# LIGHTIG FOR INTERIORS

- COLORS
- LIGHTING

Interior Design Department
Third grade/ Fall semester

Siba nazem Kady

# BRIGHTNESS

DIRECTION AND DISTRIBUTION OF LIGHT

SURFACE FINISHES AND REFLECTANCES

THREE-DIMENTIONAL FORM

GLARE AND SPARKLE

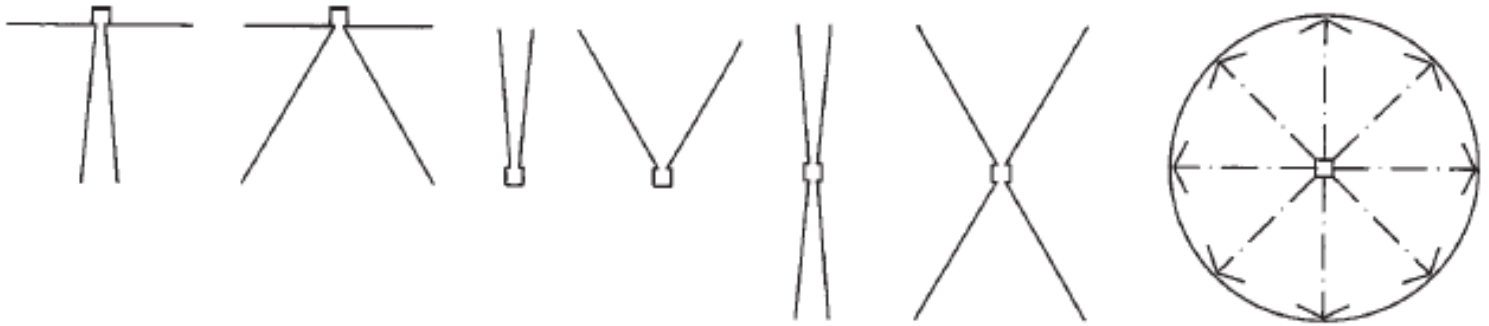
# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

A *luminaire* (lighting fixture) emits light in one of three directions:

downward, upward, or multidirectional

and in one of two distributions— concentrated or diffuse



The seven directions and distributions of light.

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

**Downward & upward Light**

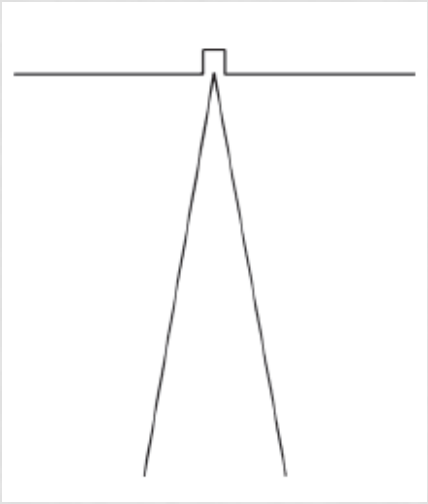
- Upward and downward light is emitted in patterns that vary from narrow to wide.
- *Concentrated* distribution focuses light in a narrow pattern;
- *diffuse* distribution disperses light in a wide pattern.

# BRIGHTNESS
## DIRECTION AND DISTRIBUTION OF LIGHT

### Downward Light

**concentrated** downward light

- When located in ***low ceilings***, concentrated downward beams—with spreads of 30° or less—create areas of high luminance on the floor with dark areas in between.
- To avoid that, luminaires would need to be placed inordinately close to each other.
- Low ceilings require the use of diffuse downward luminaires.

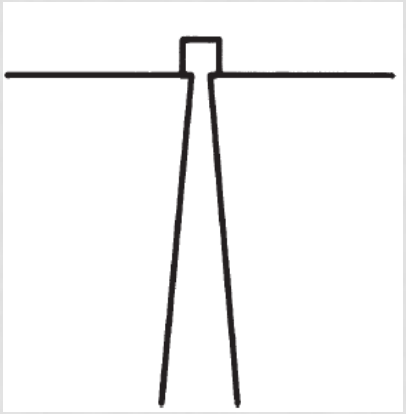


Concentrated down-ward(direct) distribution

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

- When located in **high ceilings**, concentrated downward beams overlap and avoid such light and dark areas, but only horizontal surfaces and the tops of objects are lighted; faces and walls receive little light and appear in shadow.
- This yields a high-contrast space, one of low ambient brightness with high brightness accents



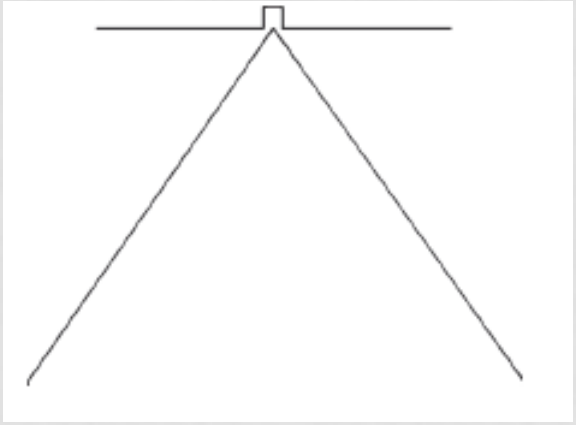
An example of concentrated downward distribution

