Outdoor lighting

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Workbook sep-nov 2011

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“Although we do need to save energy, we can not save the world by reducing the quality of light”

“We will not save the world by reducing the quality of life”

- Joachim Ritter, 19/10 - 2011 and 22/10 - 2011

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As my last workbook had hardly even cooled down from print, it was time to jump straight into the next module at Ljuslaboratoriet, Outdoor Lighting. You will soon notice that in writing this workbook, most of the time, I am not sticking to specifically outdoor aspects, and at times even wandering off into thoughts that do not draw their main essence from lighting at all. This seems quite natural to me, as the fact that light is connected to almost everything, has grown even more clear to me during the last few months. Even the lectures at schools during this period have not been solely about lighting for an outdoor environment, and adding to that conferences and other light experience I have had the opportunity to come across, it would be impossible to get into any deeper discussions without venturing far from the starting point.

Another aspect of light, that I am just starting to grasp on at any sort of conscious level, is how un-static it actually is. On the right you can see a concept description the I wrote for an installation in a photography class last autumn, and it is specifically the first line, "Not only beauty is in the eye of the beholder", that I would like to comment on a bit further.

On Sunday the 25th of september, the day before actually starting this course, I chose to visit the "See colour" exhibition in Järna a second time. You can read about this from the following spread onwards. When you get to page 8, you might wonder if I have started really going crazy. I did so myself for a while, and whether I would include this part or not in the workbook has been far from obvious up until days before deadline. The view I have finally chosen on this, much thanks to professor Semir Zekis description of ways to make people see colours where they physically do not exist during a lecture at PLDC, is however that it does not actually matter whether what I saw can be said to be possible, in todays terms, or was just an illusion. In either case, it is worth examining further.

Having made that decision, I chose to put those observations in the introduction part of this book not mainly due to chronological order, but to shine light on the way I am currently perceiving the world.

Enjoy.

- Not only beauty is in the eye of the beholder, we perceive the world the way we are used to, and only notice what we expect.

That is until at one point in time... most likely for no apparent reason... our attention shifts... and we're amazed.

Amazed by seeing something familiar, where we did not expect to find it. Whether present in nature, man-made, or simply an optical illusion of objects lining up in the exact right way, the idea of this image sticks... and we start searching... searching for similar frames.

The more attuned we get to this search, the less we need to find to see what we're looking for. The slightest resemblance to the original image, that caught our attention, can set our thoughts of... And thus, we have altered our way of perceiving the world.

/ Katja Tsychkova 2010-09-24

What do you see? *[p1]*

Further thoughts on my favourite light

At the beginning of the semester we were told to imagine our favourite light, and in my last workbook I described it as a candle-like flame that changes colour according to ones mood.

How to connect the mood changing part still needs to be figured out, but I did find a ready product for changing the colour of the flame.

Quite breathtaking, is it not?

[p2] (both pictures)

See Colour x 2

"The desire for knowledge is first stimulated in us when remarkable phenomena attract our attention. For it to continue we must find a deeper sympathetic connection, which will lead us by degree to a deeper acquaintance with the subject". - J.W. Goethe

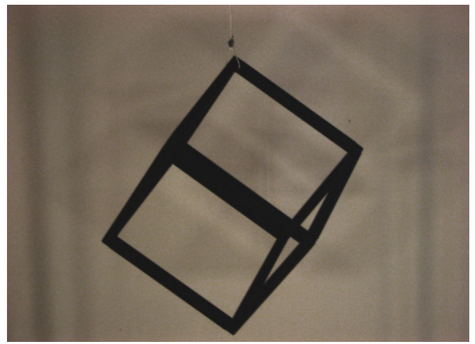
Going back to Järna, I spent half a day just in the experiment rooms, and by the end of that finally did start to get my head around at least some of the concepts presented.

One thing that I found out only now, is that not only additive colour mixing can be found in light phenomenons. Subtractive colour mixing, that we first come across when making colour circles as children at school, can also be created by light in the shadows.

The place where I spent most time was by the cube that produces a light shadow on the wall. The build up of the installation is fairly easy, instead of one light shining on the cube, there is a wide light shining on the entire space and a moveable piece of wood shielding the light in one spot. This wooden shape works as "a dark sun", shining in a surrounding of light. As we now have a dark source shining in the light, the cube is hit by the darkness and stops it from reaching the wall behind it, creating a shadow of light.

However, I can still not get this to really make sense in my head, but at the same time can not help but fantasize about what it would be like to live in a world of light, where the darkness rises every morning. Surely we would be as blind at night as we are today, as with only light, we get no contrasts, and see nothing. Then we would have to create dark sources to be able to see in the pitch light night and keep our 24-hour society afloat.

[p20]



Light shadow from a "dark sun" [p1]

Ganzfeld, Wedgework

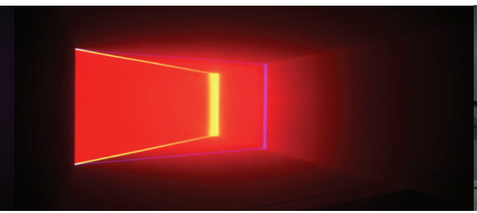
The Ganzfeld effect occurs when we observe an uniform field of colour, as the brian is not picking up any changes, it cuts off the signal from the eyes, and makes us see black as if we were blind. I did however not experience this effect at all in Turrells Ganzfeld installation, in Järna, neither last time or today, so I was a bit disappointed.

A more interesting observation was located just in the next room, at the Wedgework piece. Last time, when I walked in from the light, everything but the red area seemed pitch black to me as I made my way to the benches in the back of the room, just hoping not to walk into anyone. Once on the bench, it became obvious that this created the same effect as I had first experienced almost two years ago in London. Walking into the box of darkness, you walk slowly, wondering how you are ever going to make it all the way without walking straight into someone, but when you walk back, the terrified people still walking in make contrasts to the light ahead, and are perfectly visible.

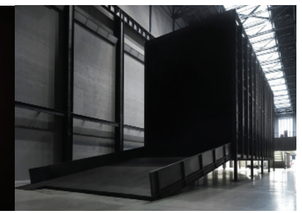
The Wedgework does spread more light into the room though, as I noticed on my first visit after sitting there for a while, walking up to the light to have a closer look, and then turning back. As my eyes had had time to adjust to the lower light level, I could now clearly see the benches from the front of the room. The most interesting part is however that when I walked in today, I could make out the shapes of the benches straight away, though they still became clearer after a while. It was interesting to notice, but I can not say I am really surprised that it was easier to see something once I knew what I was looking for.

As for the Wedgework installation itself, I do not even want to talk about it, I just want to know if the screen really is at an angle or not! But there was no chance to walk into the red area to have a look, as there was an angry member of the staff staring as soon as anyone got even remotely close. Referring to Goethes quote on the left, I really do think that design students should have the right to do stupid things...

Ganzfeld [p4]



Wedgework [p3]



Miroslaw Balkas "Box of Darkness" [p5]

Darkspace

I will not mention from who, let us just say a reliable source, but after our last visit in Dark Space, we did manage to confirm that there is a lamp inside the room. More specifically a 0,5 watt white light, shinning on a white (!) wall. I also did remember that the person, working by the installation at the time, once we got out had told us that most people, just like we had, see a glow in the red/yellow part of the spectrum, often shifting more towards yellow as time passes. He also mentioned that one guy had claimed to see blue light instead, but he was quite sceptic to the validness of this.

Going into Darkspace a second time, I will admit to having been involved in a long discussion about how we can control our dreams, and watching a NLP video where Darren Brown makes a girl see yellow as red and red as black, the night before, so I might have been in a very subjective state of mind. But sitting there in the darkness, I started to think that if I know that I am looking at a white wall, and see it as red, I should be able to see it as other colours as well. Also thinking back to my "previous experience" idea from Wedgework, the glow should really be more yellowish, as that is what it looked like when I left the room last time. It had changed colour before the thought had even formulated fully in my head.

I then pushed it towards a perfect yellow, and soon switched it back to red, without ever really contemplating about it. I wanted green now, and if I am able to even normally get a green after picture after staring at something red, that should work here to. Not a problem. Next it was time for blue, I brought it out with the thought that if someone else had been able to see blue, so should I, but it was really faint and unstable.

After this I started playing freely, just telling myself what colour I wanted to see, and seeing if I could bring it up. At the time I was picking quite randomly, but thinking back, I could see all the spectrum colours I could imagine, but not bright pink, neon yellow, gold, or any similar shades. What is more, how bright I saw a colour seemed to be connected to its wavelength, red could fill almost the whole room once my eyes had gotten adjusted, while purple would never be anything more than a faint little dot in the middle.

I am sure that by now, you are wondering if I was just imagining or dreaming all this. It is a possibility indeed. But I was able to shield every colour I saw with my hand, shutting the light out, so it must still have had some sort of connection to what I was actually perceiving.

I refrained from discussing my observations with the staff member who brought us out this time, as they were still spinning around uncontrollably in my head, but I did listen to what she had heard from people earlier during the day. One person had said that after staring really intensely on the red dot for a while, he was surprised, and a bit startled, by a sudden green light. He had not at all bought her verification that nothing changes in the room during the time spent. Had the installation not been fully booked for the rest of the day, I would have gone straight back in to experiment with how strong of an after picture I could bring up.

[p1]

Bindu Shards

There are two different programs in Bindu Shards, one tougher, and a softer one. I did the strong one last time, so no I decided to try the soft. Here I will discuss the differences between them, my first impressions of the piece can be found in my Light and Humans workbook, on page 26.

First of all there were no computers this time, that kind of annoyed me last time, so I had made a conscious effort to avoid looking at the computer outside the globe before going in. Also, the intensity of the blinking was not as strong, which was to be expected, what was more interesting was that when the picture started closing in on my, it did so in a distinctively different way.

Last time it had slowly been pushing closer and closer, until finally ending up behind my eyes. Now it was jumping closer in steps instead, almost like I was blinking that millisecond when it moved, and it never appeared to get closer than to the surface of my eyes.

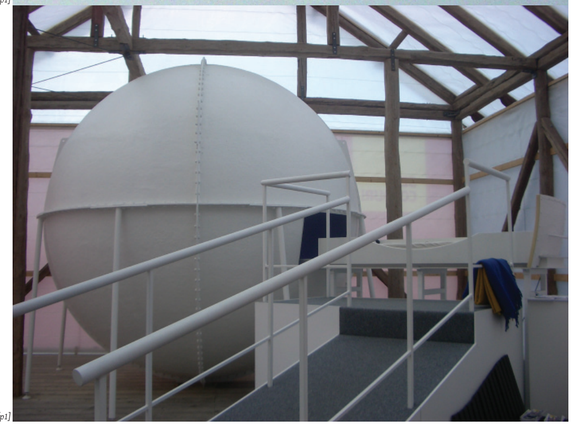
One final observation I made was that, while last time I had seen nothing but abstract dots (and tiny monochromic laptops), at times I was now picking up detailed scenery. I had quite a hard time recalling them afterwards, but I am sure to have seen a forrest scene, a room inside an old-style library-like tower, and crawling bugs.

I will not even try to make sense of any of this at this point.

Bindu Shards is a one-person experience. The spherical chamber of 4.2 meters in diameter, is designed so that the viewer while lying down on his back, is wheeled into the spherical chamber. The viewer is deprived of sensory stimuli from outside the chamber, and encounters a intense 15 minute coloured light and sound performance, allowing an experience of 'behind the eye seeing'.

