our existence’ (Corr, 2018).

![Figure 5: Therme Vals, Peter Zumthor | © Fernando Guerra](image)

In Therme Vals, Zumthor handles daylight poetically and skillfully. Subtle gaps between the volumes of the room let the daylight inside the space, thus creating a mysterious and spiritual atmosphere which connects with the symbolical character of baths as cleansing means for both body and soul. The interplay between the stone, the water and the glimpses of daylight instills feelings of relaxation and calmness.
3.2 The atmosphere of the space

‘The atmosphere is the very first impression of a place, [...] we grasp the atmosphere before we identify its details or understand it intellectually’ (Pallasmaa, 2014). All these possible contemplative places, they can be interior or outdoor, a church, a forest, or even a sunny beach. A common element in those seemingly different spaces, is their introspective character. Apart from their primary function arises the “need” to be atmospheric and inspire internal reflection. But the so-called atmosphere or ambience of a space is not a feeling restricted in vision, or hearing but it is rather a multisensory, subconscious and not, experience. In that context, light, a giver of all presences as Louis Khan regarded it, connects all the pieces of the puzzle, tangible spatial features and emotions, it creates a balance of light and shadow, a spatial harmony, while the “mysteriousness” of shadow (Schielke, 2013) inspires silence and exaltation. ‘Light is a paradoxical material that exists simultaneously as both a physical and metaphysical condition [...] it bridges the gap between the world of the immaterial, the atmospheric, with that of the physical, the concrete’ (Amour, 2012).

‘Thinking about daylight and artificial light | have to admit that daylight, the light on things, is so moving to me that | feel it almost as a spiritual quality’.
(Peter Zumthor | Atmospheres)

3.3 Daylight as a contemplative element

Central to the entire concept of contemplativeness is the concept of daylight. ‘From humanity’s very beginnings, the sun has governed both [our] bodies and [our] experience[s] of the world[...]Most people are instinctively drawn to sunlight’ (Geddes, 2019). For Peter Zumthor, ‘light is an element beyond understanding’ (Zumthor, 2006), it is intangible and unparalleled. Natural Light is an important aspect of contemplation spaces and, as Juhani Palasmaa puts it, ‘plays a vital role in the symphony of [our] senses, is a precondition for human health, and gives [us] a sense of space and time’ (Palasmaa, 2016). Additionally, he argues that that ‘natural light brings life into architecture and connects the human world with otherworldly dimensions’ (Palasmaa, 2016). In the same vein, Amour (2012) suggests that ‘light is a powerful force that instills the architectural space with character and life, while its immaterial aspect “elicits a sense of wonder” and intrigue in the built form’ (Amour, 2012). Similarly Chamilothori (2018) has investigated how different façade patterns can affect spatial ambience as well as peoples’ emotions and their perception of space. In a space, this contemplative element comes from the harmonic interaction between the permanent (textures, furniture, spatial elements) and the ephemeral, meaning the transitional nature of light. Throughout the day, light interacts with the other elements of the space, creating a multisensory experience. Light is shifting, it changes according to time of the year and according to season, thus powerfully indicating the passage of time.

Synthesis

1. Indicator of temporal | seasonal change
2. Great emotive power
3. Creator of the spatial “atmosphere”
4. Connects the material and the immaterial
5. Variations in intensity ---> “mysteriousness” of shadow (Schielke, 2013)
6. Interaction with other spatial elements (architecture, textures etc) -----> contemplativeness

Figure 6: Background Synthesis, Summarization of Findings from background section | Qualities of light as a contemplative element
4. Research+Findings
4.1 Questionnaire 1 findings - Observations

4.1.1 Section 1

In total, 43 people answered the questionnaire. The participants are coming from both Southern and Northern hemisphere and the majority comes from the Southern. They have varied professional backgrounds.

**Question 2**
If during the day you wanted to decompress where would you go? (Describe this space in a few words)

In this first open question participants were asked to describe a space they would choose to go, whenever they felt like they needed to decompress throughout the day. In describing their preferred space of contemplation, 2/3 of the participants described an outdoor space. Another important finding was that 26 of them mentioned nature (sea, forest, mountains, lake, garden) and 12 connected contemplation to a physical activity such as a walk or playing sports (check Appendix A for complete answers).