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

- Luminaires with **diffuse** beamspreads and a **downward** distribution produce *diffuse downward* (*direct* ) light

An example of Diffuse downward distribution



Diffuse downward(direct) distribution

# BRIGHTNESS
## DIRECTION AND DISTRIBUTION OF LIGHT

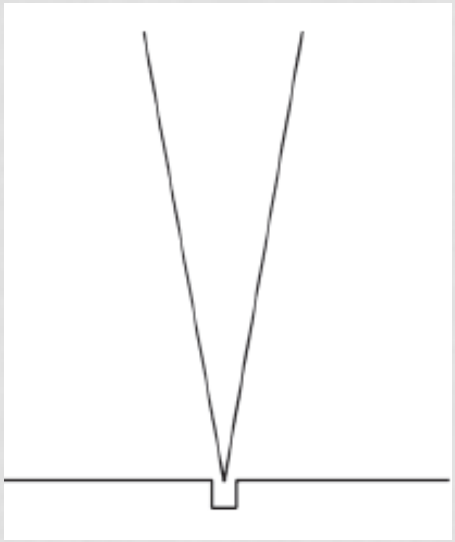
- **Diffuse downward beams**—with spreads from 80° to 120°—offer a more practical light distribution for many purposes.
- This greater percentage of light at higher angles **increases** incident(fallen) light on vertical surfaces, *models* faces, and **reduces** the concentration of brightness within the space.
- Diffuse downward luminaires yield a low-contrast setting

An example of Diffuse downward distribution

# BRIGHTNESS
## DIRECTION AND DISTRIBUTION OF LIGHT

### Upward light

- A *concentrated upward* distribution directs light toward the ceiling
- With light directed upward and the downward component removed, the ceiling becomes visually prominent(noted).
- It also becomes a *secondary light source* because of its reflective properties.



An example of Concentrated up ward distribution

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

**Upward light(concentrated)**

- When mounted in close to the surface being lighted, concentrated upward beams create isolated areas of high luminance.

An example of Concentrated up ward distribution

# BRIGHTNESS
## DIRECTION AND DISTRIBUTION OF LIGHT

**_Upward_ light(concentrated)**

When placed farther from the surface to be lighted, however, concentrated upward beams produce uniform brightness: each beam covers a wider area and multiple beam patterns overlap.

In areas with higher ceiling heights, the concentrated beam has sufficient distance to spread; thus the ceiling is lighted uniformly, reducing brightness and glare

An example of concentrated upward distribution with the light source placed farther from the illuminated surface.

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

**Upward light(concentrated)**

If this is the main source of room illumination in areas with low ceiling heights, the "spots" of high brightness on the ceiling become uncomfortable and cause glare.

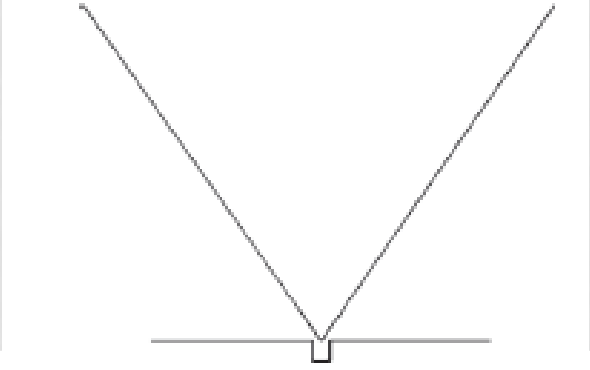
# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

**Upward light(diffuse)**

- A *diffuse upward* (*indirect* ) distribution directs light toward the ceiling and the upper side walls
- This technique is used to create uniform ceiling luminance for the prevention of glare in areas with specular wall materials (polished marble or glazing at night, for example) and to emphasize structural form or decorative detail on or near the ceiling plane.

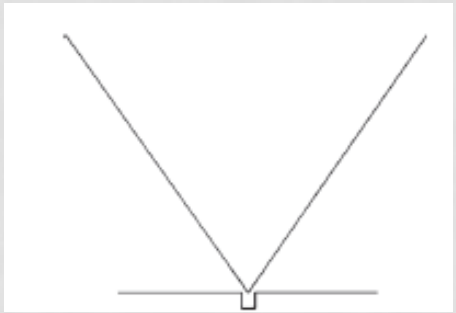
Diffuse upward(in direct) distribution



# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

- ***Upward* light(diffuse)**
- Because each point on the ceiling reflects light in every direction, diffuse upward distribution produces a flat, low-contrast environment:
- the reflected light reduces contrast and shadow; objects and faces have the washed-out(dull) appearance such as that caused by an overcast day



Diffuse upward(in direct) distribution

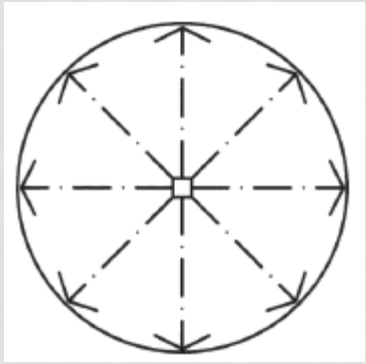
# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

**Multidirectional diffuse** *(general diffuse)* distribution is produced by luminaires that deliver both upward and downward components of light These luminaires emit light in several directions at the same time—

toward the ceiling and walls as well as toward the floor.