Turrell's art works with optical phenomena that test the boundaries of human perception. It plays with the physicality of light and reshapes how we experience the blurred lines between reality and fiction. His work must be viewed first-hand to be understood. This ongoing exploration of human perception is conducted with the precision of a scientist, the lyricism of a poet and the zeal of a visionary. Bindu Shards sets the viewers mind free to construct their own castles in the sky from an intense, yet subtle, light palette.Turrell's art works with optical phenomena that test the boundaries of human perception.

[p1]

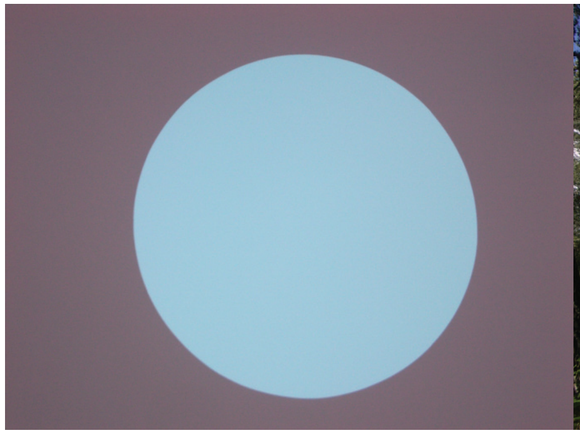

[p1]

Skyspace

The evening was cloudy today, in contrast to the clear sky from last time, and it is really unfortunate that photography got forbidden inside, so that I have no pictures to compare with my previous ones.

The colours of the sky seemed quite different to me from last time, and although this is hard do be sure of a whole month later, I do think that the clouds enhanced the colour changing, making it more vivid.

One illusion from last time, that did not appear now, was the sky going really dark to then suddenly turn out to be much lighter again. Instead, it seemed to loose brightness quite continuously throughout the duration of the light show, I am not sure whether this was mostly because of the clouds, or because I was now more aware of how much time was passing.



[p1]

[p1]

Ljuslaboratoriet

- And what was communicated there during the past few months

"We do not save energy when making a lighting installation, we use energy!"

Light planning Basics - lecture with Jan Ejhed

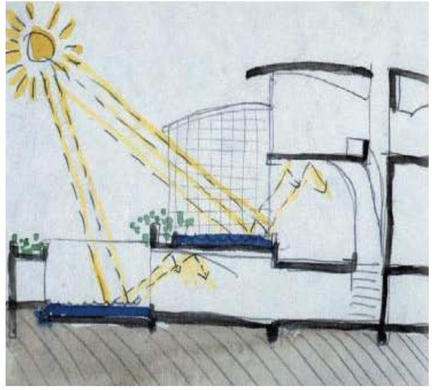
Jan made a very interesting, even in seemingly obvious, point in his lecture; That no mater how efficient a lighting installation is, it is still using energy, which from a strictly energy-saving point of view is bad. Herein falls the whole purpose of evaluating lighting simply by lm/W, and it becomes obvious that how well the light is fulfilling a specific purpouse has to be taken into consideration.

Lighting is always about creating a three dimensional space, but how this space will, and should be experienced, varies greatly depending on its purpouse and location. We can not escape the fact that a place for reading does require a certain level of luminance, but the task of making an alleyway feel safer at night could often benefit more from redistributing, than adding, light. We typically want to light tunnels so people do not have to disappear into dark holes, but if the space happens to be narrow with a lot of passing people, a very nice light that makes people stick around, might not be the best solution.

Commerce has, like with much else, come furthest in adapting their lighting to different situations, and we can usually find big differences between the light of a small bar that is expecting us to order in glass after glass of wine, and a busy lunch restaurant that wants to serve as many people as possible in that hour.

Jan divides the quality of light in a space into four main categories; Visibility, Spaciousness, Atmosphere, and Time and Rhythm. Together, those describe the different values we need to consider when planing lighting, obviously adjusting their respective importance depending on what kind of place we are currently dealing with.

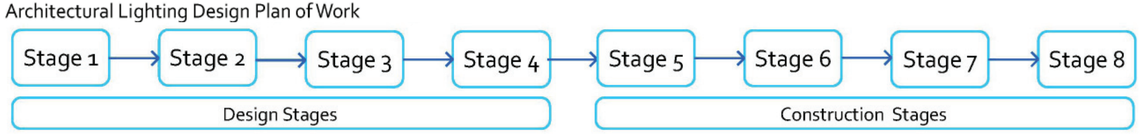
Jan did also state the fact that, in contrary to common guidelines, every requirement does not need to be fulfilled throughout the space to make it functional. A good example of this is a staircase in Vällingby centrum, where the light is concentrated along the handrails, fading out towards the middle of the stairs. The requirements of the lighting are set so that people with bad eyesight can get around too, but allowing a light planing where they might need to stay close to the handrail, where they would probably choose to be anyway, opens up for the creation of a more dynamic and interesting light plan.



Light can be brought into a room in many ways [p6]

"I learnt more about architecture in lighting, than in architecture itself. If you love architecture, lighting is the place to be."

Light planning Basics - lecture with Orlando Marques



Orlando started the lecture by asking each one of us what we had done before coming to Ljuslaboratoriet, and why we had chosen to study lighting. Although we knew most of this by now, it did open up for some interesting discussions, my favourite one being Orlandos comment, when three more people after me had more or less repeated my story of having studied architecture and considered lighting to be an important part that was never mentioned.

He said that he started out as an architect himself, and got into lighting quite fast without really knowing what he was doing, and after having worked with it for a while realized how important it was and how much there was to learn about architecture in lighting. He also said that as there are so many things possible to do with light, there is no right or wrong place to start, and opted us to just google and start building our own libraries of lighting effects.

Orlando also talked about the design process in lighting, which is quite similar to the one in architecture, and pointed out how important it is that lighting designers get involved early in the design of a building, so that light can be an integrated part of the system.

He also argued that there is a design stage before the concept, where we should almost unconsciously take in the space to be lit and let thoughts and ideas float freely before starting to analyse or conceptualize anything. I also learnt a new word after googleing "inception", to my big disappointment, it does not actually mean to plant an idea in someone elses mind like one would think from the movie, but "to begin" or "beginning". I do believe that both interpretations make sense in this context though.

Stage 1: Inception

Stage 2: Concept

Stage 3: Design Development

Stage 4: Detail Design

Stage 5: Review of Shop Drawings

Stage 6:Tender

Stage 7: Construction

Stage 8: Commissioning

Nightwalk with Henrik Gidllund and Natalie Bell

We started the walk by going up Katarinahissen and looking at Stockholm from above, when really looking, it is amazing how many different types of light can be seen from here.

The pictures on this page show different lighting situations, but are unfortunately not very representative when coming from the camera. What is worth noting though, is that Stadsgårdskajen is the only out of the five where I did not manage to write notes, and also how much the number of lux can differ depending on how far from the source one is.

The fire at Stadsgårdskajen is an element that most people instantly like, but what most of us are unaware of is that the big lantern at Stureplan contains fire, burning gas, as well. The two bottom pictures on the next page show how it looks when we go overboard with coloured lighting (Volkswagen), and a nice, subtle, but highly energy consuming, lighting of the Af Chapman hotel boat.

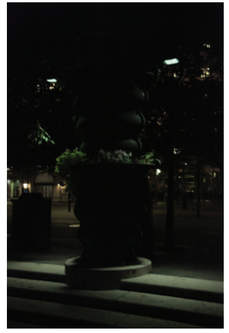
[p1] Stadsgårdskajen, 10,7 lux on reference plane 2m away from closest pole. Hi-pressure sodium 400W on 14m poles.

"I would love to see more fire in Stockholm"
/Henrik

[p1] Alley in Gamla Stan, 10,7 lux on reference plane 2m sideways from closest light. White son 50W mounted on 4,5m.

[p1] Strömbron, 20 lux on reference plane 2m away from closest pole. Metal halide in two different colour temperatures.

[p1] Kungsträdgården, 25 lux in the middle of the path. 24W fluorescent.



[p12] Kungsträdgården, 116 lux right underneath light, 4 lux half a metre away. 16 1W LEDs put up in 2005.

Outdoor Lighting - Lectures and Activities with Ljuslaboratoriet

top left: [p1] Gas light at Stureplan
left: [p1] Atmospheric fire at Stadsgårdskajen
top: [p1] View from top of Katarinahissen
right: [p1] Volkswagen store by Norrmalmstorg
far right: [p12] Af Chapman hotel boat

Stockholm lights, lecture with Henrik Gidllund

"It [light] allows people to travel safely during darkness. Always remember that, that is the core function."

In his lecture, Henrik focused on the importance of durable and easily maintained lighting and the safety aspect of urban lights.

Any light that are put up will have to be maintained sooner or later, and this will be done by a guy with gloves, high up on the pole. Thus, luminaires in an outdoor environment have to be easily opened or dismantled, while still applying to the appropriate IP rating. It is also important that any maintenance is carried out quickly as, in accordance with the broken window theory, one vandalized light gives people the psychological impression that it is ok to destroy more. For the same reason, installations that do not stop functioning completely just because part of them is destroyed, are preferable. This also prevents us from having to deal with traffic lights that are completely out, or ending up at a pitch black street.

We are instinctively afraid of the dark, but contrary to common believes, we will not automatically experience a higher light level as brighter and safer. Below is a picture of the buss terminal in Akalla, it was previously washed with light all through, and still perceived as dark and unsafe. As the busses get enough light from their own headlights, the light on the road could be taken away, creating a contrast to the still lit pave walk, and making the space feel brighter. Some coloured light on the wall were also put in for added atmosphere. Those kinds of transformations are important as, according to statistics, we are more afraid when moving around outside in Stockholm today than we need to be.

Henrik also mentioned a specific aspect to consider, when dealing with asphalt, black asphalt eats light, but when it gets wet, instead it acts like a mirror. This needs to be kept in mind when doing a lighting solution, so that enough light is provided in any condition, but glare from the road is avoided as much as possible.

According to the "Broken window theory", parking next to this car, would not be the best of ideas. [p7]

Akalla Bus Terminal, after the lights were remade. [p7]

Urban Theories, lecture with Rodrigo Muro

"Form follows function - that has been misunderstood. Form and function should be one, joined in a spiritual union." /Frank Lloyd Wright

Rodrigos lecture focused on "the new urbanism". It is a mixture between two previous theories in city planing, the structural/functional and the perceptual/humanistic. The structural approach focused on where and how different functions are placed, some examples are Ebenizer Howards garden city, Frank Lloyd Wrights broadacres, and Le Corbusiers high-tech environments. The perceptual approach on the other hand, focuses on how humans experience the city when moving through it, and has Kevin Lynch, Amos Rapoport, and Jane Jacobs, as its main front figures.

Phillip Johnsons Glass House is considered to be part of the new modernism. Its lighting was designed by Richard Kelly, who is considered to be the first professional lighting designer. He used lighting on the trees, rocks, and other areas around the house, to eliminate the feeling of living inside a lit shopping mall. This i a conventional way to do lighting today, but was considered a new, smart, solution back in 1949.

The Glass House by Philip Johnson and Richard Kelly, New Cannan 1949 [p19]

"Too strong light produces darkness since glare creates deep shadows."

Safety and Security, lecture with Per Nylén

In our society today, we need light in the dark hours to see, orientate, and to be seen. We as humans have a deep rooted belief that daytime is safer than night, brightness is safer than darkness, and thus, at night, we tend to feel safer in places that we experience as having a higher, more day-like, light level. As mentioned before, in Henrik Gidlunds lecture (pg.16), this experienced brightness does not actually mean the place is lighter according to measurements, as our eyes adjust to the brightest point currently in our view, but apart from planing the light correctly from a visual perspective, there is also another aspect to consider when it comes to safety and security.

