

# Urban darkness: human experience of atmosphere and fear

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## Abstract

The lighting of public outdoor spaces is often associated with the basic assumption that light creates a feeling of safety, while darkness is related to danger. The lighting level thus is often high and uniformly distributed, especially for public urban activities. This can cause an unpleasant atmosphere; because, when lacking a hierarchy of lighting, it is difficult to sense distances, materials and the contours of humans, objects, and buildings. To create inclusive outdoor spaces where people and surroundings can be experienced in a pleasant light, we need both light and darkness. There is a need to design lighting in relation to site-specific qualities, human behavior and to the lighting level in the surrounding context. Where due to the current energy crisis in Europe, lighting levels in public spaces are reduced and, in some spaces, even turned off to save energy, the lowering of lighting levels is often done without assessing site-specific human and spatial conditions.

This paper presents a further analysis of results from a field experiment at an urban tram station in Aarhus, Denmark. Here the experience of space, surroundings and other people was examined through semi-structured go-along interviews and participant-produced photos in two lighting settings, on bright setting and one with a lowered lighting setting. The focus for this paper is directed towards the vocabulary of words to describe experiences of light, developed by the test participants in the field. To examine if the test participants feel exposed or protected in the bright light and to collect reflections, associations and vocabulary related to human experience of increased darkness. The results show that in some cases darkness can provide more visibility than light. When contrasts in lighting levels between two lit zones are removed, a visual contact is created between people in a space and people in the surroundings, which leads to an increased feeling of safety. Urban space becomes more visible, and its site-specific qualities emerge. By considering context, and balancing lighting levels between urban zones, a more calm and friendly visual environment is established.

## Keywords

Inclusive urban lighting, darkness, atmosphere, safety, vocabulary

## Introduction

There is a fundamental belief that light is associated with safety, and darkness is associated with fear (Dunn, 2020).

But less light can also increase visibility and create a more pleasant atmosphere in urban spaces (Hvass et al., 2022). To gain a greater understanding of how urban spaces are experienced, it is important to carry out embodied experiments in the urban context. In lighting research, there is a long tradition in doing laboratory studies; field studies are often regarded as biased because of the many variables which exist when humans move through complex and dynamic urban contexts. But to get an understanding of the role of lighting in Nocturnal Urbanism (Narboni, 2016), there is a need for site-specific field studies, and a need to develop methods of investigation in complex urban scenarios. To get a closer understanding of how lighting influences human experience of site-specific architectural and social values, the importance of balancing urban lighting levels (Hvass et al., 2022), and creating lighting hierarchies (Kelly, 1952) will lead to more inclusive urban environments.

## The balance between lighting and darkness

Juhani Pallasmaa states; "Too much light wipes away the sense of space" (Pallasmaa, 2012). The 'wiping away' can occur if lighting levels are too high, the distribution is too uniform and the ability of the lighting to reproduce color is too poor. Both architectural and social qualities of an urban space disappear when shadows disappear. Because of bright and evenly distributed light, it is difficult to see the shapes of objects and nuances of faces. Likewise, when colors disappear, and the visible surfaces are mostly tones of grey and brown, urban spaces lose their visual qualities, and are often not comfortable to move through and stay in.

There is a need to balance lighting and darkness; if lighting levels are only connected to a feeling of safety, urban qualities are lost in the dark hours. Gernot Böhme describes how we need both lighting and darkness to be able to see our surroundings: "*Brightness is what turns sight into a real capability in the first place and enables visible things to be seen in reality...Light is not the only precondition of visibility. Darkness is another. True, light and darkness are asymmetrical. Light is a precondition for seeing at all, whereas darkness (interacting with light) is a precondition for our seeing something*" (Böhme, 2017).

Nick Dunn and Tim Edensor explore the multiple meanings and uses of darkness across time and space (Dunn, 2020). Specifically, they look at how darkness has been laden with negative attributes throughout history, forgetting the positive, aesthetic, and sensory experiences that darkness can create.



