Interpreting art with light: museum lighting between objectivity and hyperrealism

Light renders art visible in museums. At the same time though light also interprets. In this regard curators, architects and artists often have differing expectations about how art should be appropriately displayed. This article is based on the aesthetics of image and exhibition and presents six categories of display – ranging from the objective reception of art to hyperrealism and the dynamic mediation of art treasures.

Each method of museum lighting serves to communicate a conceptionally based approach to art. Even exhibition spaces with a neutral atmosphere represent a particular curatorial attitude, where for example only diffuse daylight is available as the light source or
uniformly illuminated walls project a sense of calm. The same applies to highly pervasive accent lighting that presents art as a collection of individual works. The decision about how to interpret the display of artworks with light is however frequently an extended process because highly different interests often clash. Architects demand an acknowledgement of the building itself, curators aim to make a contextual statement about the collection as a whole, collectors as lenders are keen to communicate a particular sense of aesthetics and the artists themselves insist on the suitable display of their individual works. Added to this are various generations of visitors whose general interest in culture hinges on the expressiveness of a presentation.

With light, exhibition organizers are presented with an influential tool that is able to define the atmosphere for viewing art, establish a sense of drama to support its reception and generally contribute to the success of the exhibition. For this reason, the question for all participants rapidly arises as to which criteria should be used to achieve a suitable lighting concept: the light atmosphere within the specific artwork? Or the light in which the work was created? And what is appropriate for art that was originally created in candlelight and that should now be displayed in an attractive way?

Should an individual work serve as the benchmark, or indeed the primary theme, of the complete exhibition? How can the impact and interaction with art be stimulated with light? When does light appear authentic and in what circumstances might it change the meaning of the exhibit?

This article responds to these issues by starting with the innate appearance of the artwork or exhibition to then proceed with suggesting a suitable concept for the lighting design. A classification of lighting solutions into six categories, ranging from the objective reception of art and hyperrealism to the dynamic communication of artistic treasures, illustrates the diversity of design possibilities and also helps with orientation in the concept phase. Introducing the categories begins with the appearance of art and space, and then describes the atmosphere from the point of view of the museum visitor. Notes on suitable lighting tools indicate how concepts can be specifically implemented. If a method of presentation and display was derived exclusively from the content of the artwork, critics would justifiably propound suggest the allegation of formalism. The model of six categories on the other hand proposes an approach that indicates how differently light is able to impact on the appreciation of art and how important differentiation is to suitably communicate culture.

The pretense of objective art appreciation
The sober, empty, white-walled rooms of exhibitions evoke the impression of a factual and objective method of displaying art. Large-format paintings such as works from the American Color Field movement from the 1950’s have a particularly positive impact in galleries often termed “white cubes” because the wall becomes an extension of the artwork itself. Works from the Minimal Art movement or the realistic photographic works of Bernd and Hilla Becher for example also achieve a high level of impact if the conceptual attitude of the works comes together a sense of cloudy sky and diffuse daylight emanating from the soft atmosphere of the room.

Any attempt to emphasize the special features of an individual artwork within such neutrally displayed exhibitions is neglected in favor of a uniform presentation of the exhibits. Visitors experience a spatial impact even in completely neutral presentations of art – the brightly lit, peripheral white surfaces attract the eye of exhibition visitors.

This in turn lends the architecture a similar level of validity to the artworks. The artwork as a darker object is able to break away from the bright background and therefore blends visually into the foreground. In terms of atmosphere, the uniform brightness of the white space is reminiscent of test laboratories where any form of external emotional influence is excluded in the striving for objective evaluation. Viewers of art can also concentrate on interpreting the exhibits in a similarly undisturbed way. The monotony of the room can however stir a sense of boredom because the light atmosphere resembles an overcast sky on a dismal day. If small-format, light-sensitive art prints are displayed on a wall uniformly illuminated with dimmed light, the large, peripheral wall area quickly becomes dominant and distracting. The contrast in brightness is similarly unfavorable with wallwashing on white walls displaying dark paintings. Soft shadowing in pictures depicting darkness may also break up and disintegrate to a certain extent if such artworks are illuminated in very bright light.