Security deals with what the risk of something happening actually is, while safety is our perceived feeling of the risk. There has been a huge amount of roundabouts built in the last few years, as statistics showed that they are more secure than traffic lights, but this was initially highly protested against as we experience traffic lights to be safer.

Per showed us the picture of the kayaker (below) in his lecture, the guy was probably feeling perfectly safe at the time, in the still blue water on a sunny day. How secure is he? With what we know from the photography, not so much, I mean, he is having a great white shark swimming straight towards him. I would however like to argue that, contrary to how a picture like this would normally be interpreted in media, an occurrence like this does not automatically mean that kayaking in that place in general is unsecure. There is just to much we do not know; Did the shark attack him or swim straight past? Has there ever been a shark attack at that place?

The point here is that we need to consider safety and security separately when planing light, a place that is secure but perceived as unsafe has a lot to win from a better lighting, but do we really want to make people feel safe in a place we know not to be secure?

You might say that lighting something up would not only make a place safer, but also securer at the same time, but this is not necessary the case. Per showed us a very interesting survey of a test area, where stronger light had been added to see how this would affect crime rates. People did feel safer in the place after the change, but the number of crimes committed stayed the same. What was even more interesting was that less crimes now occurred during the day, and thus more at night. "Think like a criminal" was Pers conclusion of this, criminals need light too, and while putting up lights on our empty backyards might make us feel safer, it is questionable if a home has gotten more secure when the robbers do no even have to bring flashlights to examine the lock while we are sleeping unknowingly.

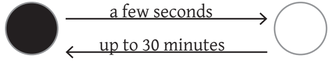
[p8]

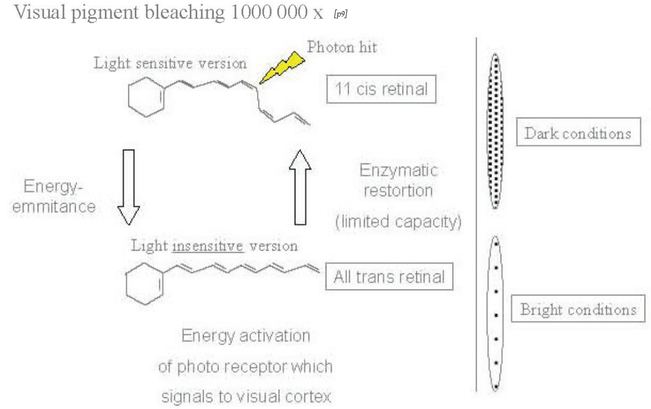
"In the future, seeing glaring, wasteful, lighting, will be as obviously out of place as it would be today to stroll down the river and see large pipes spewing out raw sewage."

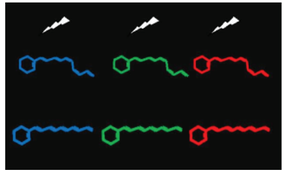
Light and Colour adaptation

Per also talked a bit more about Light adaptation, which he had described in his last lecture (workbook 1, pg. 20). Once again, he mentioned that while our eyes adapt to brightness in seconds, it can take up to half an hour to adapt back to darker conditions. This is generally experienced with white light, but does work separately for red, green, and blue as well. This can be used in for example warning lights, a strong red light in a dark room will draw our attention, while not washing out the surroundings, as our blue and green cones stay adapted to prevailing darkness.

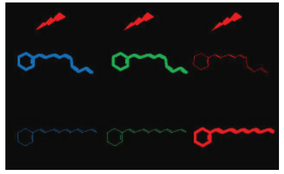
This is just another aspect on how we perceive light that we need to be aware of, and learn to use, as in the future, lighting will have to be more carefully thought through, just like we carefully consider other environmental aspects today.







[p9]



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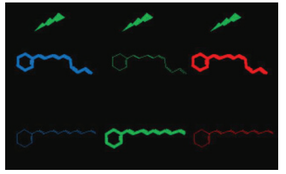

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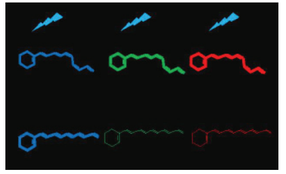


[p9]

Study visit at Fagerhult

"An IP rating of at least 54 should be used outdoors, 65 is preferable"

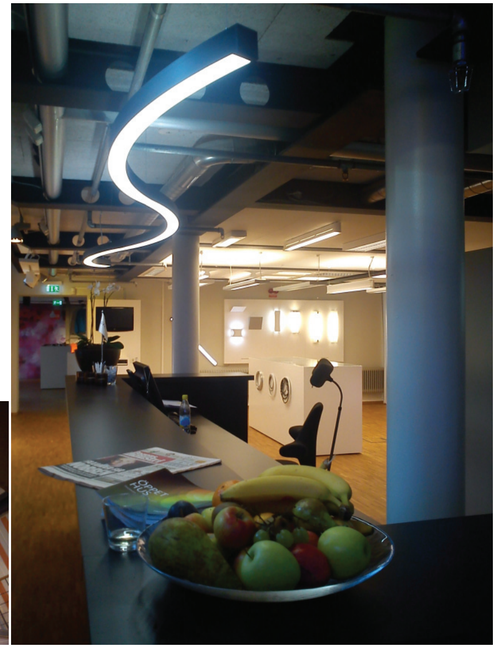
Fagerhult has been around since 1945, and today has about 2000 employees, I really like their office in Stockholm, especially the lamp over the front desk.

Although they have been working with interior lighting for a long time, exterior fixtures is, for them, a quite new area. Mats Paulsson showed us around the roof, where they exhibit their luminaires, and also talked a bit about outdoor lighting in general and about IP ratings. Apparently more than 90% of all road lights in Sweden were hi-pressure sodium just a few years ago, but today they are quickly being changed to mostly metal halide. One good point that Mats brought up, is that bollards can be quite effective for lighting up footpaths, and are easily made glare-free.

Frank Augustsson also showed us a bit of Fagerhults interior lights, and mentioned that pendant lights with combined up and downlight are typically Nordic, while recessed lighting is more common on the continent. He also said that while fluorescent office lights are usually 3000°K, with LEDs 4000°K is more commonly used, as it is typically perceived as nicer than LEDs at 3000°K.

The roof [p1]

Gobo projections on the top floor [p1]



The front desk [p1]

Outdoor Lighting - Lectures and Activities with Ljuslaboratoriet

[p12]

Above is an example of Blitz luminaires, they have lenses inside to focus the light into narrow beams.

1st number : protection against ingress of solid objects		
IP	tests	
0		Non-protected
1	ø50.5 mm	Protected against solid objects of 50 mm (1.968) and greater
2	ø12.5 mm	Protected against solid objects of 12,5 mm (.492) and greater
3	ø2.5 mm	Protected against solid objects of 2,5 mm (.098) and greater
4	ø1 mm	Protected against solid objects of 1 mm (.039) and greater
5		Dust-protected (no harmful ingress)
6		Dust-tight (no ingress)

[p11]

2nd number : protection against liquids		
IP	tests	
0		Non-protected
1		Protected against vertically falling water drops
2	15°	Protected against vertically falling water drops when enclosure tilted up to 15°
3	60°	Protected against water sprayed vertically at an angle up to 60°
4		Protected against splashing water
5		Protected against water jets from any direction
6		Protected against powerful water jets
7	E	Protected against the effects of temporary immersion in water
8	x	Protected against the effects of continuous immersion in water (depth x to be specified)

[p11]

The IP rating describes how well a luminaire, or other type of electrical equipment, is protected against intrusion. For example, a luminaire with an IP rating of 54 is protected against most dust, and splashing water.

"Make as much trouble as possible, it is the final result that counts."

Kai Pippo - Lighting design experience

We met Kai out at Normalmstorg, just a few days before his lecture, while doing the nightwalk with Henrik and Natalie. There, they worked with what he calls "Architectural photosynthesis" , making architecture come alive. The Nobis Hotel, which is the one building there, that has been finished so far, is a really nice example of how well planned accent lighting can lower the light level and the energy consumption, make the space feel brighter, and bring out the details of a building, all at the same time.

Some other projects that Kai mentioned were "Living Place" in Hamburg, and the re-lighting of a chandelier at Gallerian in Stockholm, I will get back to the chandelier shortly. The "Living Place" is an apartment at a laboratory, with completely controllable lighting and other technological features, where people can come and stay for free. The catch? Constant monitoring... Summing up it is made to research how people use intelligent homes.

Apart from his projects, Kai also mentioned several points to think about when doing a lighting solution; It it likely to be where it is for many years, talking to the person who will handle the maintenance from the start is a good idea, it is ok to cause trouble during projection, we know very little about how light affects us today, and that nordic light is so special because thanks to the Gulf Stream we are living at a latitude not largely inhabited anywhere else on earth.

Another thing that was interesting about Kais lecture, was how convincing everything he said seemed, at first I assumed that this was just because he was speaking about things that were true, but then there was that chandelier. It is made of thousands of Swarovski crystals, but was not making the strong impression it was supposed to (top picture), so Kais company, Ljusarkitektur, got the task to remake the lights inside it. The lighting is really nice now (bottom picture), but when Kai showed those before and after pictures together, I could not help but pointing out that it is not a fair comparison. With all other lights off in the bottom picture, the chandelier obviously stands out more than it would on a normal day.

Thinking back, I never really got an answer to whether there is a really big difference or not when the surrounding lights are on, although at the time I agreed I did. I need to re-listen to this lecture ten times and steal anything I possibly can on how to talk convincingly...

[p10]

[p10]

"You have to be very sensitive to what people expect."

Luke Lowings - Lighting design experience

Luke showed us a lot of projects that he has worked on with his company Carpenter & Lowings, many of them using materials or applications of materials that I had not come across before.

Dichroic Glass was a completely new term to me, it is a type of glass that has one transmitted colour and a different reflected colour, this makes the colours change depending on the viewing angle. Luke has used this material in several of his projects, the Dichroic Light Field in New York being one of the first.

Another material that I did not know much about before, is retroreflective film. It is normally used on road signs, and was put up as a road installation in Boston, as shown below. The shining clouds to the left of it, is an installation for the 2000 Olympics in Sydney, water vapour is here being pumped out through high poles, and illuminated to create the effect.

The solar light pipe uses fibreoptics technology to bring down daylight into a narrow space, I quite like this project as, contrary to when daylight is brought into places with no outside connection at all, here you really do feel that it is daylight.

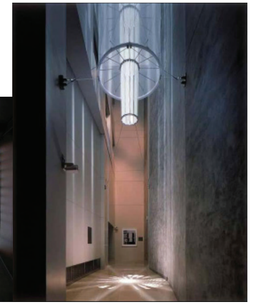
And finally I would like to mention my favourite project of the morning, that I will have to see before I quite believe it. This chapel is situated on the second floor of a building between St Pauls Cathedral and Tates modern in London, and the view of the sky is brought in by reflective louvres. It really looks as amazing as almost impossible.