**Question 3**
Which feature(s) of this space make you feel contemplative? (Try to select 3 or 4 max.)

- openness
- tranquility
- views
- proximity to nature
- textures/materials (if the space...)
- privacy
- darkness
- daylight
- colours
- maybe dimmed but not completely dark
- cozy
- silence
- movement

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>openness</td>
<td>26 (60.5%)</td>
</tr>
<tr>
<td>tranquility</td>
<td>24 (55.8%)</td>
</tr>
<tr>
<td>views</td>
<td>23 (53.5%)</td>
</tr>
<tr>
<td>proximity to nature</td>
<td>25 (58.1%)</td>
</tr>
<tr>
<td>textures/materials (if the space...)</td>
<td>16 (37.2%)</td>
</tr>
<tr>
<td>privacy</td>
<td>11 (25.6%)</td>
</tr>
<tr>
<td>darkness</td>
<td>10 (23.3%)</td>
</tr>
<tr>
<td>daylight</td>
<td>11 (25.6%)</td>
</tr>
<tr>
<td>colours</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>maybe dimmed but not completely dark</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>cozy</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>silence</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>movement</td>
<td>1 (2.3%)</td>
</tr>
</tbody>
</table>

Graph 1: Geographical backround of questionnaire participants

Graph 2: question 2 | results
In the second question participants had to prioritize 3 or 4 important spatial contemplation elements. From the chart above, it can be seen that by far the most prominent contemplation feature is openness, followed by proximity to nature, tranquility, and views. Privacy was also deemed as a quite important factor. The results support the findings of question 1. Interestingly, only 17 of the participants indicated daylight as an important contemplation factor, although it can be suggested that all the previous factors mentioned above, imply and/or include daylight.

**Questions 4 | 5**

4. How bright would you prefer/expect this contemplative space to be?
5. Would you expect this brightness to be even and uniform in the space or you would rather prefer a gradation of brightness in the space with some darker and some brighter zones?

![Graph 3: question 4 | results](image3.png)  
![Graph 4: question 5 | results](image4.png)

As shown in graph 4 there is a general preference for brighter spaces although it is not that prominent and there is a good amount of people that chose a darker space. This can be related to the different responses in Question 1. which already indicated a certain variation in brightness levels. Graph 5 shows that there is a clear tendency (37 participants) for different light zones in the space in favor of a uniform level of brightness.

**Questions 6 | 7**

6. What about the shadows? How soft or sharp you would expect the shadows to be?
7. From scale 1 to 5 how warm or how cool would you expect the space to be?  
   (in terms of general ambience NOT temperature)

![Graph 5: question 6 | results](image5.png)  
![Graph 6: question 7 | results](image6.png)

Regarding the character of shadows, the answers are distributed along the scale, however most participants seem to prefer more diffused shadows than sharper. Regarding the general ambience of the space there is a clear preference for warmer spaces.
Question 8
According to you, how important is the presence of natural elements (trees, water etc) in proximity to a contemplative space?

From graph 9 it is crystal clear that the presence of natural elements is considered as a pivotal contemplation factor. This fully accords with the results of questions 1 and 3 where proximity to nature was chosen by the majority of participants.

Question 10
Do you think that coloured glass (for example like the one in the picture) would add to the contemplative atmosphere?

4.1.2 Section 2

In this section, participants had to select the most contemplative space, between the following pairs of spaces. Only interior spaces were selected since, the research question concerns an indoor space. Their choice was made to further test and expect some contemplative elements such as proximity to nature and views already mentioned in section 1. Nonetheless, one of the goals of this part was for the choice to be spontaneous so no further explanation or description were given.
The second section of the questionnaire supports evidence from previous observations made in section 1. For example, set 1. reflects the preference for brighter surroundings and close proximity to nature and views, while providing privacy and protection. Views in particular are further support the findings of question as indicated in sets 2.3.4. Regarding sets 2, And 3 there is a clear preference for a generally brighter space who provides a clear view outside. What’s more it can be argued that even the orientation of the seating space is an important factor to be considered. In both 2 and 3, it can be assumed than a seating space towards the main view is considered to enhance the spatial contemplativeness .Concerning set 4, most people preferred space b although it could be considered more maximal than space a. If we relate it with the concept of view and openness however, although space a is warmer and more minimal, it “forces” the visitor to sit and interact with the other people using the space. Moreover, although the forest almost surrounds the space, it cannot be seen directly while a person is in the space, unless they look up.

Similarly, sets 5 and 6, echo previous observations regarding the general ambience of the space as well as openness and views. More participants selected the warmer space, with softer textures and a warmer colour palette. For set 5, it can be suggested that the preference for space a (31 participants) can be linked to the views. Similarly at sets 6 and 7 views seem to prevail since in both cases most participants selected the space providing them with a view outside and the presence of natural elements.
Questions 18

Last but not least, if you should summarise the most important spatial qualities for a contemplative experience in 2 keywords, which ones would you choose?