- The reflected light from the ceiling and the reflection of light in the space, reducing shadow and contrast and creating a uniform, high-brightness interior.(low contrast)



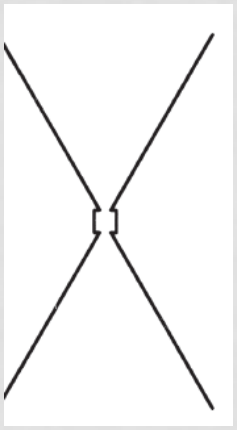
Multidirectional diffuse(general diffuse) distribution

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

### Downward & upward Light

- Luminaires that deliver both direct and indirect components of diffuse light, but no side lighting, are called *direct/indirect*.
- They provide efficient use of light on work surfaces while relieving contrast.

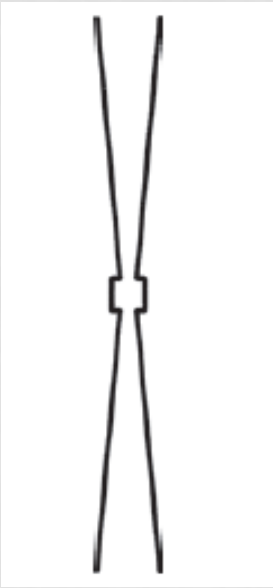


An example of direct/indirect distribution

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

- Multidirectional distribution created with concentrated beamspreads is called **multidirectional concentrated**
- It is also called *semidirect* if 60 to 90% of the *lumens* (light emitting from the luminaire) are directed downward,
- and *semiindirect* if 60 to 90% of the lumens are directed upward.



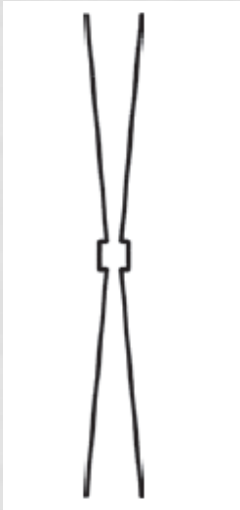
Multidirectional concentrated (semi direct or semi-indirect) distribution.

# BRIGHTNESS

## DIRECTION AND DISTRIBUTION OF LIGHT

- A higher-contrast, nonuniform brightness condition is produced with concentrated distributions present in both the upward and downward components.
- The nonuniform light reflected from wall or ceiling surfaces is insufficient to "wash out" all shadow and contrast. This lack of diffusion yields moderate contrast

Multidirectional concentrated (semi direct or semi-indirect) distribution.



# BRIGHTNESS

## SURFACE FINISHES AND REFLECTANCE

- What is perceived as brightness is not the incident(fallen) light on a surface, but the light that is reflected from that surface toward the eyes.
- Brightness results from the intensity of light that strikes a surface *and* the reflecting or transmitting properties of that surface.
- Reflected light is usually diffuse and multidirectional and fills in shadows, reduces contrast.

# BRIGHTNESS
## SURFACE FINISHES AND REFLECTANCE

- The overall brightness results from the distribution of reflected light, which, in turn, depends on the reflectance properties of the surfaces in the space.
- **Dark-colored**, And **low-reflectance finishes**

- absorb much of the light that strikes them

- reflecting only a small amount toward the eye.

If all the room surfaces are dark, there is little interreflection; contrast is high

# BRIGHTNESS

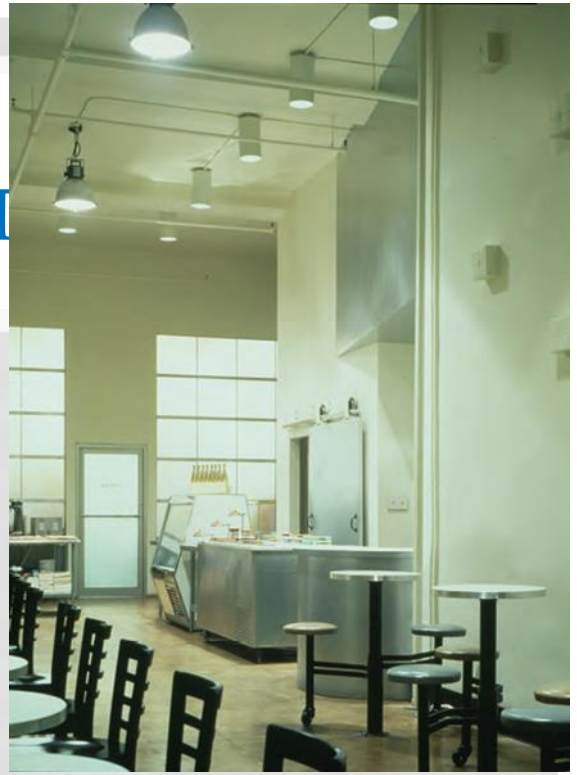
## SURFACE FINISHES AND REFLECTANCE

- This gives an impression of a dark, high-contrast space regardless(ignored) of the amount of illuminance

If all the room surfaces are dark, there is little interreflection; contrast is high

# BRIGHTNESS

## SURFACE FINISHES AND REFLECT



- **Light-colored** and **high-reflectance finishes**

- Reflect light much more of the incident light
- contributing to a higher brightness and a greater diffusion of light
- The choice of surface finishes increase or decrease the initial distribution of light from luminaires.