Dichroic Light Field, NY 95-96 [p13]

Luminous Threshold, Sydney 2000 [p13]

Light Portal, Boston 1992-2007 [p13]

Chapel in London 2002-2004 [p13]



Solar light pipe, Washington 2002 [p13]

Electricity Basics, lecture with Lars Hägglund

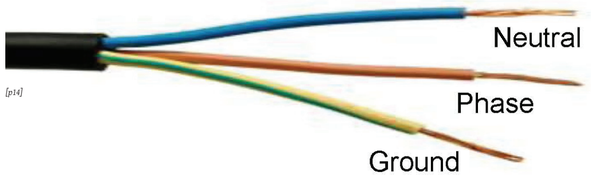
Electricity travels in closed loops, or circuits, it must have a complete path before the electrons can move. If a circuit is open, the electrons cannot flow, when we flip on a light switch, we close a circuit.

I Europe we get alternating current in our wall plugs, the current changes direction 50 times per second (50 Hertz Hz). The voltage in Sweden is 230 Volt. Alternating current is used because it is easier to transport in cables for long distances.

Electricity is measured in units of power called watts, named to honour James Watt, the inventor of the steam engine. Comparing to older measurements, 1 horsepower is almost as much as 750 watt, a kilowatt represents 1,000 watts. The amount of electricity we use over a period of time is measured in kilowatt-hours (kWh).

In Sweden we use a green/yellow cable for ground and a blue for neutral. When there is only one phase in the cable, it is usually black. In cables with three phases, they are most commonly black, brown, and white.

The earth connection is used to allow current to go back through the earth cable, in any case of failure, rather than, for example, through a human body.



[p14]

"Electricity is the flow of electrical power or charge. It is a secondary energy source which means that we get it from the conversion of other sources of energy."

Ohms Law

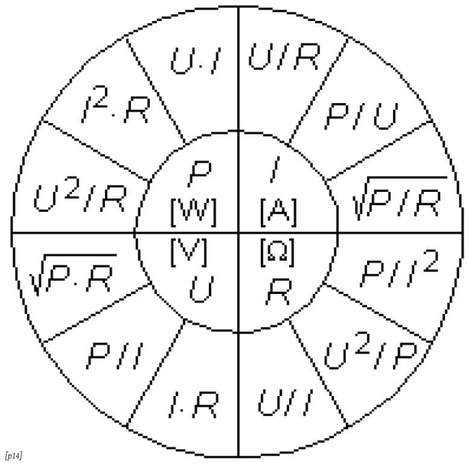
Voltage, Volt, V (U)
Current, Ampere, A (I)
Resistance, Ohm, d (R)

U=IxR

Effect (how much can be connected to a fuse/plug)

Effect, Watt, W (P)
Voltage, Volt, V (U)
Current, Ampere, A (I)

P=UxI



[p14]

"We want to improve the quality of city life."

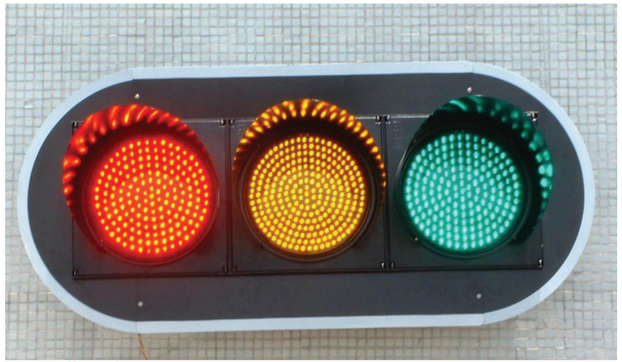
Light, lecture with Lars Hägglund

Sunlight contains the whole visible light spectrum, and is spread by small particles in the atmosphere. If we look at the sun through a prism, we can see the different colours divided, this effect is similar to how a rainbow is formed. As blue light has the shortest wavelength, it spreads most in the atmosphere, eight times more red, which has the longest wavelength. This is why the sky is blue, and it is also due to how light spreads that the sky is always darker above a rainbow than below.

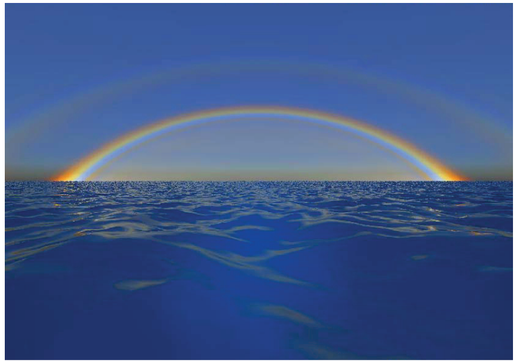
After having talked a bit about light in wide terms, Lars told us that today, we are trying to use light not only to see, but to improve the quality of city life. This, of course, needs to be done with great consideration, as there is no simple answer to what quality of life is.

LEDs are being used in many different ways, one very suiting application is in traffic lights. Before, when there was one lamp behind glass for each colour, the lights would no longer fulfil their function if one broke. When the lights are made with LEDs instead, quite a few of them can stop shining before the lights stop being functional.

One more questionable use of LEDs is in retrofit lamps, as the light bulb is disappearing, we do need those to keep or old luminaires, but it just does not go very will with the nature of LEDs.



LED Traffic Light [p16]



Double rainbow [p14]

"It [electricity] can be evil."

Electrical safety and security, lecture with Mats Bruce

This lecture was obviously aimed at scaring us a bit just before starting to connect cables out in Nynäshamn. And it worked.

I have always wondered how it is possible that an eagle, having caught a pray, can not release its grip before landing, even if sinking because of the weight. It still does not make sense to me, but now I know that we as humans can get into a similar situation.

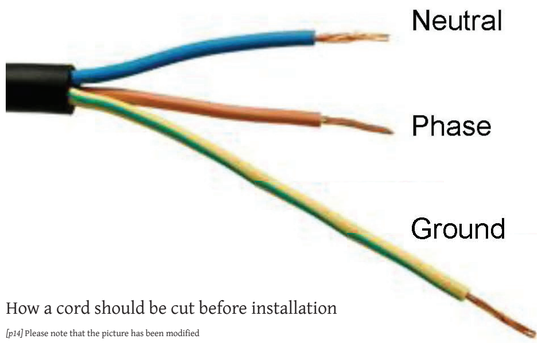
If we are holding on to metal, for example a ladder, and get enough current flowing through the body, our hands will instantly lock. It is pretty scary to think about actually, I have always before been under the impression that if getting an electric shock, I would pull my hand away by reflex just like I would when accidently touching a hot stove.

To avoid electricuting people, there are quite a few measurements to be taken, for example, a device that is not double insulated (CE approved) should always be connected to ground. The ground cable should also be cut longer than the other ones, to minimize the risk of it disconnecting before the phase in case the devise falls.

When working with outdoor cables, we also need to keep in mind that there is often more than one phase inside. If two phases are connected to each other instead of one phase to neutral, we get a current of 400V instead of the, in Sweden, normal 230V.

Finally. Mats mentioned that up until 1992, not all houses were built with residual current devices, that break the circuit in case of a leak. This could be quite a big potential hazard, as a fuse will not break until it is overloaded, by which time it would usually be to late for a human that came in contact with the current.

[p15]



How a cord should be cut before installation

[p14] Please note that the picture has been modified

Outdoor Lighting - Lectures and Activities with Ljuslaboratoriet

"LED kills facade colours"
/Henrik Gidlund

Akalla LED test project

A test path in Akalla has been equipped with LED lighting, of 30 different types, to evaluate the quality of LED lighting for pedestrian streets. Some important aspects that are being evaluated are; how the light is experienced, how safe the area is interpreted as, and how much energy can be saved with LED solutions.

[p17]

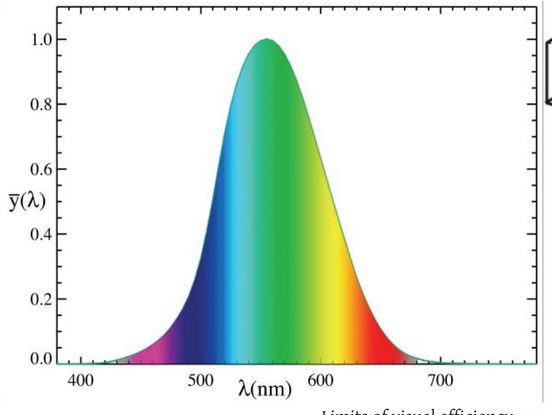
Lecture with Kevan Shaw

"What is a perfect white light?
The sun has an efficiency of only 93 lm/watt."

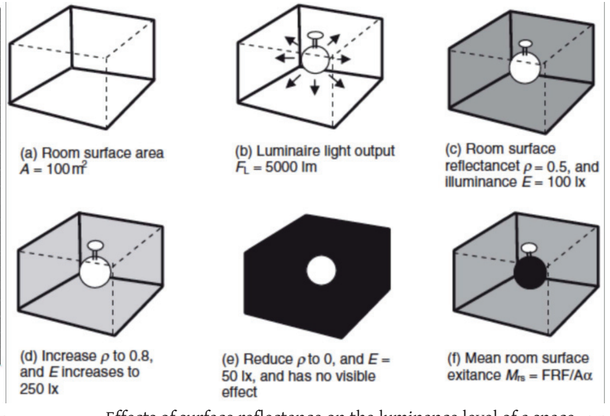
Kevan showed us a few of his projects, and then talked about sustainability in lighting. The most important point he made was that the graphs of how efficient white LEDs will get in the future, that point straight up with no ending, are impossible. Due to the way our visual sense works, a perfect white light from any light source has a theoretical limit of 245 lm/watt, when accounting for losses this is brought down to about 200 lm/watt. To convert electricity to anything higher then this, we have to make peaks in the green area of the spectrum. But how much light do we actually need? Research has shown that we can read adequatly in only 10-15 lux.

Also, as we are measuring illuminance with our lux meters today, we are not getting a fair value on how much light we are actually experiencing. If we would meassure luminance instead, how much light is actually reflected back from objects, what we see, we would have to account for other things in the space than only the actual light source.

As you can see in the examples below, if we could create a room where all surfaces had 0 reflectance, we would see absolutely nothing, no matter how strong of a light source we were to put up.



Limits of visual efficiency [p17]



Effects of surface reflectance on the luminance level of a space [p17]

Observations

- Things I have noticed randomly about light in my everyday life

“Det ser ut som att molnen ligger på vattnet och flyter” /Maria Tsychkova, 1/10 - 2011

“It looks like the clouds are floating on the water”, was what my 10 year old little sister said after noticing me take pictures out the window of the plane, and then having a look on what was there herself.

Of course they do! I had taken the picture because it appealed to me as in looked quite weird in some way I could not exactly point at.

It is a well known fact that we often have a hard time seeing what things really look like because we know (or think we know!) that a lot of possible interpretations are impossible, I have been trying to work on getting away from this, but obviously there is a log way to go. *[p1]*

The Elephant Cave, Crete, Greece

What would a workbook of mine, with no reference to diving be? Probably someone elses workbook, so here goes; The Elephant Cave is situated just a few minutes boat ride from Almridia, close to Chania, but the only entrance is located 14 meters below water. The cave is completely submerged for the first 40 meters of its length, and then stretches another 100 meters with partly air filled chambers. Inside there are stunning formations of stalactites and stalagmites, and also some remains of an extinct kind of elephant.

One thing I realized this sunny day was how dependant we are on light, and how much we take it for granted. I did mention in my last workbook (pg. 8) that I would like a torch for deep dives for better colour rendering, but I had not thought once about the seemingly obvious fact that I would be completely dependant on one more then 100 meters into a cave with no additional openings to the outside world, even in the middle of the day. Not until the guides started handing them out that is, just before we got in the water.

