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

Summary

- *An understanding quality versus quantity*
- *Art and Science*

- 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.

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.

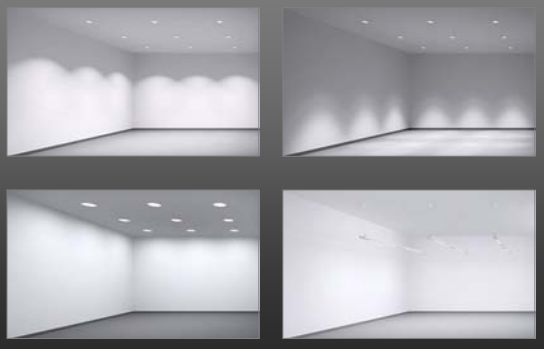
Light In Architecture

Planning and Process

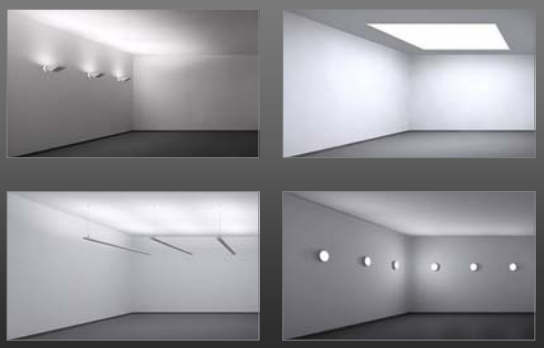
Summary
- *Utilization of Space*
- *Psychological Requirements*
- *Architecture and Ambience*

- 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.

Types of Lighting



Types of Lighting



Light In Architecture

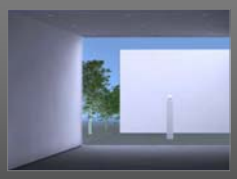
Forming Functional Zones

room with left wall illuminated (simulate daylight)

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

Forming Functional Zones

Forming Functional Zones - *Exterior*



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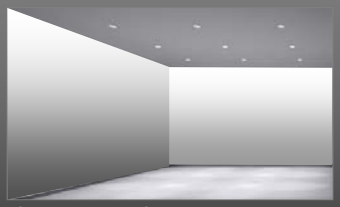
Forming Functional Zones - *Exterior*



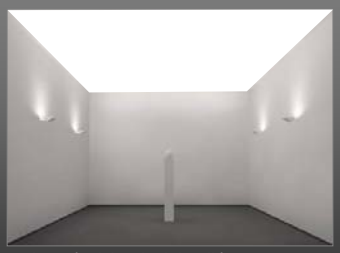
Defining Spatial Borders - *Horizontal*



floor lit with downlight fixtures

- Floor illumination emphasizes objects and pedestrian surfaces.

Defining Spatial Borders - *Horizontal*



ceiling uniformly lit with uplight wall fixtures

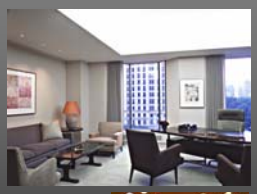
- Indirect lighting of a ceiling creates diffuse light in the room with the lighting effect being influenced by the reflectance and color of its surface.

Light In Architecture

Defining Spatial Borders – *Horizontal*



Defining Spatial Borders – *Horizontal*



Defining Spatial Borders - *Vertical*

walls uniformly lit with wall fixtures

- 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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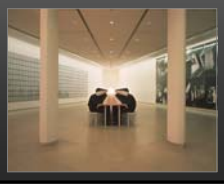
Defining Spatial Borders - *Vertical*

- 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 emphasis the surface textures and become the dominant feature.

Defining Spatial Borders - *Vertical*



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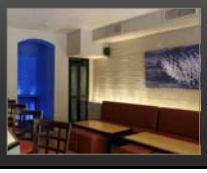
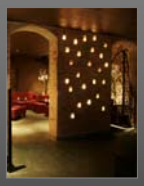
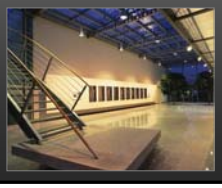
Defining Spatial Borders - *Vertical*