If all of the room surfaces are light-colored, interreflections will fill in shadows and reduce contrast.

# BRIGHTNESS

## Secondary Light Sources

- Any object or surface that reflects or transmits light becomes a secondary light source.
- The moon is an example: it is incapable of producing light.
- The moonlight we see is produced by a primary source—the sun—that is reflected by the moon's surface.

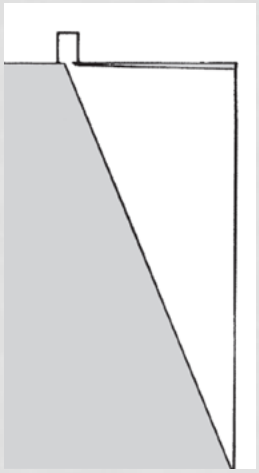
# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- Lighting alters perception of texture.

1. grazing light
2. Diffuse wash light

Graze Light



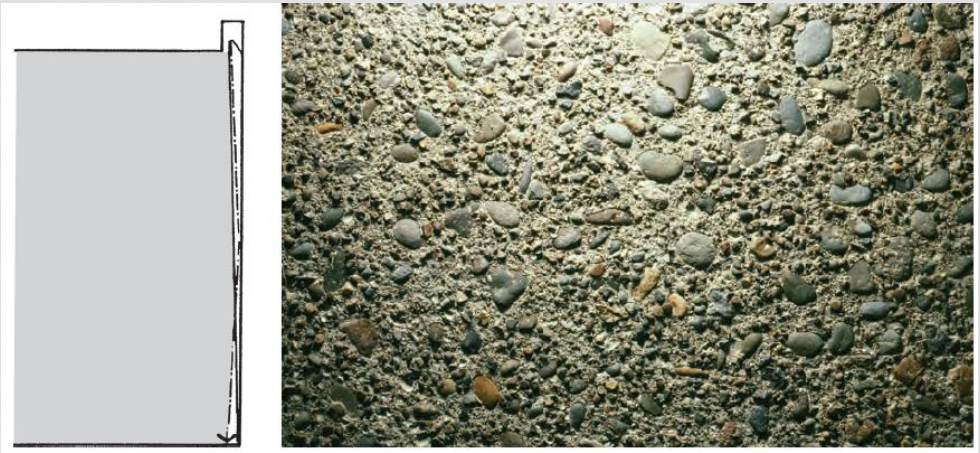
Diffuse Light

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

**Grazing *light*** , luminaires located close to a surface

- Gives strong highlights and shadows
- It enhances the perception of depth by emphasizing the natural textures
- **(note)**Grazing light is also used for inspection to detect surface distortions and errors in workmanship.



Grazing illumination

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- **Grazing light** is appropriate for lighting heavily textured surfaces such as rough plaster, stone, or concrete.
- It is disastrous for "flat" walls of smooth plaster or gypsum board, however, because such walls are not truly flat: minor surface imperfections such as trowel and tape marks, are increased by the shadows that result from grazing light.

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- **Diffuse *wash light*** reduces the probability that surface errors will be noticed and strengthens our impression of surface smoothness.
- This is more suitable for a smooth plaster and gypsum board wall.

Grazing light

Diffuse wash light

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- **Concentrated direct lighting** on objects

- produces drama and emotional excitement.
- the sharp shadows reduce visibility of detail.
- This decrease the ability to study all aspects of the object accurately

Sculpture lighted with concentrated direct lighting from below

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- **A diffuse lighting distribution**,
- illuminates the entire object
- reducing shadows
- Much easier to study of workmanship and detail
- Although it is often desirable, this kind of lighting reduces dramatic impact and visual excitement

Sculpture lighted with a diffuse from above

# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- Some shadows on a work surface are annoying, such as those cast by a hand or pencil while one is writing under a concentrated light source.
- On most work surfaces, however, *diffuse light* distribution is desirable to minimize highlights and shadows.
- working in high-contrast settings result visual tiredness, errors, and accidents.