They draw attention to this historical tradition of relating lighting to safety and darkness to danger in urban spaces, without considering the aesthetical values of darkness. Lighting and darkness can thus both be linked to the understanding and feeling of a pleasant/ unpleasant atmosphere or a safe/unsafe space. A particular lighting design can never fit all users of a public space; however, a more detailed understanding of the experience of lighting and darkness is needed to challenge biased assumptions about the link between a high lighting level and safety (Dunn, 2020).

### Human sensory experience of lighting

To explore architectural qualities of urban contexts, human night vision must be adapted to the experience of fine nuances between light and dark areas in an urban space (Boyce, 2014, 2019). Sound, smell, and touch are also human senses that have an influence on how a place is experienced (Pink, 2015). Pallasmaa touches upon the complexity of evaluating the quality of a space by stating: *"The quality of a space is not merely a visual perceptual quality as it is usually assumed. The judgement of environmental character is a complex multi-sensory fusion of countless factors that are immediately and synthetically grasped as an overall atmosphere, ambience, feeling, or mood"* (Pallasmaa, 2014). Lighting and darkness are part of this multi-sensory experience and should therefore be investigated in the urban context to explore interaction between lighting and site-specific qualities.

To explore the social qualities of lighting there is a need to explore the ties between lighting people and the city and focus on people's emotional, cognitive, and motivational perceptions to achieve more accessible, sociable, and sustainable cities (Casciani, 2020). Daria Casciani highlights the need for a greater understanding of the influence of urban lighting in terms of luminous atmosphere perception, positive social affect, social enhancement, accessibility, and hospitality (Casciani, 2020).

Often, people don't possess a vocabulary for explaining experiences and feelings about lighting and darkness. Sumartojo and Pink describe reasons for this: *"presence of light is often taken for granted in everyday experiences; a vocabulary is lacking"* (Sumartojo, 2020). In a test situation, *"a vocabulary"* can be formulated as a pre-defined questionnaire, or through interviews where the test participants use their own words. To try to grasp nuances and get insights into experiences of either a perceived pleasant atmosphere or a perceived danger in the dimmed lighting during the field experiment, semi-structured interviews with participant-produced images were used to collect human experiences.

### Inclusive outdoor spaces at night

In the dark hours, the level and distribution of lighting determines which areas are visible and which are not and how spaces and people appear. To fulfill the Sustainable Development Goals 'Leave No One Behind' (UN, 2015) and create inclusive public spaces, lighting must be designed to meet many different needs. Thus, there is a need to focus on the quality lighting can create not only the dangers lighting can prevent.

### Research Question

To get a closer understanding of human experience of an urban context in a dimmed lighting setting and their choice of words to express these experiences, the following research question was posed:

How does dimmed lighting levels affect the human sensory experience of atmosphere and fear and how are these experiences described?

### Background

The field experiment described in this paper is part of a PhD project on human sensory experience of outdoor lighting with case studies of tram stations in Aarhus, Denmark (Hvass et al., 2022). The PhD project consisted of a total of four studies. Firstly, a literature study where the use of lighting in the theater is compared to the use of lighting in the urban space. Secondly, a field study with the aim of obtaining knowledge about the experience of the lighting at tram stations in Aarhus in different urban contexts. Thirdly, a laboratory experiment where the experience of lighting levels is investigated, and finally, all results are used to design the final field experiment at Nørreport tram station in Aarhus, Denmark. (Hvass et al., 2019, 2020, 2021, 2022)



Figure 1. Nørreport tram station in daylight, transition hour and the dark hours.

A case study was chosen to investigate human experiences of urban lighting in a specific context. According to Bent Flyvbjerg, case studies should be viewed as means to gain knowledge of human experiences in real-life situations. He states: *"One can often generalize on the basis of a single case, and the case study may be central to scientific development via generalization as supplement or alternative to other methods. But formal generalization is overvalued as a source of scientific development, whereas 'the force of example' is underestimated"* (Flyvbjerg, 2006).

Tram stations and the 'real-life situation' of waiting for the tram was chosen as a case because the stations are surrounded by buildings and roads; people stay at the station and go to and from the station every day, as part of their everyday routine in the urban mobile situation (Jensen, 2013). The results from the field experiment at the tram station must therefore be assessed in relation to the specific context of the station, the buildings and the people using it.