**Minimalist accenting – subtly emphasizing works of art and motifs**

To disassociate from the uniformity of the "white cube" concept without taking on a more theatrical form of presentation, an approach has developed that works with bright surroundings but subtly emphasizes individual works or conceptional motifs. In this regard two varying strategies are used: firstly with the background that differentiates itself from the artworks via the brightness and color tone of its wall color, and secondly the use of discreet accent lighting. Visitors to historic museums presenting classic art are frequently subjected to a very inconspicuous method of presentation.
With dark wall colors, the paintings often seem brighter on their own due to the contrast in brightness compared to displaying them on white walls. Another variant consists in the use of color contrasts, where for example paintings with warm color tones are displayed on walls with cool colors. This effect can be highlighted with supplementary accent lighting. In the world of art, subtle differences in brightness are found for example in the Gothic era with Giotto di Bondone or in the Renaissance with Sandro Botticelli, Michelangelo and Leonardo da Vinci. Such artworks feature very soft shadow modeling.

Curators use pinpoint light accents to lend the works a greater sense of presence in relation to the wall surfaces. The same method can also be used to emphasize central works in the space, thus attracting the attention of visitors to essential exhibits and discreetly communicating the general motif of the exhibition. In contrast to a consistent "white cube" approach, the room adopts a sense of calm but without sterility or monotony due to the visual dynamism of the unobtrusive contrasts in light.

Individual works or complete groups can be accentuated to establish relationships. Another feasible approach is to discreetly accent a section of a painting to reference the theme of the exhibition for example, although a cultural-philosophical question arises in such situations – how far can a curator go in modifying an artwork's statement via lighting? Would perhaps the artist disapprove of such an encroachment and see it as manipulation?

Making the right decision demands a degree of experience and sensibility concerning art and artists.

**Grading information with perception-orientated lighting design**

To establish hierarchies of perception that discreetly structure and prioritize the information, exhibition organizers often adopt accent lighting dimmed in a nuanced way as a supplement to general lighting. Striking contrasts in illumination are achieved with a brightness ratio from 1:10 upwards between the accent light and its surroundings. Whilst this ratio seems exaggerated for the subtle emphasizing of individual works, a contrast of 1:2 for example has almost no effect for perception purposes. For this reason a brightness ratio of 1:5 is assumed to be ideal. Decisive however for an appropriate result is the overall visual impression of the artwork in the space rather than a painstaking glance at the instrument measuring illuminance. Softly diminishing graduations on light beams also support the impression of curatorial encroachments taken with care. Discreet accent lighting gives a new impact to sculptures in particular because their silhouettes and surfaces are modeled by the shadowing and radiance. Another form of discreet interpretation is in the shape of the light beam. If, for example, related artworks are
grouped together using an oval light beam the observer rapidly identifies contextual references, whereas this might not be the case with individual light accents pinpointing the individual meaning of the work.

With exhibition spaces where daylight enters from one side only, subtle displays of artworks can be achieved if the lighting adopts this light direction along with its associated distribution of brightness, and indeed simulates this with appropriate illuminances on the specific walls. As a result the wall opposite the window facade gains a higher illuminance than the wall segments between the windows.

**Strong contrasts in light achieve dramatic presentations**

Both painters and photographers take advantage of intensive contrasts in light and shadow to achieve a sense of tension in their image compositions. Transferring this ambience to the exhibition room suggests itself to provide visitors with holistic experiences of art. The Chiaroscuro style developed in the Late Renaissance and Baroque eras typical for example of many works by Caravaggio or Rembrandt attempted to achieve dramatic image effects with use of intensive bright-dark contrasts. Such high-contrast light and shadow effects are also an essential part of the photographic style of many works by the fashion photographer Mario Testino. In a time in which exhibitions have become a popular leisure activity, rich-contrast presentations, as used on the stages of theatres for example, also achieve a stimulating, entertaining allure.

If this approach is transferred to an exhibition room the artwork becomes the centre of attention and the peripheral space recedes to disappear into the surrounding darkness. The darker the wall color, ceiling and floor, the more intensive the spatial impact.