There was a lot to see in the cave, but still, the most amazing part was actually swimming out of it. With torches now off, we slowly closed in on the bright blue light. I have never seen such a beautiful blue colour before, which of course does not even close to translate onto a picture.

Inside the cave *[p1]*

Exiting the cave *[p1]*

Lake Kournas, Crete, Greece

I used to think that accounts of a light beam from the sky, suddenly shining up something, and changing the whole story, were just fairytales. But as you can see, it does happen.

I do not even have words for how much I wanted to just discard everything I was supposed to do, and spend the remaining part of the day trying to get up on the hill to where the light is pointing.

Maybe I should have. Unfortunately, we will never know.

[p1]

A note about natural and artificial lighting

I really, really, liked those lights at Chania airport on Crete, first time I saw them. I did find that a bit odd, why was I so fascinated by static light spread into beams high upon a wall with no real purpose whatsoever?

A few days later we were in Rethymnon, a bit east on the coast, for the sunset. Right, how many times have I not heard that “we instinctively like lighting that reminds us of natural phenomenons”?

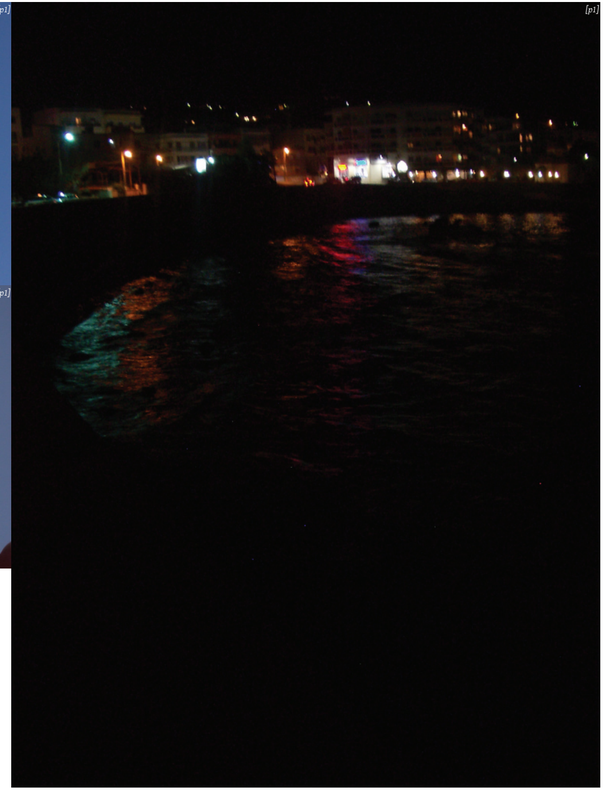
It is interesting to think how many different artificial lights could probably be connected to things we can find in nature, so why are we only talking about a, when you pin it down, pretty specific state of the suns glow as natural-like light?

At Chania airport, Crete, Greece [p1]

Sunset in Rethymnon, Crete, Greece [p1]


[p1]


[p1]


[p1]

Just looking

I wanted to include those three pictures in my workbook because they show some things we do not always think about with light. Above is an example of how different a material can look depending on the direction of light, and the picture on the right shows how some colours hardly visible in the lighting take much more space when reflected in water. All photos are taken on Crete.

Norwegian's new aircrafts have more than just free wifi

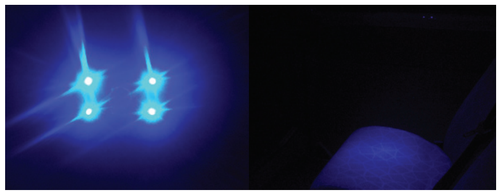
Getting on a late evening flight from Crete we had to wait. In the terminal. In front of the buss. On the slow moving buss. And for ages on the buss after it stopped. Once we finally got to walk out to the aircraft, non stop announcements were counting down the time before we had to leave to make our slot time, exhorting passengers to move quickly.

As I had been standing just by the buss door, and was sitting in one of the front rows, I got to watch most on this circus from my window seat. While doing so, I noticed the lights in the roof. The modern shapes, and even more the bluish colour of the light, made me quite certain they were colour changing.

That was indeed the case, as when they dimmed the lights for take-off, they chose to get rid of the white light, and just keep a deeper blue tone. And once we got up in the air, the light level was set back to the same as during boarding, but now with a orange/pinkish glow.

My analysis of this is that they were using the blue light to keep people alert and moving, or being ready to move, quickly, while the warmer light allowed everyone to settle down and fall asleep if desired, although there was still enough light to move around the cabin.

I do not know for sure that they really planned it this way, but I do know they managed to board a full flight of almost 200 people, do a head count, and start rolling, within 12 minutes of letting the first passengers onto the stairs.



The reason behind me being forced wide awake by blue LEDs throughout the trip on the shuttle bus from the airport though, remains a mystery, as they were only placed above the passengers, not the driver. [p1]

Light during boarding [p1]

Light during takeoff and landing [p1]

Light during the flight [p1]

Facts and Illusions

In case you have not figured that out yet, the picture on the bottom right is the same as the one in the introduction on page 4. What did you think that it showed? If you saw a snowy landscape, a beautiful winter morning, I have made my point. If not, maybe you can still, like me, see the resemblance to the previously described scene, in this picture above the clouds.

At the moment, I do not have much more to say about this kind of illusion, but I did get another nice thought when putting the picture next to one I took only minutes earlier, on the Arlanda runway; During the day, the sun is always shining somewhere above us, even if we can not see it.

Heading for Madrid [p1]

Up above the clouds [p1]

Do we really need to hate the sodium lamp?

As Mats Paulsson said, 90% of our road lighting consisted of hi-pressure sodium lamps just a few years ago, but today they are being phased out in most applications if favour mostly of the white son.

Some reasons given are that the white light is crisper, healthier, and brighter (!) at the same lux level. The fact that we can not as easily recognise people or notice details in yellow light is also stated, and a lot of people seem to want to push the sodium lamp off the market all together. At the same time, we are going crazy with monochromatic LEDs.

The bottom right picture is from an entrance at Arlanda airport, I would claim that I would not be able to easily recognise people or notice details in this blue light. But do I need to? Or do I just need to see enough to get of the bus and walk safely, with my luggage, into the terminal?

Sodium lamps are used in the tunnel below, and their yellow glow is nicely enhanced by painted shapes on the concrete. I like this place, and think that while the sodium lamp might not be the best solution for all applications it is used in today, it can still be an interesting choice in some situations.

Tunnel in Sollentuna [p1]

Entrance to terminal 4 at Arlanda [p1]

We can not help but to love colours

The parrot is a commonly used symbol in all kinds of commercials. This animal has as little to do with Prague as with hamburgers, but still the advertisement to the right is probably quite effective.

We are instinctively drawn to bright colours, even if we learn to partly counter this effect as we grow up, and the parrot with its vivid array of shades is hard not to like.

So is it really that strange that we are fascinated be coloured lights? There is nothing unnatural about them by the way either, just have a look at the setting sun.

Looking out the window of the lighting laboratory, 8/11 - 11 [p1]

Poster at Prague airport [p1]

Conferences

- Some views and lectures on lighting outside uni

PLDC

The professional lighting designers conference, started off with a preconvention meeting about sustainability, for me. Professor Heinrich Kramer and Giovanni Traverso talked a bit about how important it is that we not only have a suitable level of light, but light with the right spectrum, mentioned that the yellowish glow from a fire does not suppress melatonin at all as much as sunlight does, and noted that with LEDs we have a interesting opportunity to choose exactly what wavelengths we want. Most of the morning, however, focused on the problem of over lighting today, how we are loosing or dark skies, and changing the behaviour of not only ourselves, but also other animals. An interesting side note was also made about skin cancer, that the most deadly form of it normally occurs on places where sunlight does not reach, and is caused by a deficiency of vitamin D, not an overexposure to ultraviolet light.

As the days went on, it was obvious that the questions about light and darkness, and what light sources we should use, is the biggest issue today. Edward Barthalowem talked about how much more important contrasts are for our vision than the actual light level, and mentioned that we consider an interior space to be day lit as soon as it gets as much as just 2% of the daylight intensity from outside. Malcolm Innes noted that a dark space with a bright light in it, is still a dark space. Carl Gardner described how sky glow is mostly created by light spreading on, or just above, the horizon, and mentioned that the yellow light of the sodium lamp has an advantage here, as it can quite easily be “cut out” by astronomers. Kristin Bredal stated that if we were able to turn all lights of a city down by 30% at the same time, noone would even notice the change. Collin Ball claimed that Picassos “Guernica” was a unconscious reaction to his inability to deal with the new, electric, light. Paul Gregory pointed out that we need to remember that we only see reflected light, not the actual light coming from a luminaire. Andreas Danler questioned why we have automatic blinds coming down when the sun shines, shutting the natural light out, and turning on the electric. And finally Peter Dehoff brought up a thought worthy quote; “And the night became day, and the day became night, and the night is bright”, following up with asking us weather we believe that we need the night and the stars or not?

Another few aspects of light that were often brought up during the conference was how we work with colours, different methods of lighting objects, and how light and colour affect our emotions. Thomas Schielke talked about how we can work with luminous walls, and mentioned that an LED wallpaper has already been realised by Phillips. Thorsten Bauer showed some of his “luminecture” projects, where they map facades to make site specific projections on them, one of my favourite examples is a projection where ants break apart and eat the facade. Philippe Rahm said that dogs have bichromatic vision, unlike our trichromatic one, and described a project where he created spaces for humans and dogs that are perceived the same if we account for our different visions. Gerard Haubers pointed out that “white” LEDs are actually blue LEDs with a phosphor filter, and talked about the difficulties in making sure to get the correct colour of LEDs. Bruce Haglund presented an ongoing project of creating a daylit artificial sky, at the university of Idaho. Jonathan Hodges described how he created a 5th, virtual, platform at Sutherland Station in England, that interacts with the movement of the people at the real stations. Adam Weir pointed out how much detail needed to be put in the lighting of British Airways first class cabins, to produce the desired feeling of luxury. And at the final lecture I went to during the conference, Tapio Rosenius made an inspiring show of the endless amount of possibilities of what we can do with digital light.

There were also a lot of other interesting facts and ideas presented during the conference, I will mention my favourite ones on the next page.

Outdoor Lighting - Lighting Conferences

Dr. Alexander Rieck told us that the first cars made were actually electric, so it seems like we are not thinking in as new ways as we like to imagine. But he also stated that we need to keep our brains occupied with new and interesting tasks to get smarter, and referred to an experiment made with mice where the ones that were put in an inspiring environment ended up having more connections between brain cells than others that did not get much to occupy themselves with.

Prof. Brian Cody questioned the concept of efficiency meaning simply that something uses little energy, and described a huge air conditioned building in the middle of the desert, that he still considers to be energy efficient. This because the building uses solar power to run the air condition, the hotter it gets, the more power is needed, but the more power is also available, and thus no external power source is required.

Prof. Alan Dilani talked about how much our attitudes affect our own health and wellbeing, and emphasised how important it is for companies today that their staff are mentally alert, as “we live in the google society today, we produce ideas, not physical power”.

And last, but certainly not least, my favourite lecture of them all, with prof. Semir Zeki. He described how they, through experiments, have found ways to measure what/when humans perceive something as beautiful. It is kind of scary to think about, but pushing this research further, Semir believes that we can pin down what stimuli it is that make us, for example, fall in love. He also mentioned that adaptation is an interesting concept, and whether their measurements would still be valid or not after someone has gotten used to a certain stimuli, is still to be researched. And finally he talked about another research project, that I mentioned in the introduction, where they were able to make people perceive colours where there were none.

