

Techniques for enhancement and visual change

Understanding the experience and effects of lighting design.

Text: Karolina M. Zielinska

There are many different ways to illuminate a building: from behind or in front, from the side, or from above or below. The job of the lighting designer is to develop the optimum lighting solution in line with the architect's intention for every individual project. Apart from the way the luminaires are focussed, there are a number of other factors that play a significant role: surface materials, the colour temperature of the light sources and coloured light.



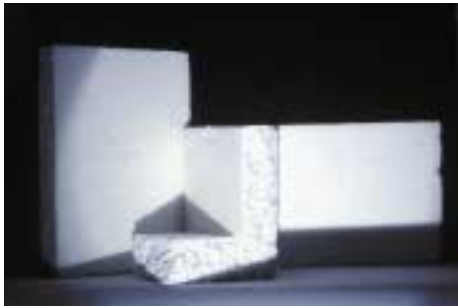
Diffuse uplighting.



Top lighting, downlighting.



Side lighting, at an angle from above



Direct uplighting.



Front lighting.



Direct side lighting.



Backlighting.



Back side lighting.



Direct backlighting at an angle from above.

Photos: Eva Zielinska-Millar

Have you ever asked yourself any of the following questions: How does one experience things visually? Why does a person sometimes like or dislike an image of a building viewed at night? Why does the lighting of a building or object evoke emotion or inspiration, or make one think on a deeper level? What is it about the illumination of architecture after dark that causes a person to pause and take notice, or simply pass by without a second glance?

Most people are unaware of the complex visual process of experiencing one's surroundings – and by extension, architecture and architectural structures or spaces. Lighting designers need to have a knowledge and understanding of this process to be able to experience architecture in an intellectual way and create a lighting design concept which will respond to the architecture and please the viewer.

When we see an architectural structure or space for the first time, we do not perceive the whole as a complete image, but instead as an impression. First, we form a rough "sketch" of the object, then, with the more we observe, we add additional details to our image. We recreate, what we have observed – a complete image of what we have seen. This process is common to all observers. It is the process we perform in order to experience any seen object. But what we see, what we recreate in our minds when observing the same object, often varies.

The way in which optical images are interpreted depends on each person's unique previous experiences, which come together to form perception. We can say that the impression a particular architectural lighting design concept makes on a individual depends not only on the design itself but to a great extent on the individual's aesthetic sensibility, mentality, education, culture, and the climate, location and environment in which the architecture is found.

Humans are subject to mood change; mood affects not only how we feel, but also how we perceive. The same architecture combined with architectural lighting can affect a person differently, not only at different times of day or night, but

from mood to mood. What is referred to as "good taste" or "good style" – does not really exist – it is the way a larger group of people experience an object. If they have similar opinions of the object under view, this may well be due to their education, professional backgrounds, the society or time they live in, all of which have an influence on their personal view.

Professional lighting designers are aware of the above issues and thus can concentrate on other elements of the lighting design, such as techniques. Lighting design techniques are powerful tools that can be used to transform architecture. By using appropriate techniques it is possible to create an outstanding lighting design concept or solution. That is why professional lighting designers use their understanding of light to enhance the viewer's emotional response to the object. The direction of light and how it is focussed, the quality of the architectural materials used, the colour temperature of the light source, and coloured light have an enormous impact on the nighttime appearance of architecture.

Going back to nature and observing sunlight and moonlight, we can discover many similarities to popular modern-day lighting design techniques. Lighting designers have observed natural light in its many different forms and adapted and transformed methods of applying electric light to imitate this. The direction that light comes from may appear to be elementary or even intuitive, but what non-specialists do not understand is that light direction has a powerful affect on how a piece of architecture or an architectural space looks.

If we want to decrease visible shadows and minimize surface details such as texture, we should use front lighting – light that falls on architectural elements more or less from the viewer's position. Front lighting also tends to minimize the apparent volume and shape of a building. A good use for front lighting is when the architectural structure or space does not rely on depth and texture and if it comprises strong colours. This technique provides the most information for the viewer while being easy to implement.