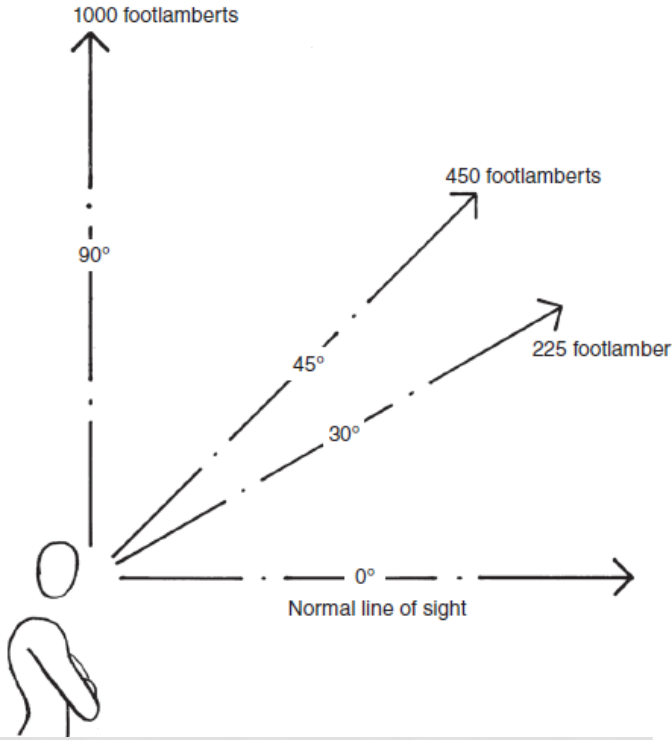
# BRIGHTNESS

## THREE-DIMENSIONAL FORM

- In practice, objects being exhibited or photographed are often lighted from two sides to reduce excessive shadows.
- The background may be lighted separately to distinguish the object from its surround and to add visual depth.

# BRIGHTNESS
## GLARE AND SPARKLE

- Excessive luminance is distracting and annoying.
- This negative side of brightness is called ***glare*** .
- Glare is often misunderstood as "too much light."
- It is light coming from the wrong direction
- glare destroys vision by reducing or destroying the ability to see accurately.

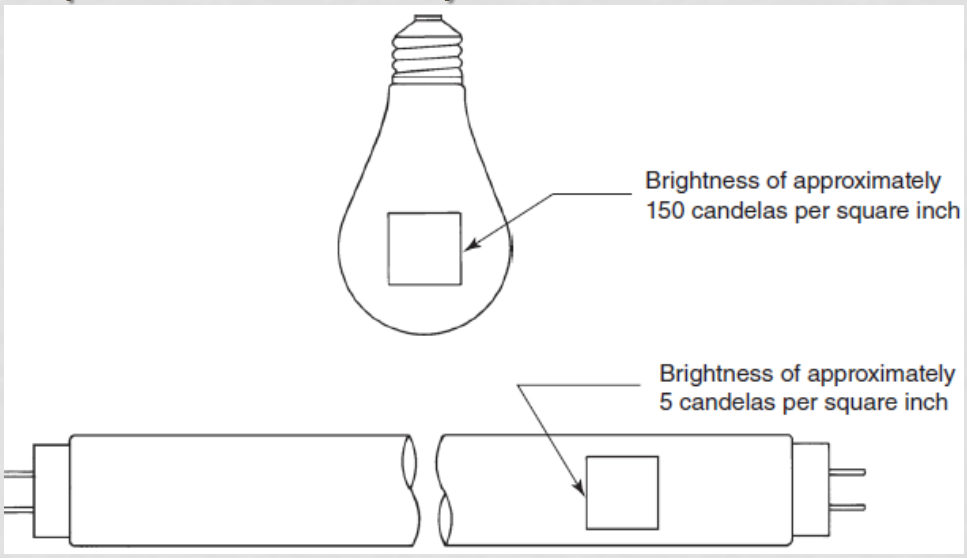


# BRIGHTNESS

## GLARE AND SPARKLE

**Direct Glare**

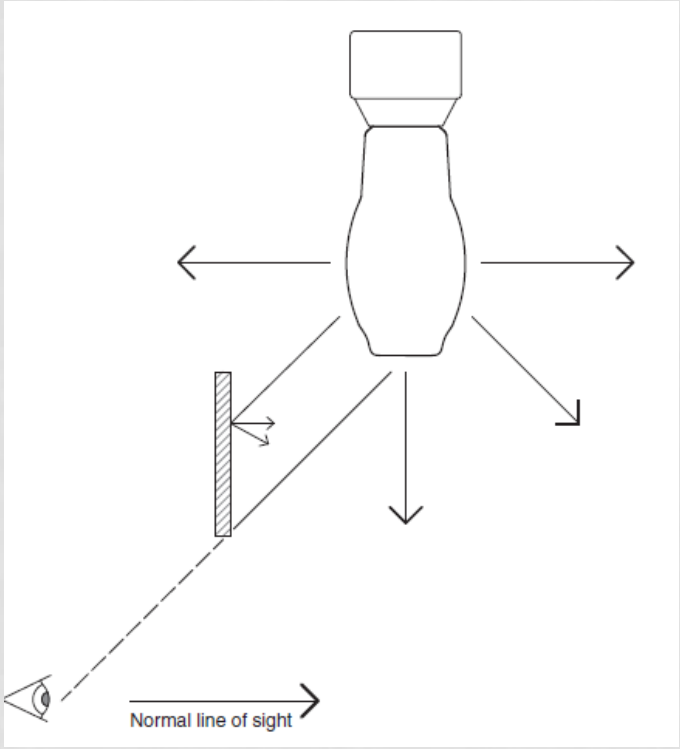
- Direct glare is caused by the lighting system; it is defined as excessive light misdirected toward the eye.
- Usually, the uncontrolled luminance of an exposed light source produces glare.
- For this reason, bare lamps are rarely used in interior design applications



# BRIGHTNESS
## GLARE AND SPARKLE

**Direct Glare**

- When direct glare occurs in the normal field of view, three main control techniques are available:
- **(1)** Limit the amount of light emitted in the direction of the eye
- Shielding devices improve visibility and restore visual comfort in this way.



