

Although shadows can cause visual discomfort, it should be noted that they are also an essential element in revealing the form of three-dimensional objects. Techniques of display lighting are based around the idea of creating highlights and shadows to change the perceived form of the object being displayed. Many lighting designers insist that the distribution of shadows is as important as the distribution of light in achieving an attractive and meaningful visual environment.

The number and nature of shadows produced by a lighting installation depends on the size and number of light sources and the extent to which light is inter-reflected around the space. The strongest shadow is produced from a single point source in a black room. Weak shadows are produced when the light sources are large in area and the degree of inter-reflection is high.

2.6.6 Flicker

Virtually all electric light sources that operate from an alternating-current supply produce regular fluctuations in the amount of light emitted. When these fluctuations become visible they are called flicker.

The probability that a lighting installation will be seen to flicker can be minimised by ensuring a stable supply voltage and by the use of high-frequency electronic control gear for discharge lamps. Incandescent light sources do not require control gear but they are particularly sensitive to fluctuations in supply voltage. Where the local electricity network has equipment attached to it that can impose sudden large loads, e.g. the motors of a steel rolling mill, local fluctuations in supply voltage are likely and, in consequence, so are fluctuations in light output of incandescent light sources. These can be minimised by using a voltage regulator between the electricity supply and the light source.

Discharge lamps are less sensitive to supply voltage fluctuations than incandescent lamps because the electricity supply is filtered through the control gear. Electromagnetic control gear typically produces an output at the same frequency as the electricity supply. Electronic control gear for fluorescent lamps typically produces an output at much higher frequencies. Given the time constants of the light producing processes in most discharge lamps, this increase in supply frequency not only produces a higher frequency but also a smaller percentage modulation in light output.

Another approach used to reduce the probability of flicker is to combine light from lamps powered from different phases of the electricity supply on the working plane. This results in an increased frequency and a reduced percentage modulation and hence a decrease in the probability of flicker being seen when looking at the working plane. Obviously, it does nothing for the probability of flicker being seen when looking directly at an individual light source.

Although flicker occurring over a large area is almost always disturbing, localised flicker does have its uses. Localised flicker is a potent means of attracting attention because peripheral vision is sensitive to changes in the retinal illumination pattern, either in space or time. Localised flicker can also create a stroboscopic effect (see Section 10.2.8).

2.7 Perception through the visual system

2.7.1 The constancies

When considering how we perceive the world, the overwhelming impression is one of stability in the face of continuous variation. This invariance of perception is called perceptual constancy.