Photo: Eva Zielinska-Millar

The negative side is that front lighting can create architecture, which can look boring – due to loss of volume and depth. Textures and details are minimized, architectural objects become flat with few shadows. Also, a front-lit object may look too bright, and the background too dark, creating unwanted shadows and uneven illumination.

If we want to emphasize shape and form or silhouette, to show architecture in a striking or unusual way – backlighting is a good solution. An object can be backlit by a point source or by diffuse lighting.

Backlighting from a point source is when one or more bright point light sources are placed behind an opaque object to generate high contrast, i.e. to emphasize the subject as a silhouette. This effect provides a flattering halo of light, adds strong shadows, especially in landscape projects, and softens sharp edges. The down side of this technique is the lack of detail on a dark subject. Also, the background may be too bright, and there must be adequate space behind the object to place the luminaire. This is the most extreme form of backlighting, and the subject shows no colour, detail or texture, only shape. Silhouettes are easy images to process because they are inherently two dimensional.

Backlighting from a point source in nature happens in early morning or late afternoon on a sunny day without clouds. When an object is between the viewer and the sun, the light appears strong and harsh. This is the kind of lighting that causes drivers to overly focus on an object to the exclusion of other objects around it.

Diffuse backlighting (light source with a diffuser located behind an

Natural backlighting: the Manhattan skyline viewed from the Jackie Kennedy Reservoir, Central Park, New York City/USA.



Cool white 4000 K – 4200 K



Neutral white (daylight) 3500 K



Warm white 2700 – 3000 K

Photos: Eva Zielinska-Millar



Uplighting technique, involving placing the light at the bottom of an object and shining up at the focal point, highlights architectural wall-like elements.
Project: The Sculpture, Ashod Marina/IL
Lighting design: Roland Zeev Friedmann, Topaz Ltd.



Diffuse backlighting is used to impart and add dramatic elements to architecture. Translucent backlit walls appear almost mystical, emanating their own luminosity.
Project: Rodin Museum, Seoul/ROK
Lighting design: Thompson + Sears Lighting



Photo: Kai Pilippo

Side lighting: This lighting treatment for the building entrance increases perception of its dimension, underlines the texture of the wall surface and creates different architectural planes
Project: The Mexican Embassy, Berlin/D
Lighting design: Francisco Serrano



Photo: Vincent Laganier

Backlighting: Light sources are placed behind the opaque columns to emphasize their shapes as a silhouette. The columns show no colour, detail or texture.
Project: Porte de Bourgogne in Bordeaux/F
Lighting design: Sylvie Sieg



Photos: Hoare Lea Lighting

Uplighting technique using magenta and cyan coloured light.
Project: Apollo Victoria Theatre London/UK
Lighting design: Hoare Lea Lighting

object) is fairly easy to implement and it is the technique for viewing translucent objects. With this method we can create partial silhouette and a very-high-contrast image. The disadvantage is that the edges of the object may be fuzzy and space must be available behind the object to position the luminaire.

Transmitting the qualities of the surface of an object can have an enormous impact. Luminance levels vary depending on the type of surface the light is being transmitted through. Translucent materials scatter the light that passes through them. Images of objects between the translucent material and the light source can be seen, but not clearly.

Backlit objects that are translucent, such as frosted glass, wax paper, plastic or metal mesh will appear almost mystical, emanating their own luminosity. This technique imparts mood, is dramatic and very abstract.

Diffuse backlighting in nature is in evidence on overcast days, when clouds diffuse the sun. This produces a broad soft light source that wraps around objects and eliminates shadows. Diffuse light occurs at other times as well, at dawn, dusk, in a fog or when light radiates through falling snow.

Side lighting is a very useful technique. It occurs when light falls mainly on one side of an architectural object. Side lighting increases the sense of dimension, depth, volume, shape, texture and pattern, and gives rise to shadows that are visible from the viewer's position and emphasize the details and texture of the illuminated surface.

Side lighting works well when you have objects of varying textures on different planes. Side lighting sculpts a three-dimensional object. It can also separate the subject from the background. This technique may be too severe for some objects, creating contrasts that are too stark (too bright and/or too dark). Natural side lighting occurs early in the morning or late in the day. When the sun is low in the sky it sidelights scenes and adds interesting textures to surfaces.