Short answer text (2 keywords of choice)

This last question constitutes the conclusion of the survey and helps solidify and extract some assumptions about (day)light as a contemplation stimulus. Study of the questionnaire results and evaluation of terms used throughout the process has resulted into these 7 contemplative features which will be used as “guide-lines” in the project phase that follows.

Synthesis

Most mentioned words:

- openness: 7
- brightness: 11
- view: 6
- large: 2
- simple: 2
- light: 2
- privacy: 4
- nature: 16
- cozy: 2
- tranquility: 2
- silence: 2
- warm: 2
- minimal: 4
- shadows: 2

Contemplation factors:

- views
- openness
- brightness
- orientation
- proximity to nature
- tranquility
- privacy

Figure 7: Question 18 | results

Figure 8: Questionnaire 1 Synthesis
4.2 Questionnaire 2 findings - Observations

Questionnaire 2 was not initially planned. However, questionnaire 1 results showed a clear preference for outdoor spaces. Therefore, an extra question was necessary in order to evaluate and understand the lighting conditions in the preferred outdoor spaces and try to translate and adjust them in an indoor space at the project phase. Questionnaire 2 comprises of one single multiple-choice question and was answered by 54 participants. The participants were asked to choose their preferred space to contemplate out of the 5 choices shown below. Choice of the 5 pictures corresponds to the most mentioned spaces in question 2, of questionnaire 1 and a personal calming experience in those places. Choices 4 and 5 were the most preferred ones.

Figure 9: Questionnaire 2 | choices

4.2.1 V/P Theory evaluation

Figure 10: Choice 4 | chosen by 23/54 participants

Figure 11: Choice 5 | chosen by 15/54 participants
Both environments are quite high contrasting environments in terms of light levels. Light zones are distinguishable and varying in brightness especially in option 4. There is an interesting correlation between the concepts of openness and privacy in option 4. The place is a bright clearing and lake shore is very much bright, yet it can be assumed that the clusters of trees provide an illusion of privacy, which, as indicated by the results of the first questionnaire is an important contemplation factor. The daylight penetrating the foliage of the trees, creates an intriguing play of light and shade in the ground, with defined shadow and light patterns in constant movement due to the wind. In option 4, there is a layering of elements framing the main viewpoint—the lake, while in option 5 it could be said that one is surrounded by the view. This is a very interesting result as it could indicate that consecutive “framing | filtering” layers create a feeling of privacy, protection, and enclosure while at the same time permitting visual escapades to the main view. It could also be assumed some sort of vertical boundary is deemed as an element of privacy. In other words this can be further supported by the preference for option 4 where the vertical element reigns in comparison with option 5. Once again, a warmer colour palette is preferred.

Figure 12: Evaluation and observation of (day)light qualities
Figure 13: Diagrammatic representation of filtering daylight, verticality, perforation and framing
4.2 Background and questionnaires Synthesis

**Synthesis | Background**

Light as a contemplative spatial element

1. Indicator of temporal | seasonal change
2. Great emotive power
3. Creator of the spatial “atmosphere”
4. Connects the material and the immaterial
5. Variations in intensity --> “mysteriousness” of shadow (Schielke, 2013)
6. Interaction with other spatial elements
   (architecture, textures etc) ----> contemplativeness

**Synthesis | Questionnaire I**

Most mentioned words:

- openness: 7
- brightness: 11
- view: 6
- large: 2
- simple: 2
- light: 2
- privacy: 4
- nature: 16
- cozy: 2
- tranquility: 2
- silence: 2
- warm: 2
- minimal: 4
- shadows: 2

Contemplation factors:

- views
- openness
- brightness
- orientation
- proximity to nature
- tranquility
- privacy

**Synthesis | Questionnaire II**

(Day) | light qualities

1. perforation | filtering
2. (distinct) organic natural shadow patterns
3. medium contrast
4. verticality ≥ horizontality
5. framing | fragmenting the view
6. natural, warm colour palette and colour of light
7. quite diffused shadows

*Figure 15: Overall synthesis*
Perforation, Filtering and framing are tools to shape openness, views and privacy, this is why they are presented in the toolbox and not as separate contemplation factors. This is the case for light zones, shadows and seasonality. Both are tools for enhancing one or more contemplative factors illustrated above.
5. Case Study | The Space | KTH Kontemplationsrum

Lindstedtsvägen 17, 4th floor
Opening hours: Monday-Thursday 07:00-20:00, Friday 07:00-19:00

According to KTH webpage, ‘the Silent Room is open to all KTH students who need a pause in life, for spiritual rest, contemplation, and meditation’ […]. It is also used as a prayer room, primarily from the Muslim students throughout the day.