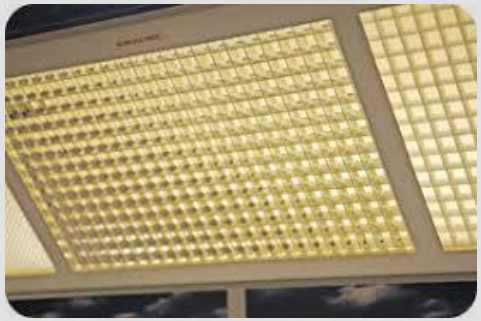

Limiting the amount of light emitted toward the eye

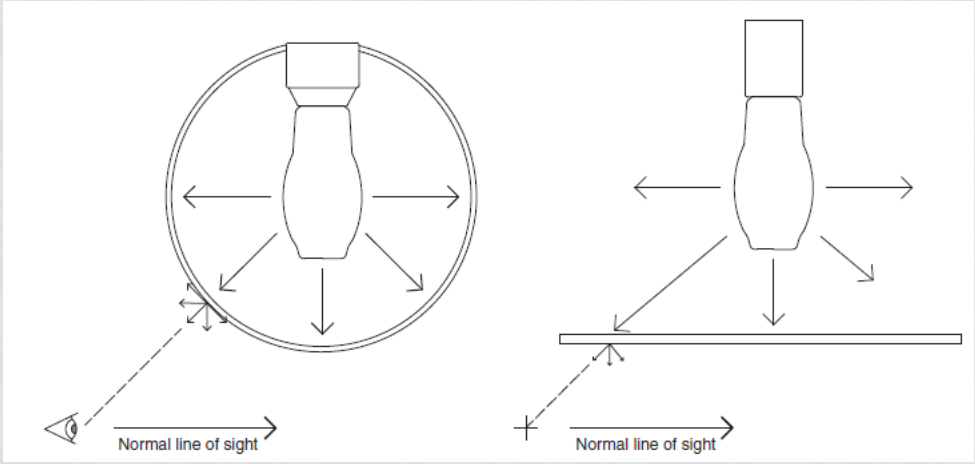
# BRIGHTNESS
## GLARE AND SPARKLE

**Direct Glare**

- **(2)** Increase the area from which light is emitted

A white glass globe and diffusing panels of white glass or plastic are examples.



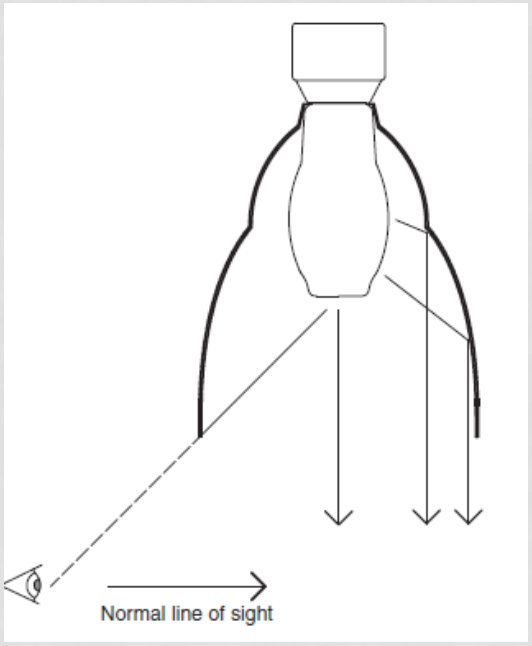



Increasing the area from which light is emitted

# BRIGHTNESS
## GLARE AND SPARKLE

**Direct Glare**

- **(3)** Change the direction of the beam.
- (The automobile headlights redirected below the line of sight )
- This third method is more efficient; it uses accurate control devices to redirect light in the desired direction.



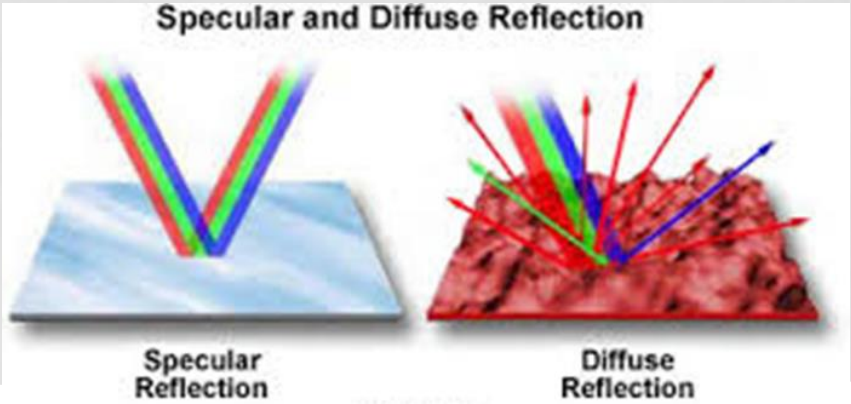

Change in the direction of the beam to control direct glare

# BRIGHTNESS

## GLARE AND SPARKLE

### Reflected Glare

- Visual comfort is achieved by limiting not only direct glare but also reflected glare.
- Reflected glare is excessive uncontrolled luminance reflected from objects or surfaces in the field of view.
- Specular surfaces have reflecting properties similar to those of a mirror
- Diffuse surfaces prevent highlights and are uniformly bright from all angles of view.