Each work of art is given its own grand entrance with the use of accent light. In terms of atmosphere the dark room involuntarily creates an impression of night-time in which the light beams bring the art to life (in a similar way to using a flashlight outside at night). Just as a projector in theatrical productions spotlights the principal actor on stage, so the focus is placed on the specific individuality of the art. The intense contrast in brightness establishes a dramatic atmosphere for visitors, exerting a sense of fascination akin to a stage performance, and in this way even the composure and dispassion of sober art works can be divested. Here again though, curators must ask themselves how far they can go in emotionalizing the apparently objective visual language of the artist in an attempt to achieve high-profile exhibitions. In dark environments, when does the feeling of a fascinating secret deteriorate into a sense of loss and disorientation? For sculptures that explicitly depend on spatial perception, the
general use of high-contrast accent lighting in achieving an intensive play between light and shadow on the exhibit is often simpler than with paintings.

The right lighting tool for dramatic displays
Directed light from spotlights is essential for exhibits if rich-contrast, bright-dark presentations are aimed for. Each source of diffuse light in the room would impair the impact of dark surroundings. The intelligent selection of specific light beams enables the surface to be illuminated to be ideally matched to the size and shape of the works of art. Spotlights with replaceable light distributions are ideal for such requirements because they enable simple modification in both temporary and permanent exhibitions. Narrow spot beam angles of <10° are suitable for accenting very small objects or for bridging larger distances between the luminaire and the work of art. In contrast, spot or flood beam angles are used for larger objects. High illuminances may occur with the concentration or grouping of very narrow light distributions that might have a damaging impact on light-sensitive exhibits, and in such cases individual dimming with a potentiometer is indispensable.

A further option for linear-shaped objects is oval flood light distribution for the ideal illumination of wide paintings and statues. Even wider light distributions such as wide flood are available, but these are less suitable for creating high-contrast, bright-dark atmospheres because they excessively brighten the room. Wide light distributions are usually only used by curators when displaying exhibits covering the height of the room such as tapestries, and predestined for such purposes are lens wallwashers that achieve a uniform distribution of brightness on the wall. However, in this context dark floors and ceilings are needed to create an intensive sense of tension in the room based on bright-dark contrasts. With sculptures the sense of drama can be increased with shadows and extreme light directions – either with the steep incidence of grazing light for emphasizing textures, or a very wide angle of incidence for sculptures that generates very long shadowing. In general a 30° angle of incidence has proved ideal for paintings and sculptures to achieve good modeling and avoid overshadowing.

The black box: magically illuminating works of art

Very dark exhibition spaces seem to exude a secretive atmosphere where works of art arouse in observers the impression of being illuminated from within. The concept of a black box where exhibited objects are illuminated as jewels in a form of treasure box represents the opposite approach to the white box. Photographs gain the impression of having been installed in front of light boxes. The
Canadian artist Jeff Wall for example shows his photographs in illuminated boxes, and this involuntarily arouses associations with the cinema, television and luminous advertising.

If artworks seem to only illuminate from within, they disassociate themselves completely from their architectural surroundings. It is as if only the art itself is important, although its effect is strongly based on this magical method of presentation. This approach creates an artificial context because artists seldom create their works in comparable conditions, and luminous surfaces in this form do not occur in nature.

Contour spotlights for a magical aura
With this method curators dispense completely from attempting to display art in a realistic way in favor of dramatic effects. Works of art gain a highly emotional, slightly mystical effect because only these are illuminated and their surroundings remain completely dark.

Contour spotlights are indispensable for such effects because they have a framing attachment that projects circles of light or contours with highly crisp edges. The attachment on the head of the luminaire is used to individually modify the projected area to the specific artwork. The crisp edge of the light beam is modified by sliding the lens, and the framing attachment is initially precisely focused when illuminating pictures. Slight defocusing is then carried out to achieve softer transitions, especially with wide picture frames. If luminaires have a closed contour attachment, museum visitors can hardly see these in dark exhibition spaces.

Interpreting artworks with hyperrealism

Visitors are confronted with an exaggerated sense of reality within hyperrealistic display strategies. The sculptor Duane Hanson was one of the founders of hyperrealism in Pop Art with his life-sized human figures reflecting scenes and situations from everyday life in America. The contemporary British artist Matthew Penn also classifies his works as belonging to hyperrealism. The artist emphasizes gradations of brightness in his portraits with use of lighting to achieve greater clarity and a stronger, more subtle definition of details. This creates an astounding interplay between the multiple layers of oil colors and the precise alignment of several contour spotlights with varying color temperatures. With Penn, the illumination of the artwork becomes a fixed component of his art.