Defining Spatial Borders - *Vertical*



Emphasizing Architectural Features

walls lit with grazing fixtures

- 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

columns lit with grazing fixtures

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

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

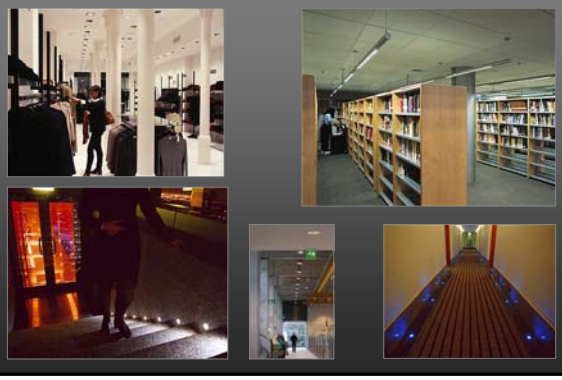
Visual Clarity

Layout and Pattern… for clarity

Light In Architecture

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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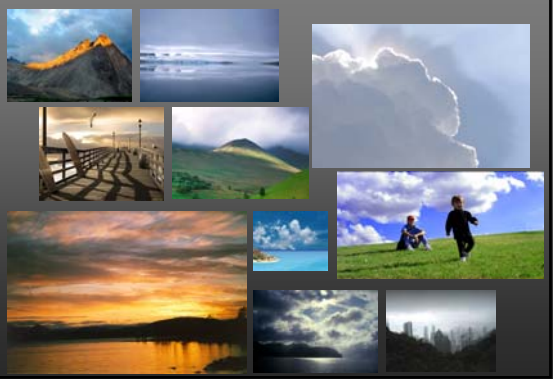
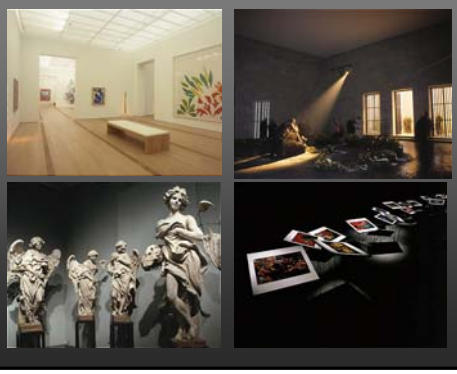
Emotional Impact



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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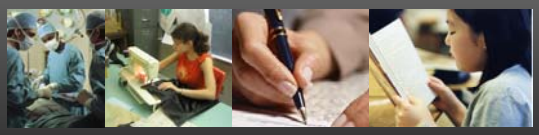
Degrees of Stimulation

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 Stimulation

Environmentalist use the terms High-load to Low-load to describe the degrees of stimulation of arousal.
The more stimuli that must be processed by a person, the higher the 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
- Impact 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 be developing patterns of light and shade – select which surfaces to receive light or leave other is darkness

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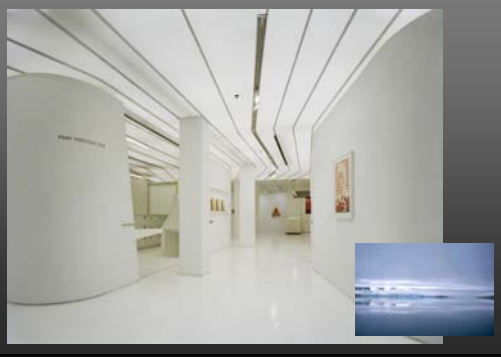
Degrees of Brightness Contrast

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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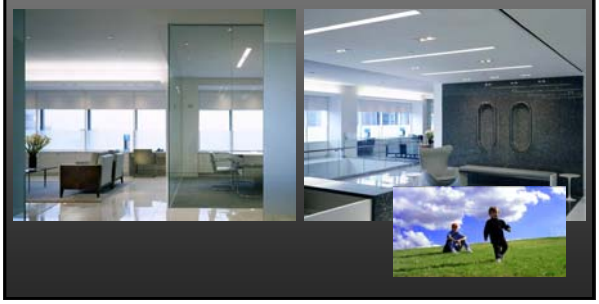
Degrees of Brightness Contrast

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*

Light In Architecture

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*

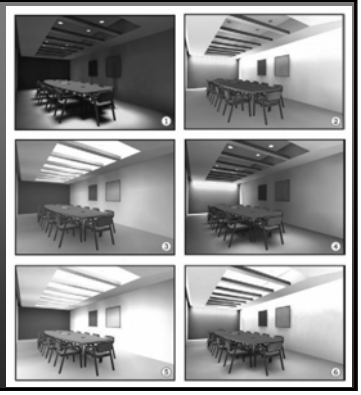
Degrees of Brightness Contrast

Very High Contrast Environment – extreme *high bright and dark areas*

Light In Architecture

Subjective Impressions

1. **Direct lighting on table** strong contrast, too harsh for lighting faces
   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 cove above,** low intensity, pleasant for near and distant faces
   Pleasantness: *Strong negative*
   Clarity: *Strong promoting hazy, quiet impression*
   Spaciousness: *Neutral*
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: *Somewhat*
6. **Lighting of cove above, Lighting of walls** flat shadow free
   Pleasantness: *Strong*
   Clarity: *Strong*
   Spaciousness: *Strong*



Subjective Impressions

Impression of Spaciousness – *the room appears larger or smaller*

Subjective Impressions

Impression of Perceptual Clarity – *the room appears public or private*

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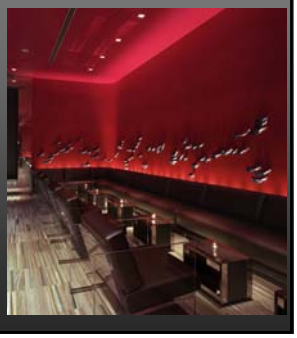
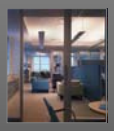
Subjective Impressions

Impression of Pleasantness – *the room appears friendly of 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

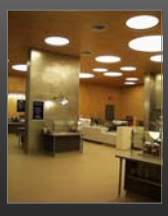
Light or Highlighting

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"



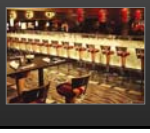
Light In Architecture

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"