- ‘The room is open to all KTH students, regardless of gender, gender identity, gender expression, ethnic origin, religion, faith, sexual orientation, disability, or age’. (KTH, n.d.).

5.1 V/P Theory evaluation

During the day, the space is pleasantly bright, however the light distribution is rather uneven compared to nighttime. During the day, the space receives ample direct sunlight, even in winter, and this results to some significantly darker and brighter light zones in the space. In the day, the shadows are really diffused and smooth while at dark they are rather defined. The space appears to be quite cool during the day, but the warm CCT of artificial light makes it warmer after dark, or generally when it’s on. Yet, this results in a more saturated appearance of space colours and textures than they actually are.
5.2 Daylight analysis

21st June

21st December

21st March

Figure 21: Kontemplationsrum, Sun-path and daylight hours

It is clear from figure 21 that the space gets ample direct sunlight throughout the year and especially in spring and summer months. It also gets a sufficient amount of indirect sunlight which, during winter probably needs to be complemented by artificial light.

5.2.1 Shadow analysis-Light zones

Figure 22: Kontemplationsrum, Shadow analysis

As for the shadows as shown in figure 22, they are quite sharp, as Kontemplationsrum receives direct (day) light in the morning and they are shorter in the winter and longer in the summer.
5.2.2 Light zones

Figure 23: Kontemplationsrum, Sketches of light distribution and Light zones

Figure 24: Kontemplationsrum, Light zones plan and section

Plan courtesy of KTH, adapted by the author. There are 3 distinguishable light zones and out of them, the darkest appears to be in the perimeter of the room.
5.3 Design
5.3.1 Inspiration board - Vision statement

>> Using the case study space as a design space. How can the contemplative-ness be enhanced in a space that is already used as a meditation space? <<

Figure 25: Inspiration - Concept board
5.2.2 Contemplativeness evaluation

The seats are oriented facing one another and not the view. It can be assumed that, in that way they encourage interaction which may be contrary to the privacy factor.

As one moves closer to the window, they can see the parking lot which takes the attention from the trees in the background. The further from the window, the better the view.

Adequate, by bearing in mind that this is a space in an existing old building.

The space is situated in the end of the corridor and quite far from the study space. Consequently, tranquility is one of the strong assets of this space as well as an adequate degree of privacy. However, due to its small size, it enforces interaction which could be suggested that it’s a rather non-contemplative element based on the questionnaire findings, but further research and feedback needs to be provided.

The space receives an ample amount of daylight. Nevertheless, the presence of shades and artificial light, permits customization of brightness according to preferences.

Ivy plant in the building façade and deciduous trees in the background.

It is a rather small space, and unofficially it is used by one person, or small groups of people.

Figure 26: Kontemplationsrum evaluation

Figure 27: First ideas
5.3.2 Intentions

- The window is a central point of this space. It is interesting to try to “bring the nature closer” since it can be assumed by the questionnaire results that the interaction between the light and natural elements is one the most contemplative factors.
- Framing of the view so that the weak point—the parking lot, isn’t that much visible.
- Accentuating | Extending (day)light hours, complimenting with artificial lighting solutions.

the praying zone
- During the visits to the Kontemplationsrum, I observed that Muslim students use this place for praying during the day. Though the spiritual/religious dimension of (day)light is not the primary concern of this thesis, it makes sense to integrate this second use of the space into the final proposal.

Figure 28: Intentions
As mentioned above, orientation to the view is very important. Thus, a rearranging of the seating space (figures 29, 30, 31) is proposed in order to “recreate” the frame for the main view and enabling people to enjoy the daylight. Majority of participants preferred a warmer spatial ambience, and this was further supported by Questionnaire II. From V/P Theory the space in the morning seems quite neutral to cool while at night with the warm CCT of the artificial light, it feels warmer. Consequently, a warmer wall colour is proposed, a very simple but effective solution in order to “warm-up” the spatial ambience of the space.

Figure 29: Proposing a sitting space in front of the window
The goal is to frame the natural view and “blocking” the view of the parking lot under the window.

Figure 30: Proposed sitting space no2 and flexibility for seating

Figure 31: Proposed sitting space no1
Framing the view of trees outside
In order to provide a first layer of filtering of the view as well as a natural shading I am proposing the natural growth of the ivy plant (figures 33, 34) that climbs the wall of the building façade over the window (figure 32). Its branches and leaves create a perforated layer of smooth movement throughout the seasons and bring the nature closer to the interior space.
Since altering the size and number of openings is out of question for the specific room, mirrors open the visual field of the viewer by enlarging and widening the view (figures 35, 37, 38, 39). What’s more, (day)light reflected on the mirror increases the brightness of the room (figure 36, 37).
Overall concept

Finding the ideal exterior space to contemplate is a simple process. Similarly, the main intention of the project phase was to use simple accessible and affordable solutions in order to enhance contemplativeness. Visualisations are presented in figures 40-44. More complex solutions could be studied as a next step in the research.