Artworks subjected to hyperrealistic display situations are intentionally exposed to transformations that aim to increase visual perception, often to an excessive extent. In contrast to the lighting concepts outlined above that concern the relation between the artwork and the space, hyperrealism works exclusively with the object
itself and its redefined statement. With discreet interpretations, an
uncanny or even frightening mood is sometimes created because
visitors discover striking resemblances to reality. In an environment in
which people interested in art are diversely stimulated by theme-
related worlds, curators are faced with the question of how far they
can proceed to contributing to a new method of experiencing art
using hyperrealism, in the striving for exhibition success achieved by
reinterpreting the exhibits.

**Lighting technology for hyperrealistic presentations**

With hyperrealistic exhibition concepts, lighting designers
experiment with special brightness distributions or the light
spectrum itself for example. With the former, the painstaking analysis
of brightness distribution on the painted surface is paramount. These
contrast ratios are then precisely simulated by the lighting.

If the work of art contains a variety of contrasts, a correspondingly
greater number of luminaires with narrow light beams are used.
Contour spotlights are ideal for such applications because the
projected area can be adjusted in shape, size and focus by modifying
the lens position. A potentiometer on the spotlight allows the
brightness of each luminaire to be individually matched to the
specific area of the painting. It is recommended to invest sufficient
time with such scenarios when setting up the exhibition.

The second option for emphasizing the impression of color via the
light spectrum requires luminaires with several individually
controllable color channels. With this method, color consistency
remains constant across several luminaires that target different zones
within the artwork. However, the composition of the light spectrum
is modified on each individual spotlight using the various color
channels – the result is that certain material colors in individual
zones of the image or within an exhibition have a different effect.
This process enables single colors, for example a blue sky, to be
emphasized in terms of color impression whilst avoiding the shifting
of colors towards blue elsewhere in the image or on other artworks
in the exhibition room. This phenomenon is known as matamerism –
working with identical color constancy whilst simultaneously
modifying the spectral composition. The spectrum of warm white
LEDs is distributed relatively uniformly across blue to red and
therefore generates a neutral impression of color. With the red, green
and blue LEDs of RGBW modules, the same warm white light color
can be created by mixing the three colors, but the spectrum exhibits
three peaks that cause an intensive color impression with red, green
and blue materials. To achieve a neutral impression the white light
color is set via the warm white LED channel without any RGB
components. If blue should be particularly emphasized for example,
the RGB components are increased with a special weighting towards
blue. DALI light control enables lighting designers to individually define the color channels of RGBW luminaires to achieve hyperrealistic color impressions.

**Dynamically communicating exhibitions**

In today's society, education and entertainment are increasingly merging to become a single entity. To motivate a younger public who's everyday existence is dominated by digital devices and multimedia experiences, museums are looking more closely at innovative forms of presentation. Visitors equipped with tablets and mobile phones already have their own interfaces to access further information, to discover exhibits in a playful way using apps and augmented reality and to even interactively influence presentations. The interest in avoiding a static atmosphere in exhibitions and influencing the attention of the public when they visit exhibitions and museums has a long tradition. However, modern technology has much simplified the implementation of dynamic display concepts and also enabled new forms and methods. Peggy Guggenheim used dynamic light in her first New York gallery "The Art of This Century" in 1940 with the intention of creating a new method of access to art, and visually communicating the pulsating character of life by using pulsating light.

Artworks as singular static objects disappear, to be replaced by dynamic backdrops for high-impact and informative overall experiences. The exhibition space is transformed into a stage for visitors that gains in aesthetic quality from the redesigned choreography of the works of art. With such concepts, visitors may gain the impression that the lighting itself dominates in the form of light art, to the detriment of the exhibits. Furthermore, if the main focus of artistic communication shifts away from the actual display of the works towards an atmosphere of entertainment, an impression of kitsch is rapidly created for the art aficionado.

**The technical infrastructure for interaction**

Designing dynamic lighting concepts is on the one hand based on modifiable lighting parameters and on the other, on the complexity of the interaction.