### Method

To conduct the field experiment, a combination of ethnographic and architectural methods was used, supported by measurements and calculations of lighting conditions at the tram station and in the surrounding urban context.

The field experiment took place in November 2020 at Nørreport tram station in Aarhus, Denmark (Hvass et al., 2022). Two go-along interviews were conducted during the dark hours when people commute to and from work. For one week, the participants experienced the tram station in the existing bright lighting setting and for one week, they experienced the waiting area in an 80% dimmed lighting setting. The existing illuminance level was measured at approx. 165 lux in a sheltered waiting area. On the pavement, by the facades in the surroundings, a level of approx. 1- 6 lux was measured. By dimming the lighting at the station during the second go-along interview, the differences in the lighting levels at the station and in the sur-

roundings were balanced, and the large contrast was thereby minimized.

Ethnographic interviews were conducted as go-along interviews with participant-produced images. The go-along interviews included 10 participants. The interviewer met each participant at the Nørreport tram station twice, in the existing and a dimmed-lighting setting, and took the tram to the next stop, then back again. Each recorded interview lasted approx. 30 minutes. At each interview, the participants were asked to comment on the atmosphere in the waiting area, their experience of the surroundings and their experience of activities at the tram station. During the interviews participant-produced images were used as a probe (Pink, 2021).

The rhythms of daylight, urban light, traffic and people were observed (Edensor, 2012; LeFebvre, 2013) and registered in sketches and photos; likewise, the movements and “the vibe” of the space (Madden, 2017) were registered in time-lapse videos.

Quantitative data about lighting levels were gathered through lux measurements on horizontal ground surfaces and luminance measurements on vertical surfaces at the station and on the surrounding buildings. Furthermore, luminance maps based on high dynamic range (HDR) photos (Inanici, 2006) provided both measurable values plus an overall visual insight into the hierarchy of the lighting levels (Kelly, 1952) in the urban scene, as well as quantifiable luminance levels.

### Analysis interviews

The present analysis will describe reflections, associations and vocabulary describing the bright and the dimmed lighting settings with quotes from test participants’ experiences of space, atmosphere and fear.

The recorded go-along interviews were transcribed and coded in NVivo12. A deductive sorting of the material was performed to detect and recognize themes; subsequently an inductive coding of the data was performed to introduce new angles and perspectives to the project (Pink, 2015; Madden, 2017). The participant-produced photos were used in the analysing process to get a closer understand of the situations where the photos lead to moments of realization for the test participant (Pink, 2021; Gaver, 1999). Visual ethnography and the use of participant-produced photos proved to be a suitable method for exploring the relationship between lighting levels and the sensory experience of urban context.

### Reflections, associations, and vocabulary

At first impression, 80% of the interviewed test participants were positive, while 20% were negative towards the dimmed lighting setting and having less lighting at the station. Test participants used different words and references to describe their positive and negative reflections about the existing high lighting level and a dimmed lighting level.

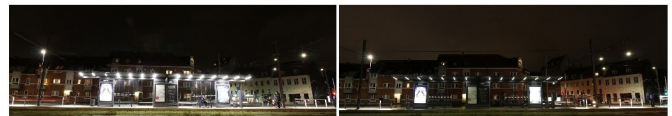
### The existing bright setting

During the first go-along interview (on the existing bright lighting setting), test participants used positive phases like: safe, spacy, practical, security, modern, minimalistic design, enough light for reading. They used negative phases like sharp, clinical, institutional, not cozy, chaotic, sterile, sharp, grey, boring, lack of texture and atmosphere, cold lighting, exposed, glare, stressful, uncomfortable, unpleasant. The negative phases were supplemented by negative references like:

it feels like standing on an over-lit island, being prisoner on an island, a gas station, prison yard, an operating room at a hospital, prison yard, the center of a target, being in a light bubble.