Top lighting, or downlighting, is light that comes from more or less overhead and selectively illuminates objects and defines their importance. This situation in the natural environment may occur outdoors at noon. Inside buildings where ceiling lights predominate, light is directed downwards onto an area or subject. This lighting technique is very efficient for illuminating horizontal surfaces.

The disadvantage of this technique is the appearance of the ceiling in buildings – top lighting creates an optical illusion of a lower ceiling and causes the ceiling to look darker than it actually is. Deep shadows are generated, especially on the faces of people present in such spaces. Shadows appear in eye sockets while the tops of noses are brightly illuminated.

One form of downlighting used in landscape lighting is moonlighting. This can be achieved by placing a wide-beam projector above in the trees, or on the top of a building, and directing it downwards to create soft, ambient light. This technique is designed to imitate moonlight; it casts shadows on the ground and makes for a very pleasant walking environment.

Uplighting is the only unnatural technique lighting designers use, and the use it to create drama. This technique involves placing the light source beneath the object you want to showcase and directing it upwards. This technique will highlight a specific architectural element, such as a wall, column, sculpture or tree, but generally will not provide as much ambient light as downlighting.

Grazing uses uplighting or downlighting techniques to create an in-

teresting visual effect on vertical surfaces such as walls, columns and vertical planes, highlighting the texture of the material the object is made of. The only difference is the position of the light source (above, below or from the side). The light source is usually placed as close to the vertical surface as possible to deepen the texture of the surface. This is achieved by focussing the luminaire so that the edge of the beam skims across the surface, casting little shadows produced by the texture. The beam spread required depends on the size of the surface being grazed.

Attention should always be paid to the characteristics of the materials of the object to be illuminated (see backlighting). Light works differently with different materials, and the lighting designer should be familiar with the various unique qualities of different materials. Reflectance (the percentage of light reflected) plays a substantial role in the appearance of a surface. The exact same light source will look completely different on a dark structure than it does on a lighter, coloured structure. More light bounces off lighter colours. Dark colours absorb light; therefore, a higher level of illuminance is needed to produce

the same effect. Surface finishes affect both the quantitative and the subjective aspects of light.

Projecting coloured images and graphics onto vertical or horizontal surfaces is a type of front lighting which one sees increasingly frequently. Unfortunately, it is often applied without rhyme or reason. The architecture is used as a decorative element or a screen surface. The decision to apply this technique should be linked to the context of the site. Many times work of this kind is viewed as light art rather than architectural lighting design. If we highlight certain buildings or complexes to define the skyline of a city, to create modern landmarks or buildings and objects which help place the architecture or person in context by night – it may be regarded as a form of architectural lighting design. This technique should always be applied with care.

The optimum surface to project images on is a light coloured, matte surface. Darker surfaces are likely to absorb much of the light and will, therefore, be less effective. Some darker paints may have special reflective qualities and may be suitable to project images onto. Generally, matte or textured surfaces produce better results than shiny

surfaces. Certain building materials are particularly suitable to project images onto: plaster, painted walls, concrete and aggregate, brushed metals, brick, and light toned wood. Glass, mirrors, and high gloss metals are less suitable.

In our visual environment, the colours we see depend on the colour temperature of the light in which the world around us is seen, and the colour reflected by the object to our eyes. Colour temperature is a simplified way to characterize the spectral properties of a light source. Technically the colour of light is determined by how much each point on the spectral curve contributes to its output. This value is useful for specifying the right types of lamps for an architectural lighting design. Low colour temperature implies warmer (more yellow/red) light while high colour temperature implies a colder (more blue) light. Daylight has a rather low colour temperature near dawn, and a higher one during the day.

Lighting designers tend to highlight the materials used by selecting a colour temperature that relates to the aesthetic associations we have in our heads. Materials such as limestone, brick and wood are rendered as warm, while frosted glass, con-

crete and metal can look cool. In landscape lighting the proper solution is often to apply a cool colour temperature for soft landscape elements since this correlates with human feelings towards cool moonlight, and a warmer colour temperature for hard landscape elements as a reference to candles and open fires.