Accordingly, suitable light control systems with sensors and controllable luminaires are selected. Three types of interaction can be identified: dynamic, responsive and interactive. Presentations using dynamic light consist of preset sequences, for example a high level of illuminance at midday that recedes towards the evening. This in turn enables visitors to register the changing course of the day outside.

Visitors are exposed to a responsive lighting situation when sensors modify the light, e.g. if people enter a dimmed exhibition space and a
motion sensor then increases the accent lighting – either due to conservation considerations or to enable observers to individually view artworks. Alternatively, changing from accent lighting to wallwashing in the room is also feasible. To achieve a stronger sense of emotion when entering the space, another possibility would be supplementing warm white accent lighting for good color rendering of the pictures with cool or even blue general lighting or wallwashing, thus further intensifying the focus on the exhibits beyond the color contrast itself.

Museums can provide interactive lighting situations via apps for example where visitors modify the light over their own smartphones. If the observer selects a particular motif in the room, appropriate artworks or sections of pictures are then emphasized with higher illuminance. With regard to museum-based education, quizzes are feasible where visitors enter their responses into the app and the accent lighting indicates the correct answer. If level-of-interest profiles are available to visitors, this enables further situations where the majority decides whether an artwork is displayed in a peaceful, neutral atmosphere or alternatively with a possibly rich-contrast, theatrical ambience.

Summary

Check list

The rise of new art forms and other aesthetic ideals is reflected in methods of art communication and in the changes that exhibition concepts have undergone. The innate diversity of art presentations with light ranges from sober, neutral atmospheres achieving an objective impression to hyperrealism and dynamic presentations that celebrate the interaction with cultural assets as experiences. Three factors can be used as criteria when selecting a lighting concept: 1. the content within the artworks, 2. the formal aspects of the image medium and 3. the spatial and temporal surroundings in which the work was created. By analyzing the artwork’s brightness, contrast and light atmosphere, curators can specify a similar method of lighting for the room and the exhibit – e.g. rich-contrast accent lighting for expressive Chiaroscuro effects. If on the other hand the size of the artwork and its picture frame are considered, lighting can also be selected that corresponds to the aesthetic approach, for example wide-area wallwashing for large, minimalistic paintings or narrow distribution accent lighting for small portraits with striking, historic frames. A suitable color temperature and lighting method can also be derived from the particular era and its historic background, e.g. either natural daylight or candlelight in a studio. An important criterion with light when aiming for authentic presentations is the question of whether the artist perceived the artwork in that way at the time of
creating the work, whether the lighting concept being considered could lead to a falsifying of the artistic statement and whether the lighting solution distracts from the essential reception of the art.

- Close agreement and coordination with the curator and artists in the preparation phase help to minimize any corrections when setting up.
- Criteria such as the size and brightness of the exhibit, frame type, image content and light conditions at the time of creating the image help to evaluate whether a lighting solution would look natural or whether it might hinder the artistic reception.
- Multiple lighting solutions need a flexible infrastructure, e.g. tracks with spotlights.
- Replaceable light distributions enable quick and convenient modifying of the lighting concept from wallwashing with a neutral impression to more dramatic accent lighting.
- To achieve contrasts in brightness that can be clearly perceived by the eye, a ratio of at least 1:5 between the exhibit and its surroundings is required.
- Dimmable spotlights are indispensable in achieving dramatic effects using differentiated contrasts between the exhibit and the room.
- Contour spotlights are a good solution for 'magical' presentations where the light beam is precisely limited to the edges of the picture.

More details in the Journal article

The Leukos Journal has published an extensive article called "Interpreting Art with Light: Museum Lighting between Objectivity and Hyperrealism" that additionally documents the historical development of architecture and exhibition design and also contains further details on lighting design as well as literature references. Go to article
Exhibition concept: Art and the space: Light

1. Objective reception of art:
   - Realistic, unemotional art presentations
   - Calm atmosphere where the art and the room appear equivalent

   - Light: uniform brightness distribution, hardly any modelling, no brilliance
   - Daylight: diffuse incidence of light through windows or ceiling
   - Lighting: wallwashing for uniform brightness distribution

2. Subtle emphasizing of artworks and motifs:
   - Discrete highlighting of exhibits
   - Calm atmosphere where art slightly dominates the room

   - Light: low brightness contrasts, slight modelling and brilliance
   - Daylight: diffuse incidence of daylight supplemented by discreet accent lighting

3. Dramatic display of exhibits:
   - Artworks are placed in the foreground
   - Emotional display of exhibits

   - Light: intensive brightness contrasts, strong modeling/brilliance
   - Lighting: accent lighting matched to the size and shape of the images. Sculptures: steep angle of incidence for striking shadows.