### The dimmed lighting setting

During the second go-along interview (on the dimmed lighting setting), test participants used positive phases like: less clinical, natural, evening mood, calm, relaxed, comfortable for the eyes, less sterile, the station fits the context, does not take attention, cozier, safe, sophisticated, serious, exclusive, intimate, less extreme, less exposed, more protected, private, not a light bubble anymore. They used negative phases like too dark, scary, unsafe, fatigue, drowsy, irritable, unsafe.



**Figure 2.** Photos a showing the existing bright lighting setting (left picture) and the dimmed lighting setting (right picture) at the Nørreport tram station, Aarhus.

The surroundings become visible when the lighting level is dimmed. Unfortunately, it was not possible to dim lighting in the commercial advertising screens at the station. The lit screens attract attention when the station is seen from the outside and present another problem concerning high lighting levels in the urban context, which is not described in this paper.

### Quotes

The abovementioned reflections and statements are extracted from the interviews. To understand the vocabulary of the test participants, four quotes are mentioned here to explain what influence the two lighting settings have on the experience of the surroundings, and the feeling of either safe, calm atmosphere or one of danger.

Two test participants expressed their view towards the surroundings in the dimmed lighting setting as such:

*“I actually think the surroundings are clearer; it’s like it’s becoming more of a whole [the station and the surroundings]. Before you stood in quite a lot of light, and then the surroundings became secondary. Now it seems more homogeneous”* (Female, age 69, dimmed lighting).

*“Somehow it seems that the station is better connected to the rest of the city because it is not a light bubble anymore”* (Female, 22 years old, dimmed lighting).

The test participants expressed that they could see the surroundings more clearly, that in the dimmed lighting there was harmony between the local and the surrounding spaces and that it had become a cohesive space instead of two spaces.

80% of the test participants preferred the view to the surroundings in the dimmed lighting setting. It came as a surprise to many, and it was difficult for them to express what they saw and why this happened. Most of the test participants did not consider the importance of the surroundings in the existing lighting setting. However, when the lighting had been dimmed, all test participants experienced a regained connection to the surroundings and sensed that the station had become a part of the urban context.

The following two quotes represent opposite views on the dimming of lighting in relation to the feeling of safety. One positive quote in relation to the dimming of the lighting reads as follows:

*"I actually start looking around in a different way because I have a feeling that I can see the surroundings. I'm in harmony with the surroundings now. It feels different from when I was in the very bright light...it is no longer the case that I am a target, exposed, and they can only look at me. Now, we can just look at each other"* (Female, 56 years old, dimmed lighting).

A negative quote in relation to dimming reads as follows:

*"It's a little scary... I think it is an advantage to be exhibited in the light because if some strange people come to the station, you can see them"* (Male, 56 years old, dimmed lighting).

The two test participants had opposite feelings about the lighting level and safety. One feels safe and calm in the dim light and the other feels unsafe. When dimming the lighting level, most of the test participants saw an advantage in the regained visual contact with the surroundings and linked this regained connection to the surrounding context with a feeling of safety.

## Conclusion

The findings from the go-along interviews demonstrated that the human sensory experiences of space and other people in the urban context were affected in the dimmed lighting. The participant-produced images were effective for understanding the participants' immediate thoughts about the experience of the urban context. Photos were taken as a collective probe to provoke responses and unexpected ideas. The

photos led to sudden realizations and triggered memories for the participants, and they helped the participants develop their own language about what they saw. It was discovered that issues that were difficult to describe in words could be easier to describe when explaining the content in a picture. Dimming and adjusting the lighting level according to the surrounding lighting level created a relaxed atmosphere at the station for those waiting for the tram. A connectedness to the surroundings and the people there was felt, thus increasing the feeling of perceived safety. This is thus an example of how site-specific experiments with lighting are necessary and how the fundamental belief of light being related to safety can be challenged when lighting is adjusted to site-specific qualities and lighting levels in the surrounding urban context.

## Future work

The field experiment was performed during Covid 19; therefore, the number of test participants was limited. It is the intention to conduct more interviews, with test participants with different needs to collect further knowledge on human experience of darkness. Furthermore, to draw on the experiences made during the current energy crisis in Europe where lighting levels have been lowered to save energy.

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