Colour to most people has always been highly symbolic. There are colours which have a special meaning or which we reserve for definite purposes and special occasions. Correctly used, coloured light may express the architectural character of a building or an object.

The quality of light is much more important than is generally recognized. We know that it is not the amount of light that always matters. Light is of decisive importance in experiencing architecture.

The same architecture can be made to give very different spatial impressions by changing the position of the light source, its colour temperature and colour. Light can make an architectural object seem lighter or heavier than it is. It can be made to appear larger or smaller, near or distant, cool or warm. Light is a powerful means of expression for a lighting designer.

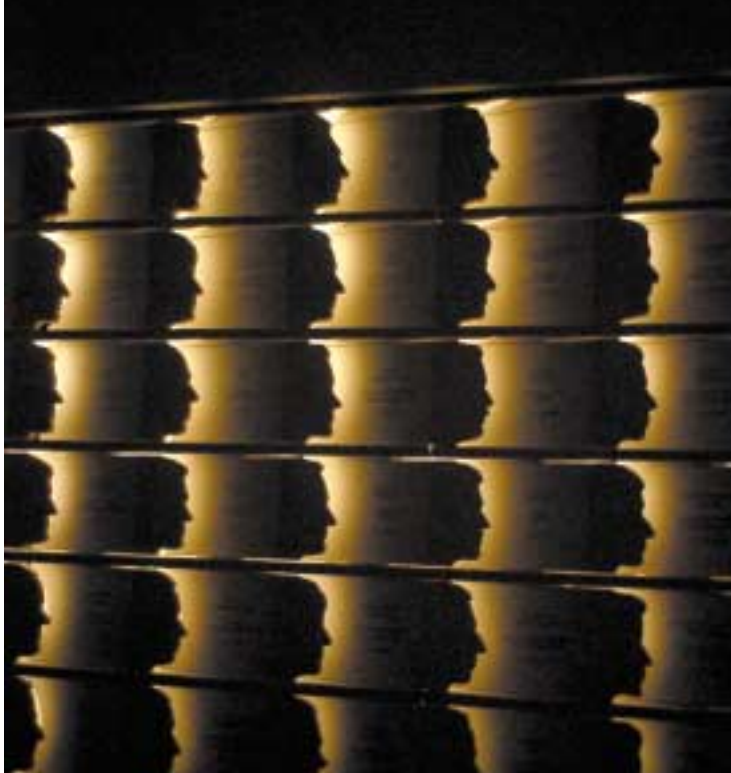


Photo: Brian Mosbacher

Point-like backlighting: This lighting approach will simplify an architectural scene by emphasizing the subject's silhouette and reducing the texture of the used material.
Project: Staten Island Memorial, New York City/USA
Lighting design: Fisher Marantz Stone



Photo: Åke E:son

Colour projection onto water creates a modern landmark and provides orientation in the environment by night.
Project: Waterfall in Norrköping/S
Lighting design: Michael Hallbert



Photo: Adam Dudko

Natural backlighting: The sun shines through translucent orange material.
Project: Christo and Jeanne-Claude - The Gates Installation in Central Park, New York City/USA 2005

There are a few issues that should be addressed before beginning working on a project: Should a lighting design concept follow an architectural approach? Should there be understanding of the architect's design? Should a concept be separate from the architectural idea – more in flow with the times we live in? The answer may not be self-evident.

As far as it is possible, an analysis must be made to understand why the building was designed for a particular functional purpose and how it was attuned to the entire concept and rhythm of certain era, special architectural style, and context of place. We must be aware of textural effects, discover why certain colours were used – because everything was done for a reason.

Our job as professional lighting designers is to respond to the above issues, recognize how light might shape architecture and use the proper language and techniques of light to communicate with the viewer. We should not take a rhetorical approach with our designs. We should feel free to present new visual ideas and interpretations, but only when we have a strong reason and understanding for doing so.

The more understanding we have of the language of light, the more freedom we have to convey architecture in the manner we want. We should find our vocabulary and language in lighting design with the goal of creating interesting lighting solutions and to enable richer experiences of architecture by night.

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