**Figure 40: Overall concept**
3.3.3 Visualisations

Figure 41: Kontemplationsrum, sunny autumn day
Mirrors on the sides of the window visually “open” the space and permit the observation of the sun and changes in colour and intensity, as it casts light on the opposite wall of the building. They also help brighten up the space as they transfer direct and indirect (day)light in the room. Ivy growing outside the window filters incoming daylight thus reducing unwanted glare and creating interesting patterns on the walls. Curtain provides an extra layer of filtering (day)light as well as one of privacy.

Figure 42: Kontemplationsrum, sunny summer day
Mirrors also create a play of reflections as direct light falling onto the walls is reflected in the mirrors. With the change of light during the day, the space has a sense of subtle movement and transition. Mirrors on the side walls and ceiling also reflect the leaf natural patterns by transferring them in the room thus enhancing the contemplative atmosphere and the proximity to nature. The mirror in the right corner subtly highlights the praying zone* as reflects the changing sunlight patterns in the opposite wall. The mirror is located in the direction of Mekka.

*Muslim students use Kontemplationsrum for praying everyday after sunrise, midday, midway of afternoon and after sunset.
The Ivy plant outside the window brings nature even closer in the space and provides a feeling of being in nature. Subtle movement of the leaves with the wind instills tranquility and their view is visually enhanced with the help of the mirrors. The falling and blooming of leaves alters the filtering effect and increases the transitional and contemplative atmosphere of the room.

Due to its eastern orientation, Kontemplationsrum receives direct (day)light all year long. However, its intensity and angle varies according to weather and season change. In that context Kontemplationsrum is an ever changing and transforming space as, the experience of (day)light in it, changes with time and day. Differences in (day)light and the patterns that are formed on the walls of the room, shape a unique contemplative experience every day.
5.3.3 Artificial Light Concept

A further development of this endeavor would be an artificial light study. Artificial light in Kontemplationsrum is needed, especially between mid-autumn and spring where daylight hours are limited. Simple subtle and dimmable are the keywords for the artificial light concept. Artificial light is intended to hold a complementary role by accentuating the contemplative feeling (day)light creates in Kontemplationsrum and keeping its transitional character as shown in figure 45.

Figure 45: Kontemplationsrum, overcast winter day, need for artificial light

By using and adapting design principles such as perforation, framing already mentioned above artificial light will compliment (day)light when it is needed. As seasonality and temporality of (day)light are important factors of contemplation a dimmability option to enable flexibility of users, as well as varying scenes could be implemented to extend the contemplativeness of the space beyond (day)light hours.
6. Final observations-Discussion

As already mentioned above, this thesis arises from the consensus that nowadays, spaces of retreat from the vigorous reality are necessary. Since access to the ideal contemplative environment isn’t always possible, it is even important to understand and interpret the contemplative daylight qualities of an outdoor space, and how they could be interpreted and adjusted. After summing up research findings and forming the design toolbox, discussion is structured according to the 7 contemplation factors noted: orientation, views, proximity to nature, openness, tranquility, privacy and brightness.

6.1 Orientation

From both questionnaires, it was evident that viewpoint orientation is of great importance. In fact, most participants, chose a darker standing point facing a brighter view in questionnaire 1’s second section. It could be suggested that the contrast between a darker and a brighter lighting zone, adds depth in space and acts as contemplation “activator”. As a result, a rearrangement of the seating space in Kontemplationsrum was proposed so that people sit facing the main (day)light source, the window.

6.2 Views- The importance of window

One of the important aspects of the window is the framing of the view and letting (day)light in the space. Patterson (2011) argues that ‘a view can be an anchor’; this can be interpreted as a point of focus for the space. In Kontemplationsrum, the presence of a window establishes a clear visual hierarchy and distinct light zones which guided and greatly affected the design phase. ‘Windows are important mediators between the inside and the outside’ (Patterson, 2011). It could be suggested that the presence of windows corresponds to the primitive need to be “en plein air”, in touch with nature. For Kellert, interaction with nature is critically important to human well-being and development. ‘When it comes to indoor spaces, interaction with natural environment primarily comes through the window and the light that passes through it’ (Kellert, 2005). In fact, incoming (day)light fills the space and acts as a powerful indicator of time and seasonality. In that context, Heerwagen suggests that the variations in intensity and colour of daylight, its absence at nighttime and its extension during summer affect behaviors and emotions (Heerwagen, 2011). In Kontemplationsrum, the window also acts as a visual relief: the subtle movement of vegetation and people passing by, the play of (day)light with the foliage of the trees and the shadow patterns that are formed, create a visual interruption from the homogenous texture of the interior walls. Views of the sky, nature and daylight become the heart of the contemplative experience.