[p1]

In conjunction with the conference there was a manufacturers exhibition, where I was able to have a look at a lot of different luminaire concepts, some completely new to me.

Philips showed an LED luminaire that changes colour temperature when it is dimmed, as an incandescent light would, but I was more impressed by Xicatos prototype of a LED lightsource in which the colour temperature and the light output can be changed seamlessly, independent of each other.

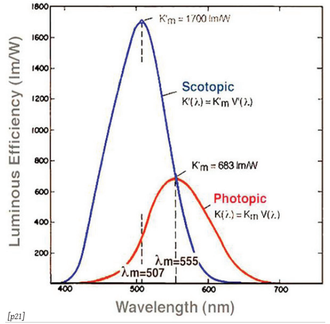
I was least impressed by the poster on the left, as when I asked them why the fish had been colourised I was expecting an answer in line with that their new luminaires could contribute towards saving the coral reefs, but they only looked at me as if they were completely unaware of that those fish do not look like this naturally.

Street Lighting forum in Stockholm

Peter Bennich was the first speaker of the forum, he talked about how important it is that we continue to quickly sharpen the demands on our light sources, as with the goals we have set up today, scientists predict that we have a only 50% chance of not raising the global temperature with more than 2 degrees. He said that we have to learn to adjust to more effective light sources than we are used to, as otherwise we would soon not have enough power to run all lights “since we all want more light than we have today”. At the end of the lecture, he got a question from someone in the audience, whether he thinks that there will soon be energy restrictions not only on light sources, but on actual luminaires as well. The answer was no, because this “is very hard to measure, and would be the end of many design luminaires”. Later, Magnus Wiklund described how the city of Örnsköldsvik had been able to afford to invest in new luminaires by temporary reducing the light level within the city, and could now happily announce that they would soon be able to turn all af the lights on again as they were now saving money through lower energy costs. When someone in the audience asked what negative effects they had experienced, that they now wanted to eliminate by going back to having more light, the answer was that; The crime rates had stayed exactly the same, as had the number of traffic accidents, but they “had not measured whether people were feeling as safe after the change as before”.

But there were also many speakers who believe that we need to consider lighting situations separately, instead of just forbidding specific ways of producing light. Johan Moritz questioned the lighting in Malmö, as “it creates a big cloud of light wherever you go”, and admitted that the city needs to work more with how it is lit, as “we need the darkness to appreciate the light”. Vesa Honkanen presented a similar view of lighting in general, saying; “I love the light... and the darkness”. And Johan Röklander talked about that there is no law telling cities that they have to have any public lighting, it is up to each one to decide how much they want, and that public lighting should enhance the opportunity for people be, and feel comfortable, in the city at night, but not about lighting up everything possible. He, like Per Nylén, also mentioned that more and more research is pointing towards that more lighting does not necessary reduce crime rates.

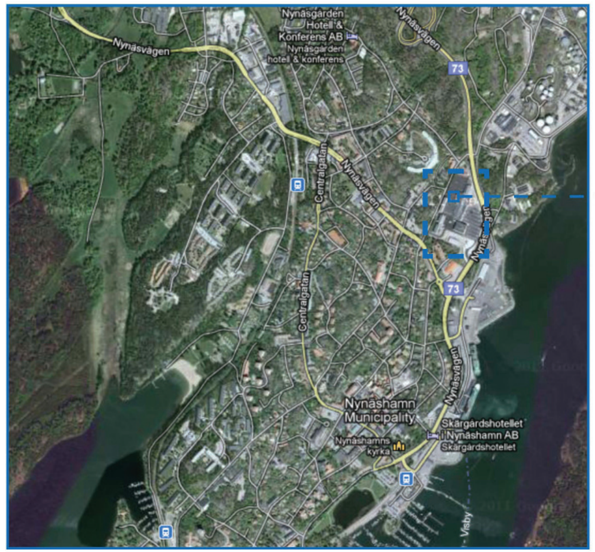
Ingemar Carlsson told us that at night people experience that white light is brighter than yellow light of the same intensity. So I asked him if that would not mean that there is something wrong in how we meassure light, as we use the Lambda curve to determine how strong the light output is depending on its colour, where yellow light is considered to give more light due to the experiment that constructed the curve. He was not quite sure, but after the lecture, Peter Lindberg from Prismalence explained the phenomenon to me. His view was that there is nothing wrong with the cure, accept that it is constructed for photopic vision. And although we are breaking up the night with more and more light today, in most places we are still mostly using our scotopic vision at night. The Lambda curve does not apply to the Scotopic vision, which has its peak in the blue part of the spectrum, so this does explain why we do not experience yellow light as bright as “we should” in low light levels.



[p21]

Workshop

- My first real outdoor lighting installation

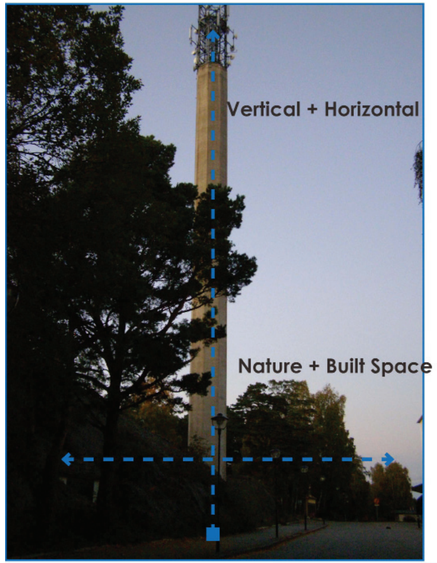


Lights in Nynäshamn

Our first outdoor lighting installation was placed in Nynäshamn, and I was working together with Anders Lind, Anastasia Iliadou, George Kalampokis, Katerina Konsta, and Sandra Valdelomar, on lighting up the telephone tower.

I chose to work with this site as I find it interesting how the tall tower is such a distinctive direction point in the city of Nynäshamn during the day, but completely invisible at night. Also, I wanted to look at how a structure this big is perceived in the close verses the far scale.

Outdoor Lighting - Workshop in Nynäshamn



Site Investigations

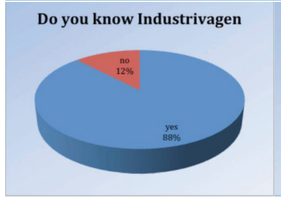
We were able to draw some important conclusions from a questionnaire we did on site, these are presented below. The total number of participants in the survey was 36, 2 out of 3 were female, and all of them where living and/or working in Nynäshamn.

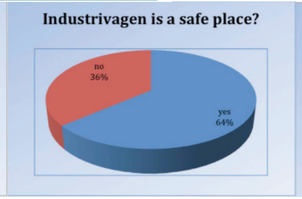
As a majority of people consider Industrivägen to be a safe place, we decided early on that we would focus on the tower itself rather than improving the lighting in the surrounding area.

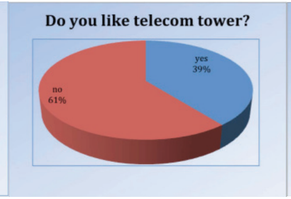
As most people do not seem to like the tower today, we wanted to give it a new identity, and make it a bit like a lighthouse guiding people around the city in the night. We also wanted to accentuate its octagonal form, to both get people to notice what it actually looks like and give it a specific nighttime appearance, as it tends to look round from a distance during the day.

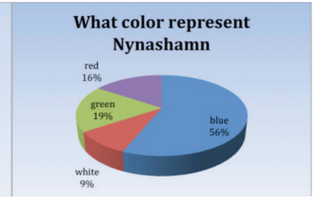
However, we did want to create something in the small scale as well, something to experience and interact with as you get close to the tower. The idea for this part came from how the tower sends out signals connecting different devices, and we wanted it to send out visual signals, connecting people to it as well.

As Nynäshamn is located next to the ocean and has a big harbour, we saw blue as a typical colour for the city, and through our questionnaire, we could see that this was the general impression of people there as well. Therefore we decided to use blue as a signature colour in our installation.



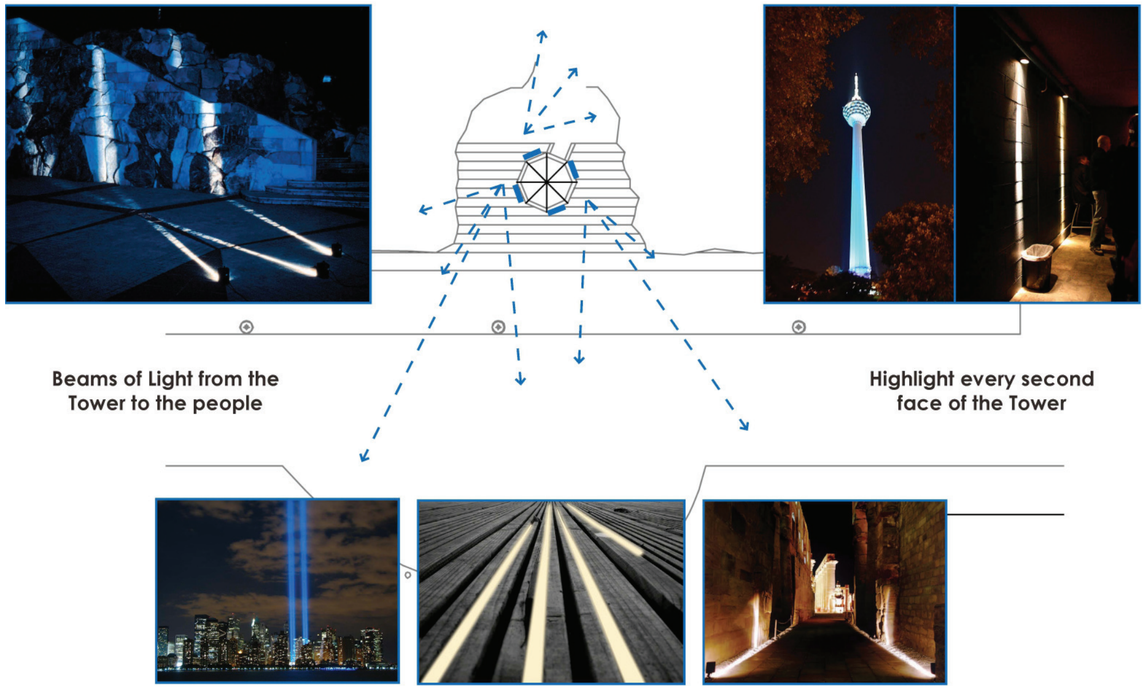






Imageboard

Concept



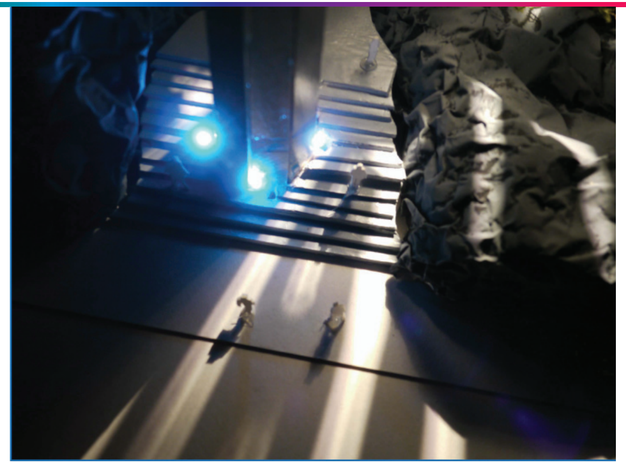
Testing

After having formulated our concept we started testing how we could achieve the effects we wanted.

