Light In Architecture

Designing with Light

- Light plays a central role in the design of a visual environment.
- The architecture, people and objects are all made visible by the lighting.
- Light influences our well-being, the aesthetic effect and the mood of a room or area.
- It is light that first enables “what you see”.

Our perception of architecture will be influenced by light:
- Light defines zones and boundaries,
- Light expands and accentuates rooms,
- Light creates links and delineates one area from another.

Planning and Process

- The basis for every lighting concept is an analysis of the project...
  - the tasks the lighting is expected to fulfill,
  - the conditions and special features of a space or work surface.

A quantitative design concept can to a large extent follow the standards laid down for a specific task.
- standards will dictate how much light is needed,
- the degree of glare limitation,
- the source color and color rendering.

When it comes to qualitative planning, it is necessary to gain as much information as possible about the environment to be illuminated, how it is used, who will use it and the style of the architecture.

Summary
- An understanding quality versus quantity
- Art and Science

Planning and Process

- Preliminary lighting concepts list the properties that lighting should possess. They may give no exact information about the choice of lamps or fixtures or their arrangement.

Further analysis provides illumination guidelines giving information about the individual forms of lighting... i.e. high light levels will need high performance fixtures and lamps, etc.

The challenge of a qualitative lighting design is to develop a design concept that combines the technical and aesthetic requirements of complex guidelines.

A concept that delivers the required performance with a equal level of technical expertise and the highest level of artistic clarity will produce the most convincing solution.
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Planning and Process

- As the design phase progresses, decisions are made regarding:
  - the lamps and fixtures to be used
  - the arrangement and installation of the fixtures
  - any required electrical and control devices
- The decision regarding lamp type can be made at the beginning of a project or left until an advanced planning stage
- Lighting layouts (the plan) can be determined by the choice of a light fixture or could be the criteria for fixture selection.
- Lighting design process should be seen as a “back and forth” check in which developed solutions are repeatedly compared to the predetermined goals and requirements.

Summary
- Utilization of Space
- Psychological Requirements
- Architecture and Ambience

Types of Lighting

Types of Lighting
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Forming Functional Zones

- Distinct contrasts between individual zones and their surroundings remove them from their spatial context.

Forming Functional Zones - Exterior
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Forming Functional Zones - *Exterior*

- Floor illumination emphasizes objects and pedestrian surfaces.

Defining Spatial Borders - *Horizontal*

- Floor illumination emphasizes objects and pedestrian surfaces.

- Indirect lighting of a ceiling creates diffuse light in the room with the lighting effect being influenced by the reflectance and color of its surface.
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Defining Spatial Borders – *Horizontal*

- Vertical spatial borders are emphasized by illuminating wall surfaces.
- Uniform light distribution emphasizes the wall as a whole.
- Bright walls create a high level of diffuse light in the room.
- Vertical illumination is used to shape the visual environment.
- Room surfaces can be differentiated using different levels of illuminance to indicate their importance.
- Uniform illumination of the surfaces emphasizes them as an architectural feature.
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Defining Spatial Borders - Vertical

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Defining Spatial Borders - Vertical

- Grazing light gives the wall structure by adding patterns of light.
- A decreasing level of brightness across a wall is not as effective as uniform wall washing at defining room surfaces.
- Lighting effects using grazing light emphasize the surface textures and become the dominant feature.
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Defining Spatial Borders - Vertical

Emphasizing Architectural Features

- The illumination of architectural details draws attention away from the room as a whole towards individual components.
- Columns appear as silhouettes in front of an illuminated wall.
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Emphasizing Architectural Features

- Rooms can be given a visual structure by illuminating the architectural features.
- Narrow-beam downlights emphasizing the form of the columns.

columns lit with grazing fixtures

Emphasizing Architectural Features

- Grazing light accentuates individual elements or areas and brings out their form and surface texture.
- Grazing light can cause highly three-dimensional features to cast strong shadows.
- By using different levels of illuminance, different parts of a room can be placed in a visual hierarchy.

Emphasizing Architectural Features
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Visual Clarity

Visual Clarity

Layout and Pattern… for clarity
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Layout and Pattern… for architectural relationships

Layout and Pattern… for function

Psychology of Light

Because the sense of sight is contrast sensitive, the brightness contrast of a space determines its emotional impact.

Emotional Impact: individual impressions of a space are a function of brightness contrast:
--the relationship of surfaces that are lighted to those left in the dark
--the focus or foreground to the surround or background

General illumination in a room will permit vision. The emotional impact of an interior through the manipulation of brightness contrast is a real challenge for the creative lighting designer.
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Emotional Impact

Degrees of Stimulation

All activities benefit from some form of visual stimulation.