6.3 Privacy-(Gradual-customisable)Brightness

At the same time, the window creates a distinct barrier between interior and exterior; the glass acts as a protective filter as it enables a detached observation of reality without the need for the observer to act and be part of it. It constitutes a visual and sound barrier between the person and the outside world; one can observe the ongoing reality outside but at the same time remains unaffected. Enclosure and privacy was stated by Olszewska et al. as a contemplative landscape element (Olszewska et al., 2016) and one of the most repeated terms in question 10 (See Appendix A). Privacy creates an ephemeral state of pleasant stillness; although privacy is mostly achieved by the architectural elements of space, their interaction with (day)light enhances that effect with the gradation of shadow which creates different light zones and adds layers of depth in the space. Privacy is strongly connected with the component of (adjustable) brightness. Elements like blinds, curtains, screens or a layer of vegetation over the window (figure 41, 42, 43) permit the adjustment of the amount of incoming (day)light thus enabling the user to create a space that feels comfortable for them to be in.
6.4 Openness

Openness ostensibly contradicts privacy. Regarding an interior space like Kontemplationsrum, while privacy implies a connection with the indoors, openness creates a direct link with the window and the outdoor space. It hints the importance of the nature outside and an undisturbed 360° view. But how is openness achieved in an existing space where (re)designing the openings is out of question? Openness in an interior space can be literal, but it can also be experienced through the visual enhancement of the existing openings. The use of mirrors in Kontemplationsrum enhanced the openness of the space by providing multiple viewpoints to the outside view but it also enabled the optimal distribution to daylight in the space. Mirror reflections let users to experience the sun path during the day and enjoy extended (day)light hours.

6.5 Proximity to nature—towards a biophilic approach

As previously mentioned, throughout the course of the research, it became evident that proximity to nature is one of the most important elements and potential contemplation stimulus. The innate need to be close to nature fits the definition of biophilia hypothesis which is described as ‘the idea that humans possess an innate tendency to seek connections with nature and other forms of life’ (Rogers, n.d.). According to Kayihan (2018), ‘biophilic design is expression of the inherent human need to affiliate with nature in the design of the built environment’. Biophilic design is not a modern concept, as nature inspired themes have frequently appeared in art and design since antiquity. E.O Wilson has defined biophilia as ‘an innate tendency to focus on life and lifelike processes’ (Byrne, 2010). Heerwagen (2011) writes that the course of daylight throughout the day fits the definition of these lifelike processes E.O Wilson describes and thus, light on its own can be considered biophilic. Experimentation with mirrors in Kontemplationsrum accentuates this transitional nature of light by enabling the observation of the sun cycle on the opposite wall. What’s more, the proposal for the growth of the ivy plant in front of the window, further bridges the gap with nature. The vibrant and calming shadow patterns created, are the product of the filtering of daylight through the ivy leaves resemble to the ones observed and analyzed in questionnaire 2. Furthermore, additional work could be done in order to propose a screen pattern that enhances feelings of calmness and contemplation. Chamilothori (2018) has already thoroughly investigated such patterns in her paper* and reached some conclusions about calmness and excitement (Chamilothori et al., 2018, p.3). The pattern deemed as most calming could be suggested that resembles the motive of tree trunks in questionnaire 2, which was also deemed as a contemplative and calming environment. There seems to exist some connection between contemplation and verticality of frames and patterns, however more thorough and careful work needs to be done in order to establish a more concrete connection between them. Nevertheless, the calming effect of both patterns (tree branches on the one hand—a branchlike pattern on the other) could be a first design guideline in the enhancement of the contemplative atmosphere in Kontemplationsrum.

6.6 Tranquility

Back in questionnaire 1, tranquility was mentioned as the 3rd most important spatial feature that inspires contemplation.