We used fibre optics in a scale model to see different ways of directing the light to get the beams to stretch out towards the people around.

We also tested a lot of different luminaires to get blue wallwashing as high up as we intended, and to produce the narrow beams we wanted to send out from the tower.

As we wanted the lighting in ground level to interact with passing people, we also tried several ways of changing the white beams into blue as someone walked through them. The way we found that we could reasonably create for a short installation like this, was to have disks that had a clear and a blue part, rotated by disco ball motors, and steered by burglar sensors.

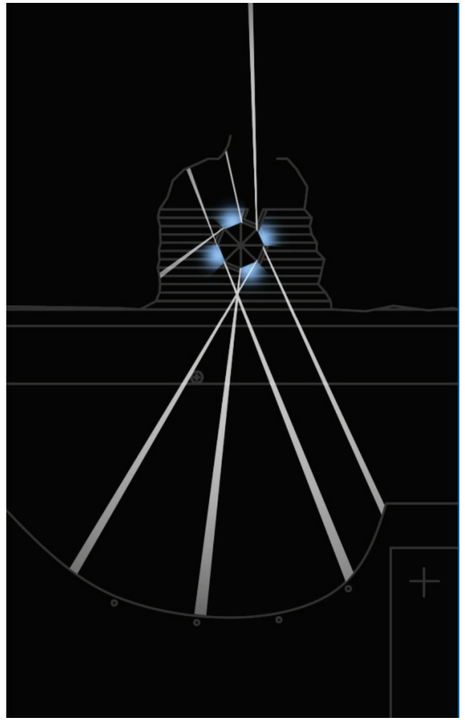


Equipment specification list

Luminaires:
- 4x Colour blast, 10 degree
- 16x IGuzzini Kriss QT – DE 150 Watt, narrow beam
- 1x HPL Thorn Contrast, Metal Halide 400 Watt

Control:
- 16x 230 volt, 13 amp, IR sensors max load of 200 watt each
- 16x 230 volt, slow rotation motors, ex. mirror ball motors
- 16x blue gel squares
- 16x clear plastic circles

Accessories:
- 4x Top-hats/glare reducers for Colour Blasts



Testing on site

Getting on site, we found out that we had not gotten any motors for our colour changing disks, only one IGuzzini Kriss luminaire, and one Colour blast. We did get three other coloured luminaires, one gave off a blue beam, and another a diffused blue light that only reached a very short distance. The last one was red. The rest of our equipment consisted of a few strong metal halides, and various luminaires with different angles and colour temperatures. So, now it was time for new testing, how could we achieve our concept with the material we got?

The blue light on the tower was a very important element, and as we did not see a way to light up four different sides with one luminaire, we opted for blue gels. And after having changed luminaires with other groups, we managed to have four similar metal halides to put filters on. Those were not giving us as much light up onto the tower as we wanted, so we kept trying all different ways we could think of to get more light out of them. One interesting occurrence was when we changed the lightsource in one of then from 75W to 150W, the light on that side was suddenly amazing, and we decided to change them all for the next day. On the next evening, just as we had set up, Rodrigo walked past, and instantly asked us why we had not changed the light sources, why the light was as bad as the night before? We were all just standing around wondering the same thing. Wondering enough to open up one of the lamps again and check that we did put in 150W lights. That was the case indeed. I had kind of accepted the concept that our eyes adapt to the brightest light at any given moment, and thus rasing the general light level will not necessary make something feel brighter, but it now became annoyingly obvious as we could find no other explanation to the overnight loss of light after hours of tweaking. The Colour blast had however given us a stronger light impression all by itself, and although this could be partly credited to it only having been tested alone with only one side of the tower lit and as the strongest light with different luminaires on the other sides, I do believe that the unfiltered light had somehow had a richer character that did give it more focus.

The second challenge was the beams, as we were not happy with just having one. We tried working with lenses, but could not get a hold of enough of those in time. We tried directing the light with blackwrap, but as the best luminaires we had managed to collect several of were LEDs with five lightpoints each, it persistently kept on spreading into five fields of light rather than one beam. So we tried using the existing topography and send the light across vertical parts of the stairs, and this actually worked really well. We did have to settle for LEDs of different colour temperatures, but after having moved them around probably more than a hundred times, we found a constellation that did not make this look obviously weird. Also, we did use the one IGuzzini Kriss we had to have at least one beam of light going out on the road where people walk.

Once we had managed to get acceptable light on the tower it was time to work on the interaction part, and as we had initially intended to change the white beams into blue, we started looking into simplifying this by having a blue light light up, just adding to the rest of the lights, as someone walked past. However, we soon realized that this was not giving us the strong interactive effect we were searching for, and after testing having more lights come on and of by the sensor, we ended up deciding to have all the round lights come on and off as movement was detected.

Outdoor Lighting - Workshop in Nynäshamn

Final installation on site

Improvements and Thoughts

Although we did learn a lot about how much can be done with equipment at hand during the workshop, there are a few thing we would like to change if the tower was to get a permanent lighting installation.

First of all, we would have used Colour blasts or similar blue LEDs to light up to tower, to both get a better light and avoid wasting energy on emitting it through a filter. While we were happy with having the stairs create the beams, we would like them to have a more equal feeling, and have thus nominated norrowbeam luminaires so that we could use the same ones for the beam shining to the front as well.

Moving on to more general reflections on the project, one interesting phenomena we were made aware of was how the tower looked kind of transparent with four dark sides against a dark background. This was not something we had accounted for in advance, but it did enhance the statement of the tower not being round.

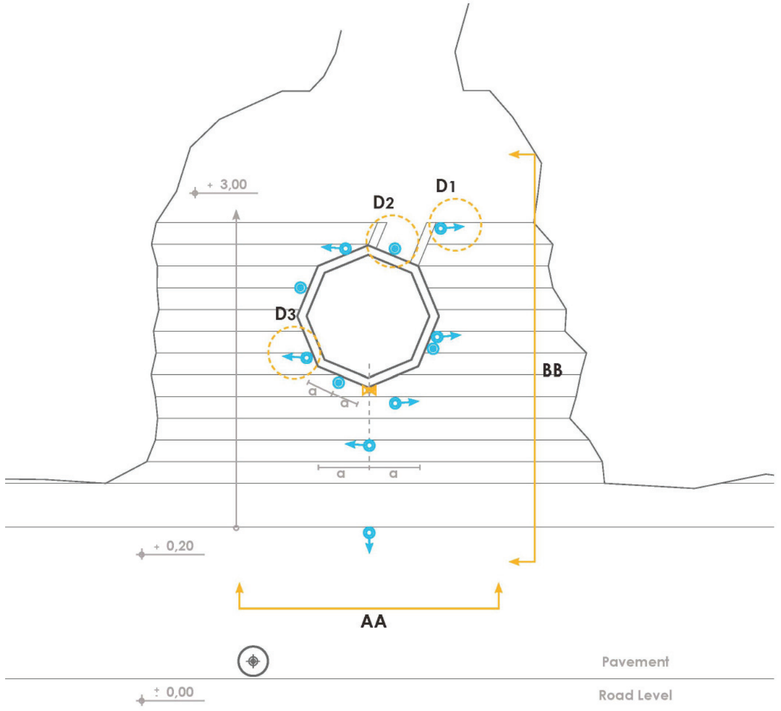
Another very interesting discussion circled around the colour blue. First of all Kevan Shaw described how blue is always picked as the best/nicest/most appropriate colour in surveys, thus questioning the validity of our questionnaire results. And later Jan Ejhed told us that blue light reaches a substantially shorter distance than red and green, not only due to the shorter wavelength, but also because our cone receptors for blue light are distinctively different than the ones for green and red. Kevan Shaw also mentioned that although blue light is the quickest to loose intensity with distance, it still causes major problems with light pollution at night as it suppresses melatonin more than any other light. Knowing this, using blue to light up a tower we wanted visible form quite a distance might not seem as the best idea, but after having mentioned that blue is likely connected to Nynäshamn due to its closeness to the sea, we did get acceptance for it being important in this case. It is however interesting to note for the future, that blue light will not be seen from as far of a distance as other colours.

One thing I really liked about our installation on site was how people threw a quick look on the tower from a distance, kept walking, and then stopped and had good look as they came closer and the ground lights came on. It is a really nice short term effect but, as Jan mentioned, in a permanent installation something that is still interesting after being seen a few times might have to be considered. In this respect, it would have been really fun to try out our initial idea with each beam being able to change colour independent of each other, as that would provide a more varied interaction, especially if several people are walking around the tower at once.

In general, I was happy with our installation, both with the final result and as a lesson on planing lighting in the future. One thing that I think is really important to remember, is that it is usually impossible to design a good lighting installation without testing it, as small changes in angles, colour, surrounding, and a lot of other things, can throw off a desired effect completely.

Outdoor Lighting - Workshop in Nynäshamn

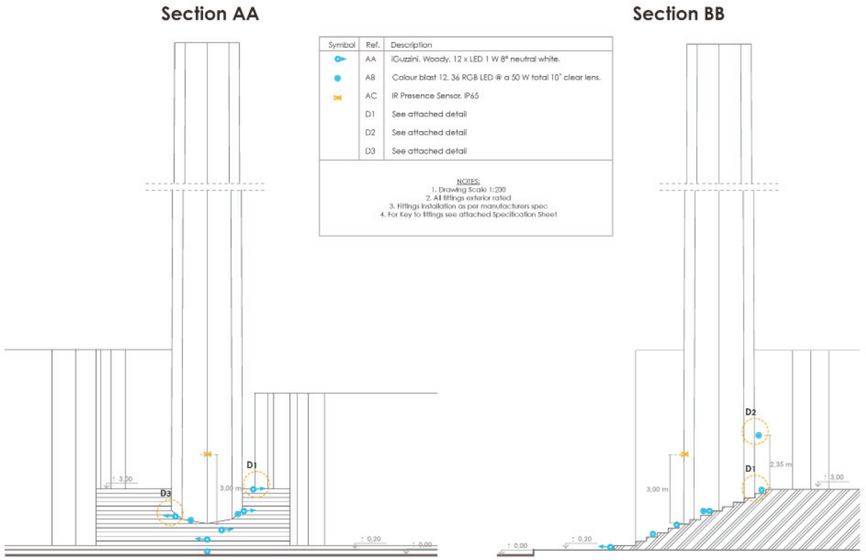
Final Plan



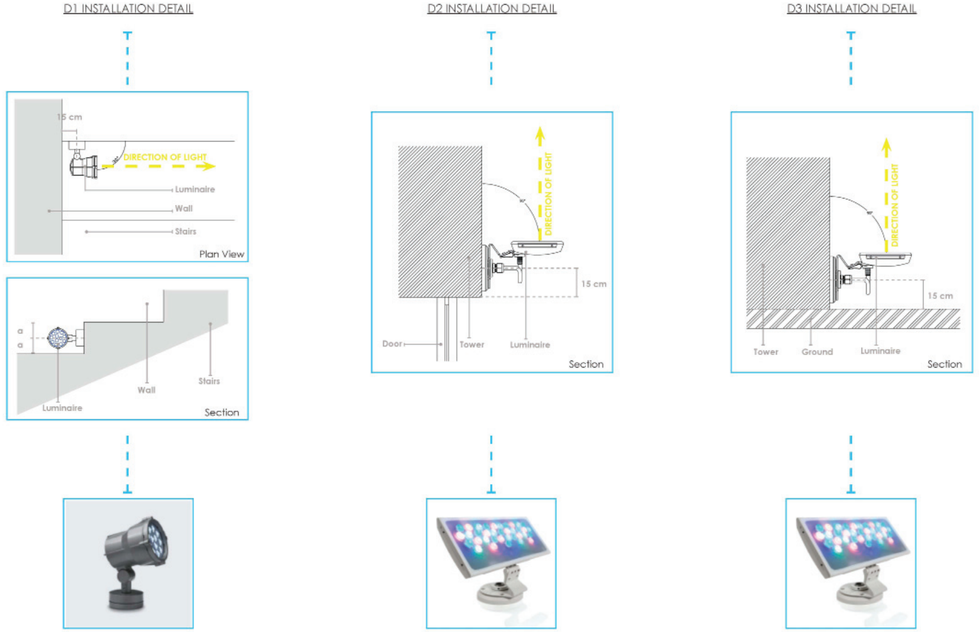
Symbol	Ref.	Description
	AA	IGuzzini. Woody. 12 x LED 1 W 8° neutral white.
	A8	Colour blast 12. 36 RGB LED @ a 50 W total 10° clear lens.
	AC	IR Presence Sensor. IP65
	D1	See attached detail
	D2	See attached detail
	D3	See attached detail