- High levels encourage participation and increase enjoyment.
- Low levels help a person feel contented, comfortable, focused, and relaxed.

Although individuals react differently to the same environment, there is a high degree of similarity in people’s reactions to light.
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Degrees of Stimulation

Environments that are complex, crowded, asymmetrical, novel, unfamiliar, surprising, random are High-load. Environments that are simple, uncrowded, symmetrical, conventional, familiar, unsurprising, or organized are Low-load.

Degrees of Brightness Contrast

The degree of brightness contrast evokes emotions in the same way as background music. It affects:

- the performance of task,
- influences the behavior of people at work or play, and
- impacts the amount of containment and pleasure we experience.

The degree of brightness contrast establishes the emotional setting, which either enforces or undermines the intended activity.

Steps in the design process:
1. Define the activity that will occur in the space
2. Determine the degree of simulation that will enforce the activity
3. Establish the degree of brightness contrast that will yield the necessary level of simulation

Brightness contrast is established by developing patterns of light and shade – select which surfaces to receive light or leave other as darkness.
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Degrees of Brightness Contrast
Low Contrast Environment – everything is of equal emphasis

Degrees of Brightness Contrast
Low Contrast Environment – everything is of equal emphasis

Degrees of Brightness Contrast
Low Contrast Environment – everything is of equal emphasis
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Degrees of Brightness Contrast
Mid Contrast Environment – combinations of emphasis

Degrees of Brightness Contrast
Mid Contrast Environment – combinations of emphasis

Degrees of Brightness Contrast
High Contrast Environment – high bright and dark areas
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Degrees of Brightness Contrast
High Contrast Environment – high bright and dark areas

Degrees of Brightness Contrast
Very High Contrast Environment – extreme high bright and dark areas

Degrees of Brightness Contrast
Very High Contrast Environment – extreme high bright and dark areas
Subjective Impressions

1. Direct lighting on table, strong contrast, too harsh
   - Pleasantness: Neutral
   - Clarity: Hazy, quiet impression
   - Spaciousness: Strong impression of confinement

2. Lighting on all walls, low intensity, suitable for display
   - Pleasantness: Neutral, tending towards a more pleasant impression
   - Clarity: Neutral
   - Spaciousness: Promotes impression of spaciousness, increased height

3. Lighting of room above, low intensity, pleasant for near and distant faces
   - Pleasantness: Relatively Strong negative
   - Clarity: Strong
   - Spaciousness: Somewhat

4. Direct lighting on table, lighting of small wall
   - Pleasantness: Relatively Strong positive
   - Clarity: Neutral
   - Spaciousness: Neutral with strength in impression of length

5. Direct lighting on table, lighting of cove above soft subdued effect, pleasant for near faces
   - Pleasantness: Relatively Strong negative
   - Clarity: Strong
   - Spaciousness: Strong

6. Lighting of cove above, Lighting of walls flat, shadow free
   - Pleasantness: Strong
   - Clarity: Strong
   - Spaciousness: Strong

Impression of Spaciousness – the room appears larger or smaller

Impression of Perceptual Clarity – the room appears public or private
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Subjective Impressions
Impression of Pleasantness – the room appears friendly and sociable.

The Three Elements of Light

General or Ambient lighting
provides an area with overall illumination. Also known as ambient lighting, general lighting radiates a comfortable level of brightness, enabling one to see and walk about safely.

Task Lighting or Lighting at the Work plane
helps you perform specific tasks such as reading, sewing, cooking, homework, hobbies, games, or balancing your checkbook.

Light or Highlighting
adds drama to a room by creating visual interest. As part of a decorating scheme, it is used to spotlight paintings, houseplants, sculpture, and other prized possessions, or to highlight the texture of a wall, drapery or outdoor landscaping.

Richard Kelly

General or Ambient light is…
“a snowy morning in open country”
“twilight haze in a mountain top or cloudy day on the ocean”
“the light in a white tent at noon”
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Richard Kelly

Focal Glow or Task light is…

“The campfire of all time, the glowing embers around which stories are told”
“The light burning at the window or welcoming gleam of the open door”
“directive, creates a brighter center: tells us what to look at, organizes, marks the important element”

Richard Kelly

Sparkle or Glitter is…

“A play of brilliants”
“The sensation of a cache of diamonds in an opened cave”
“A ballroom of crystal chandeliers”