The ever-changing nature of shadows and lighting zones implies the concept of movement and transience which, on their part, are also linked with the concept of biophilic design mentioned above. This can be further supported by the fact that most participants preferred a gradation of brightness in the space which is also connected with proximity to nature, openness, orientation, and views outside. In the words of Kaoru Mende, ‘shadow is the very essence of tranquility’ (Mende, 2018). Although the other six components are primarily perceived as visual, tranquility on the other hand also implies both acoustic, visual, and emotional stimuli. In that context, could it be that tranquility is an/the emotional outcome of the other six components?

*Façade design and our experience of space: the joint impact of architecture and daylight on human perception and physiological responses
7. Conclusions

The purpose of this thesis was to determine the role of (day)light in inspiring reflection and contemplativeness in an interior space used for contemplation purposes. Findings have shown that the (contemplative) spatial atmosphere is a multidimensional process thus the daylight cannot be isolated, for it is far more valuable to study its interaction its surrounding elements (natural or architectural elements and textures). In overall, background research and study of the questionnaire findings resulted in the aforesaid 7 components which were deemed as important factors for spatial contemplativeness. Although findings are based on a case study of Kontemplationsrum in KTH, the outcomes could be applied to other potential contemplative spaces. Such a strong connection with outdoors was not intended but questionnaires’ 1&2 outdoors-related responses led the research to that direction and outlined the importance of designing such spaces of retreat with a more biophilic approach. But let’s return now back to the matter of “fōs=light”... Background research, questionnaire findings and case study, conclude that light surpasses its illuminating function; As Beever and Blossom suggest, ‘light is the prime animator of space[...]Light renders space: without light, form, color, texture, and scale are unrecognizable’ (Beever and Blossom, 2009). In the words of architect Rick Joy ‘architecture cannot exist without light’ (Eliassen, 2018). It is both a powerful visual and emotional guiding force; Not only does light illuminate the space but it also creates the emotional, intangible catalyst that creates the multisensory self-reflection experience of a contemplative space.
This page intentionally left blank
8. References-Bibliography

Books


Conference Papers


Encyclopedia Article

Journal Articles


Patterson, D., 2011. A critical examination of ‘the window’ in art and architecture from Ancient Greece to the present day. Ejournal by Newcastle University, (10), pp.1–21.


**Magazine Articles**


**Theses**


**Webpage**


43
9. Table of Figures

Figure 1: Cimetière du Père-Lachaise | October 2019 ................................................................. 7
Figure 2: Etymology of the word “fos” ................................................................. 8
Figure 3: Sustainability goals ................................................................. 9
Figure 4: Methodology process diagram ................................................................. 11
Figure 5: Thermes Vals, Peter Zumthor | © Fernando Guerra ................................................................. 12
Figure 6: Background Synthesis ................................................................. 13
Graph 1: Geographical background of questionnaire participants ................................................................. 14
Graph 2: question 2 | results ................................................................. 14
Graph 3: question 4 | results ................................................................. 15
Graph 4: question 5 | results ................................................................. 15
Graph 5: question 6 | results ................................................................. 15
Graph 6: question 7 | results ................................................................. 15
Graph 7: question 8 | results ................................................................. 16
Graph 8: set 1 ................................................................. 16
Graph 9: set 2 ................................................................. 16
Graph 10: set 3 ................................................................. 16
Graph 11: set 4 ................................................................. 16
Graph 12: set 5 ................................................................. 17
Graph 13: set 6 ................................................................. 17
Graph 14: set 7 ................................................................. 17
Figure 7: Question 18 | results ................................................................. 18
Figure 8: Questionnaire 1 Synthesis ................................................................. 18
Figure 9: Questionnaire 2 | choices ................................................................. 19
Figure 10: Choice 4 ................................................................. 19
Figure 11: Choice 5 ................................................................. 19
Figure 12: Evaluation and observation of (day)light qualities ................................................................. 20
Figure 13: Diagrammatic representation of filtering, verticality and perforation ................................................................. 21
Figure 14: Questionnaire 2 Synthesis ................................................................. 21
Figure 15: Overall synthesis ................................................................. 22
Figure 16: Design Toolbox ................................................................. 23
Figure 17: Lindstedtstvägen 17 | © Google Maps ................................................................. 24
Figure 18: Kontemplationsrum, 20 April, 15:00 pm ................................................................. 24
Figure 19: Kontemplationsrum, 15 March, 19:30 pm ................................................................. 24
Figure 20: Kontemplationsrum, 25 May, 9:00 am ................................................................. 24
Figure 21: Kontemplationsrum, Sun-path and daylight hours ................................................................. 25
Figure 22: Kontemplationsrum, Shadow analysis ................................................................. 25
Figure 23: Kontemplationsrum, Sketches of light distribution and Light zones ................................................................. 26
Figure 24: Kontemplationsrum, Light zones plan and section ................................................................. 26
Figure 25: Inspiration-Concept board ................................................................. 27
Figure 26: Kontemplationsrum evaluation ................................................................. 28
Figure 27: First ideas ................................................................. 28
Figure 28: Intentions ................................................................. 29
Figure 29: Proposing a sitting space in front of the window ................................................................. 30
Figure 30: Proposed sitting space no2 and flexibility for seating ................................................................. 30
Figure 31: Proposed sitting space no1 ................................................................. 30
Figure 32: Ivy on the walls of KTH outside Kontemplationsrum ................................................................. 31
Figure 33: Ivy growing in front of the window ................................................................. 31
Figure 34: Sketches showing ivy growth and difference throughout the seasons ................................................................. 31
Figure 35: Sun-path ................................................................. 32
Figure 36: (day)light and mirror reflections ................................................................. 32
Figure 37: Mirrors opening up the view ................................................................. 32
9.1 List of Figures