NOTES:
1. Drawing Scale 1:100
2. All fittings exterior rated
3. Fittings installation as per manufacturers spec
4. For Key to fittings see attached Specification Sheet

Final Sections



Final Details



Other installations during the week

To the right are pictures of installations that the other groups from our class made in Nynäshamn. It was interesting how the Red Tower group associated their spot to a ship while we were talking about a lighthouse, they looked nice together from the roof of the shopping mall. I also really liked the installation by the benches, as a lot of different elements were combined to create a cosy atmosphere. The Back Entrance installation was mainly focused on the glass box entrance itself, nicely directing people to the important part of the space. My favourite thing about the rock wall was the colours, a very apparent, but not to intense autumn influenced palette.

Parking Lot (top left) and Back Entrance (foreground)

Red Tower

Rock Wall

Benches

Discussions

- Some thoughts connected to what I have lately learned and experienced about light

What lights should we have in the future?

The light bulb has been around since December 1879, and was for long the only light source that did not require a living flame. Today it is being phased out in Sweden, like in many other parts of the world, because it is considered too inefficient as it produces much more heat than visible light. As me personally, I would probably not miss it greatly. I have always preferred light with a much cooler colour temperature, and started changing my lamps to either specifically coated light bulbs or full spectrum compact fluorescents, as soon as I was old enough to be allowed an opinion.

As a future lighting designer, however, I believe that we should have as many different types of lights as possible to make site specific decisions, and do find this situation more than a bit odd. My first objection goes to the opinion that we need more efficient light sources so that we can have more light which, for example, Peter Bennich expressed during the street lighting forum (pg. 42). He is basically saying that people want more light, so we should give it to them. Well, people obviously want light from the light bulb, as if they did not there would be nothing to ban, so how come we do not need to give them that?

The sky picture to the right, has by now been shown in countless lectures, and everyone likes to point out that it is a lie, as it is never dark on the entire earth as the same time. But that is beside the point, it does show that the civilized countries are casting a lot of light into the sky. I spent most of 2011 in Australia, and there, people kept telling me that I had to go to the outback and watch the stars as the night sky was simply amazing. In july I did, for two nights we slept in swags out in the open. I will not even try to put what could be seen into words, but if you have a look on the amount of disturbing light in the middle of Australia, you might be able to imagine.

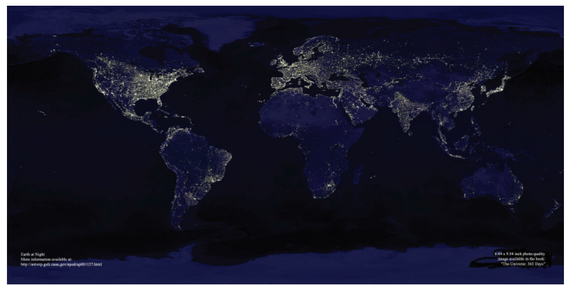
As Kristin Bredal mentioned at PLDC (pg. 40), we could probably lower all our lights with 30% without even noticing. Someone at the Street Lighting forum in Stockholm mentioned the same concept with 50%, and there has been numerous research proving that humans perceive contrasts, not actual light levels. At the same time we have still not found another light source that gives the same type of light as the light bulb, and we can see scary effects in both human and animal behaviour due to our over lighting of the night. But what are we banning?

I do realize that it would be much harder to control how much light people use than just banning a light source, I do, but lets examine that thought a bit further. On a clear evening, a couple of weeks ago, I was walking down Drottninggatan with a few friends. As we got close to the subway station, I looked up, and said “light pollution” to myself. “What do you mean?” The comment came almost instantly. ”There is too much light here, I can not see any stars”, I answered. “Well would you prefer that it was dark, and we would get robbed?”, was the reply. “We do not need this much light to see well, as long as there is enough contrast”, I commented. “Maybe, but it is much easier to put up more light than to try to think about the contrasts”, was the final reply. By now, we had gotten to the place where we were to go our separate ways, so I did not take the discussion further at this point, and I was not at all surprised by what I had heard. Actually, I think that this is the way most people today, who are not specifically interested in lighting, would reason, as we are used to turning the lights on or up if we can not see properly. It lies in human nature to go for the simplest solution to a problem, so I would not blame the average person for an opinion like this. But, should we really accept that the people who are making crucial decisions about what lights we will be allowed to work with in the future, are reasoning in a similar way?

What is more, as Peter Bennich also mentioned in his lecture (pg. 42), there are no restrictions on the efficiency of luminaires, just actual light sources. Basically, I could put a thousand LEDs inside a box, and only make a one millimetre wide hole for the light to come out of, just because I feel like it, and that would be ok. Several manufactures, at the Street Lighting forum, were exhibiting new LED street lights where the light was shining upwards, to then be redirected down by reflectors. I can nothing but agree about that this highly reduces glare, and they could all show me beautiful efficiency numbers of the LEDs used, but noone could even guess what the output of their actual luminaire would be once the light had been reflected. On the same topic, Peter seemed to believe that we should not really put demands on the efficiency of luminaires, as this would cause problems with design luminaires. I see the point, I do not want to throw away my Christmas chandeliers. But what about the “Light Shadow Bulb” below? It is a design luminaire, should it disappear just because it happens to have a tungsten wire inside?

Now, lets go to the big picture. We are currently trying to construct good cars that run on electricity so that we can stop using oil. We do not stop people from driving, we just make gas more expensive so they will think about it a second time. This works for electricity as well, commerce and offices have not been using light bulbs in any large scale for years, unlikely to save energy for any other reason than that it saves them money and that they also have to deal with getting rid of heat most of the year, which is easier without light bulbs. Homes are a totally different point, on the 25th of may 2011, Kevan Shaw wrote in his blog that the light bulb ban had been put on hold in Canada, with consideration to that its production of heat is not really a big problem in such a cold country. I would like to see how much more power the heating of an apartment in Sweden uses, if we change all light bulbs to LEDs. And by the way, would any lighting not become a statistically insignificant minority in electricity use if we all get electric cars?

The only reason I can accept for taking the light bulb off the market, is that we as humans mostly do what we have always done until we are forced to do otherwise. Jamie Olivers revolution of the food in British schools is a good example of this, a similar concept was tried in Sweden and failed miserably as the “normal” food was not temporary taken away and the children continued with doing what they always had. But if we take the light bulb away just to make people explore other alternatives, we should put it back out there after some period of time. Maybe Philips, having their main office in Holland where all light bulbs have been banned already, should do a comparison between peoples attitudes to different lightsource there and here in Sweden, where more then 9 out of 10 people still seem to be completely unaware of that the light bulb is about to disappear.



top: *[p23]* Map of night lights in the world

left: *[p22]* Light Shadow Bulb, by Ingegerd Råman

right: *[p1]* Home stylist Ann recommends that people change their lights to 60W tungsten light bulbs, to make their homes appear nicer. Note that the specific lightsource may not be produced, or imported into Sweden since 2011-09-01.

Do I paint my bedroom blue?

A couple of months ago, I found out about the third receptor for the first time, during Jans lecture (first workbook, pg. 12). I was aware of that blue light makes us more alert before, but only lately learned how big of an effect it can actually have.

A few weeks ago I started thinking of what colour I should paint me bedroom in, blue was the first that came to mind, as it is considered to be calming. I have heard about the psychological effects of blue within colour theory countless times, and even touched on the subject in an essay at the school of Architecture back in 2009. But now I suddenly became aware of a contradiction, how can blue as a colour be calming, and red be activating, while blue light is activating while light without blue wavelengths is less so?

I had the opportunity to discuss this concept which Kevan Shaw, and at first the discussion circled around that there is a difference between how we perceive pigment colours on a wall, and blue light within the space. This, however, reminded me of an experiment that I had come across while writing the previously mentioned essay. Its focus had been on showing that colours do effect us, not only when we are watching, but also if we close our eyes, and even with blind people, but what is more interesting in this discussion is that the study was made with blue and red light, not pigment colours.

The conclusion was that the light colours do have physiological effects on us, as the researchers were able to clearly meassure how, among other effects, peoples heart rate slowed down when they were exposed to blue light. Those findings were valid for all perceptual variations described above, and red light had the opposite effect of raising the heartbeat.

Another thing I also came to think of is that, as blue walls reflect blue light and absorb the other wavelengths, having blue walls should mean that there will be more blue light in the room if starting off with a white light source.

After having brought those points up, the discussion went on into several different directions at once, but my final sum up would be something like this; We as humans are biologically programmed to associate blue light with the day, melatonin is suppressed by is so we can be active to gather food and perform other tasks. At the same time, the day is the time when we do not need to be as worried of dangers lurking in the dark, thus the blue light makes us feel safe and calm. The absence of blue in light on the other hand, reminds us of the camp fire, we need to be more alert about that something might jump out on us, but at the same time melatonin is rising as it is soon time to blow the fire out to not be found by anything as we go to sleep.

Another thing Kevan did state, is that we still know very little about the effects light of different colours actually has on us, and at any given time, we can only do our best to work with what we currently know.

Well, in this regard, I am now not quite sure of what it is I actually know. The sum up of why we react the way we do to blue, above, does shine some light on how it works, but the contradiction of blue as calming or as activating still stands. So, should I paint my bedroom blue or not? ... Help?

The End

- After references and a final thought

Sources of information

Most of the content in this book is based on lectures and seminars at the Lighting Laboratory, KTH, during september through november 2011, lecture notes from those, and my own experiences.

Where it does draw from specific conversations and occurrences, this has been stated within the text, the rest are thoughts and understandings that have become clear to me during a longer period of time.

The few additional sources I have chosen to use when deciding on content for this book are listed below in no particular order;

coolstuff.se

savethebulb.org

artglassvista.se

stockholm.se

shvoong.com/exact-sciences/biology/1671321-ganzfeld-effect

viva-lite.se

Karl Rydberg - Färger i vardagsliv och terapi, Ica bokförlag 1999

Picture credits

[p1] My own pictures
[p2] coolstuff.se
[p3] blog.ohmynews.com/seulsong/238188
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[p6] From pdf of Jan Ejheds lecture, 26/9 - 11
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All photographs and sketches, in the Nynäshamn Installation part of this book, have been made by someone in our project group. [refer pg. 44]

If we can not save the light bulb, what else is likely to soon follow it on its way? [p1]