4. Magically illuminating artworks:
   - Only the surfaces of the image are seen
   - The art is intensified; the room visually disappears

   - Light: uniform brightness only on the image surface with no light in the room
   - Lighting: contour spotlights with crisp light beams

5. Interpreting of artworks with hyperrealism:
   - Artworks are placed in the foreground, details are emphasized
   - Image characteristics are highlighted to intensify the reality

   - Light: Brightness and colors are intensified
   - Lighting: dimmable contour spotlights for the differentiated illumination of picture sections and spotlights with multichannel colour control for modifying the spectrum (matamerism)

6. Dynamic communication of exhibitions:
   - Lively displays of art
   - As well as purely observing the art, the entertainment factor is increased

   - Light: dynamism from brightness, color temperature and spectrum
   - Lighting: time-based light control, sensors or apps
Dr. Thomas Schielke, ERCO.

Dr. Thomas Schielke studied architecture at the Darmstadt Technical University, Germany. He has worked for more than ten years as editor for didactic communication at the luminaire manufacturer ERCO and is the co-author of the textbook "Light Perspectives: Between Culture and Technology".
The exhibition spaces as “white cubes” support the objective viewing of art. The uniform wallwashing does not differentiate between the art and the wall plane to give a generous spatial impression. Richard Nonas / Donald Judd exhibition in the Fergus McCaffrey gallery, New York. Photography: Edgar Zipfel.

The neutral background of wallwashing is especially advantageous for galleries and art fairs because lighting need not be modified if formats and exhibits change. Art Basel at the Miami Beach Convention Center. Photography: Moritz Hillebrand.

Homogeneous wallwashing communicates the impression that large-format works and walls blend to become a single entity. YUZ Museum, Shanghai. Architecture: Sou Fujimoto Architects, Tokyo. Photography: Sebastian Mayer.

The room and the light atmosphere in the painting are in unison at the Barbican Art Gallery in London: uniform daylight and wallwashing correspond with each other. Architecture: Chamberlin, Powell and Bon, London. Photography: Frieder Blickle.


Various light beam dimensions enable exhibition organizers to individually emphasize exhibits. Museum Guggling, Maria Gugging. Photography: Gustavo Alldi Bernasconi.

The cool-warm contrast between the blue wall and gold in the painting achieves a subtle contrast that emphasizes exhibits at the Pinacoteca di Brera, Milan. Architecture: Alessandra Quarto / Angelo Rossi. Photography: Dirk Vogel.

The foreground achieves a harmonious relationship between the gold color and red wall while the artwork significantly distances itself from the wall in the background. Pinacoteca di Brera, Milan. Architecture: Alessandra Quarto / Angelo Rossi. Photography: Dirk Vogel.


Contour spotlights enable works of art to impressively illuminate from within. Hangaram Design Museum, the Seoul Arts Center, Seoul. Photography: Sebastian Mayer.


The defined light beams on the antique objects establish a bridge to the stringent geometry of the wall of windows at the Museo Egizio in Turin. Architecture: Migliore + Servetto. Photography: Dirk Vogel.

The British artist Matthew Penn classifies his works as hyperrealistic, highlighting gradations in brightness using several contour spotlights for each work. Photography: Frieder Blickle.

Interfaces between lighting and apps or augmented reality enable museums to interactively communicate their culture. YUZ Museum, Shanghai. Architecture: Sou Fujimoto Architects, Tokyo. Exhibition design: IDEAS, Shanghai. Photography: Sebastian Mayer.

Accenting art with white light enables good color rendering, particularly in situations where colored dynamic lighting is implemented in the background. Danubiana Meulensteen Art Museum, Bratislava. Photography: Dirk Vogel.

The effect of stringent linear arrangements with artworks can be ideally emphasized with contour spotlights – these limit the light beam to the picture surface, leaving the surrounding wall in shadow. Arano Museum Dongmun, Jeju. Photography: Sebastian Mayer.