Courtesy of the author

Figures

cover page, 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

Graphs

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

figure 3: Sustainability goals | accessed April 2022
< https://www.globalgoals.org/goals/>

figure 5: Fernando Guerra | Peter Zumthor’s Therme Vals Through the Lens of Fernando Guerra | accessed April 2022
< https://www.archdaily.com/798360/peter-zumthors-therme-vals-through-the-lens-of-fernando-guerra?ad_source=search&ad_medium=projects_tab&ad_source=search&ad_medium=search_result_all>

figure 17: Google Maps | Lindstedtsvägen 17 | accessed March 2022
< https://www.google.com/maps/place/Lindstedtsv%C3%A4gen+17,+114+28+Stockholm/@59.3473238,18.0721595,17z/data=!3m1!4b1!4m5!3m4!1s0x465f9d4038538349:0x96ebbe34418dad8f!2m2!3d59.3473238!4d18.0743482>

figure 21: SunCalc | Sun-path and Daylight hours | accessed April 2022

figure 24: floorplan, Kontemplationsrum | KTH places | accessed April 2022
< https://www.kth.se/places/room/id/65bc734e-1129-473f-8766-099b3394f55>
First things first, where are you from? *
Short-answer text

If, during the day, you wanted to decompress, where would you go? (Describe this space in a few words)
Short-answer text

<table>
<thead>
<tr>
<th>Mentioned Nature</th>
<th>Water Element</th>
<th>Forest</th>
<th>Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>11</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

I would go to a quiet cafe or bar, and relax in some corner.

For a walk:
- At the sea
- Visit museums, go for a walk, visit other cities/countries
- An open space

To the garden, in order to make some shots with the ball:

To nature, a walk at the park:

At mountains or garden:

Near a landscape location:

Near the beach or an urban garden:

To a beach:

At the sea:

Walk outside (park, by the sea...):
What feature(s) of this space make you feel contemplative? (try to select 3 or 4 max pls) *

- Openness
- Tranquility
- Views
- Proximity to nature
- Textures/materials (if the space is interior)
- Privacy
- Darkness
- Daylight
- Colours
- Other...

How bright would you prefer/expect this contemplative space to be? *

1  2  3  4  5  6
very dark ○ ○ ○ ○ ○ ○ very bright

Would you expect this brightness to be even and uniform in the space or would you rather prefer a gradation of brightness in the space with some darker and some brighter spots? *

- Uniform brightness
- Gradation of brightness

What about the shadows? How soft or sharp you would expect the shadows to be? *

1  2  3  4  5  6
soft ○ ○ ○ ○ ○ ○ sharp

From scale 1 to 5 how warm or how cool would you expect the space to be? (in terms of general * ambience NOT temperature)

1  2  3  4  5
Warm ○ ○ ○ ○ ○ Cool
As can be seen from graph 10 the majority of participants reacted negatively in the use of coloured glass.
1. Which of these spaces seem more contemplative to you? 

a. 

b. 

---

2. 

a. 

b. 

---

3. 

a. 

b. 

---

4. 

a. 

b. 

---

49
Last but not least, if you should summarise the most important spatial qualities for a contemplative experience in 2 keywords, which ones would you choose?

Short-answer text
Which one of these places would you choose to unwind?

- Option 1
- Option 2
- Option 3
- Option 4
- Option 5

preferred space

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>0</td>
</tr>
<tr>
<td>Option 2</td>
<td>10</td>
</tr>
<tr>
<td>Option 3</td>
<td>6</td>
</tr>
<tr>
<td>Option 4</td>
<td>23</td>
</tr>
<tr>
<td>Option 5</td>
<td>15</td>
</tr>
</tbody>
</table>