# BRIGHTNESS

## GLARE AND SPARKLE

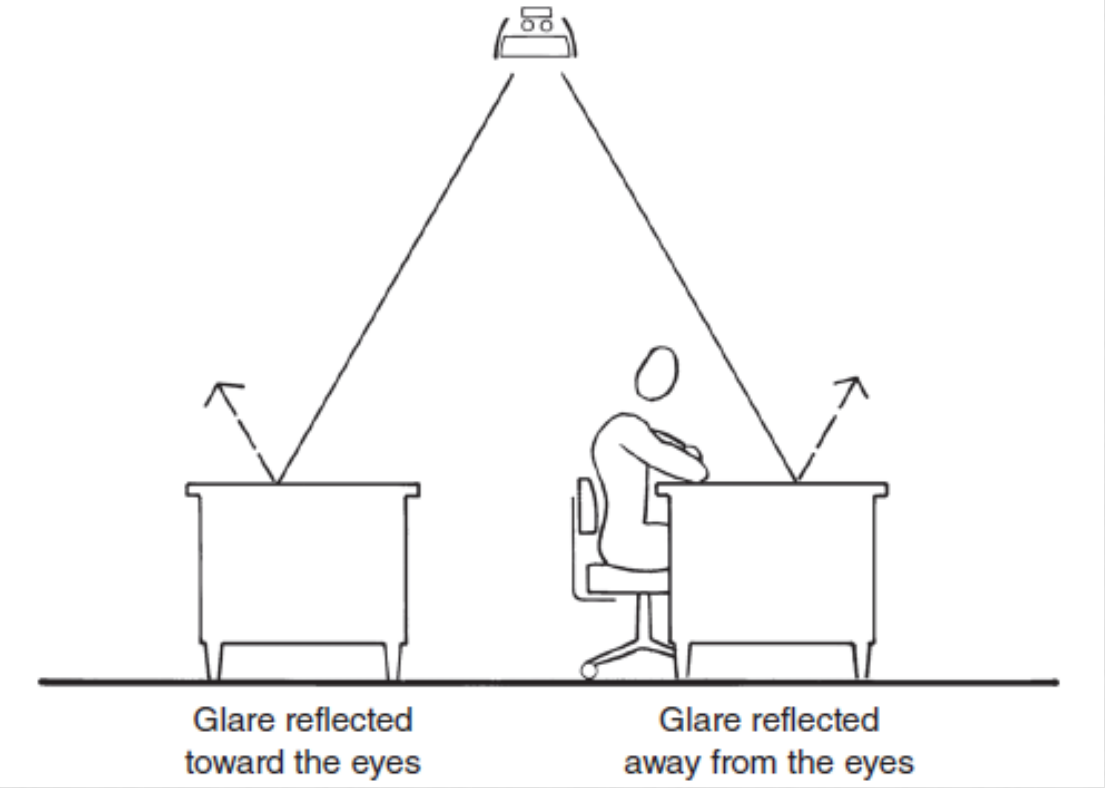
**Reflected Glare**

- Most work surfaces reflect light both diffusely and specularly.
- A glass-covered or highly polished desk top is quite specular; reflected images become distracting.
- In the visual task area, remove glossy surfaces wherever possible.
- Matte (low-gloss) finishes should always be used for work surfaces.

# BRIGHTNESS
## GLARE AND SPARKLE

**Reflected Glare**

It is helpful to **think of the work surface**

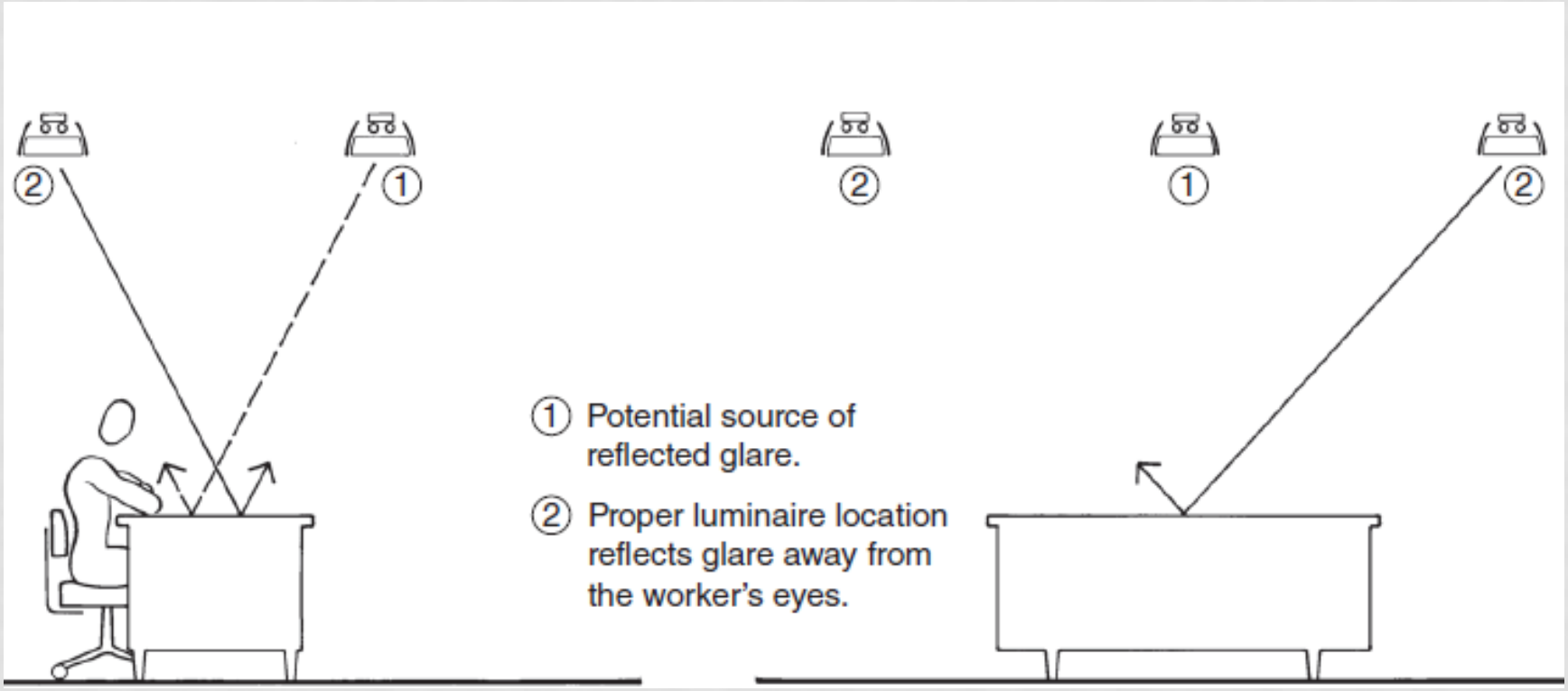


# BRIGHTNESS

## GLARE AND SPARKLE

**Reflected Glare**

Proper luminaire location reduces reflected glare from the task

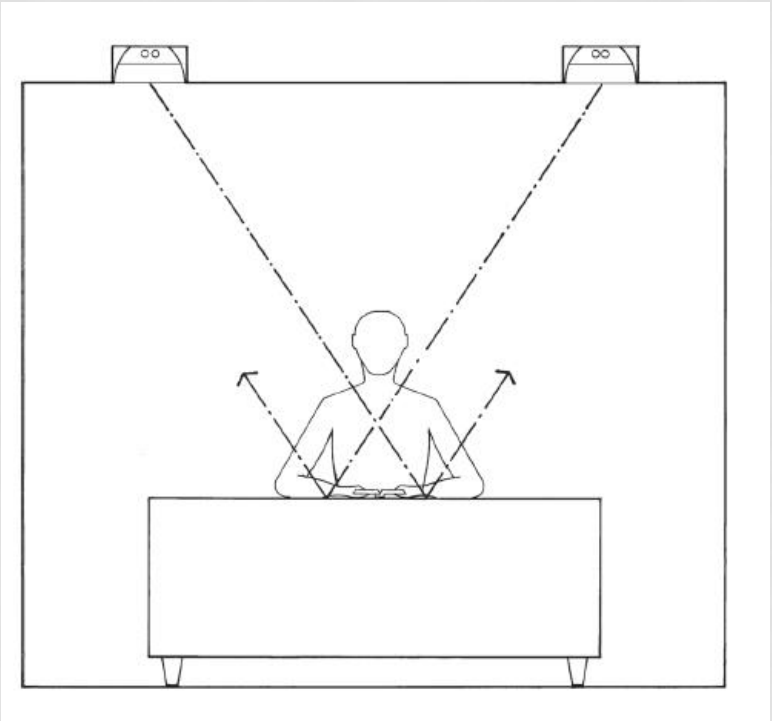


# BRIGHTNESS

## GLARE AND SPARKLE

**Reflected Glare**

- When luminaires are located on either side of the desk, shadows cast by the luminaires are filled in and light is reflected away from the worker's eyes



Proper desk lighting

# BRIGHTNESS

## GLARE AND SPARKLE

**Sparkle**

- sparkle contributes to emotional excitement and visual interest. The three types of sparkle are:

1. Direct sparkle:

Examples include Christmas tree lights; small, exposed, clear, filament lamps; and perforated shielding materials

# BRIGHTNESS

## GLARE AND SPARKLE

**Sparkle**

2. Reflected sparkle:

Examples include textured metal and pebbled surface finishes

# BRIGHTNESS
## GLARE AND SPARKLE

**Sparkle**

3.Transmitted sparkle:

Examples include crystal chandeliers and etched-glass (frosted)


Thank you!