Threshold luminance contrast is relevant to the detection of targets on a background. Targets with a luminance contrast close to or below the threshold value are unlikely to be seen and targets with a luminance contrast more than twice the threshold value are likely to be seen every time.

Figure 2.11 shows the variation in visual acuity with luminance for foveal viewing of the target. As luminance increases, visual acuity, measured as the reciprocal of the minimum gap size, improves, approaching an asymptote at very high luminances corresponding to about 0.45 min arc. Visual acuity deteriorates with increasing deviation from the fovea and improves as the area around the target that has the same luminance increases.

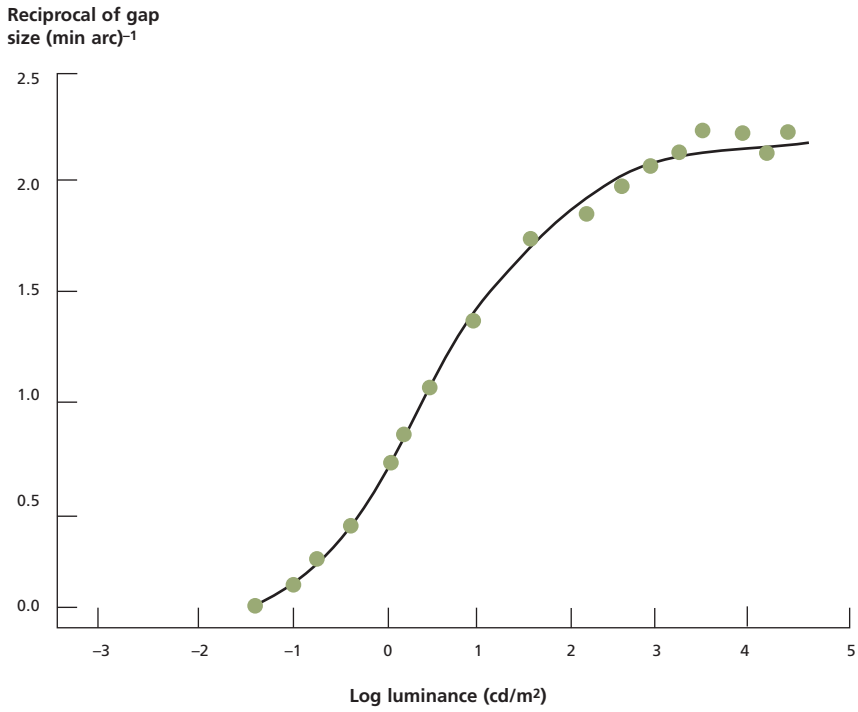

Figure 2.11 Visual acuity, expressed as the reciprocal of the minimum gap size, for a Landolt ring, plotted against log background luminance (after Shlaer, 1937)

2.3.4 Temporal thresholds

The simplest possible form of temporal visual task is the detection of a spot of light briefly presented against a uniform luminance background, i.e. a flash of light. For such a target the visual system demonstrates temporal summation, i.e. the product of target luminance and the duration of the flash is a constant. This relationship between target luminance and duration is known as Bloch's Law. It implies that the total amount of energy required to stimulate the visual system so that the target can be detected is the same, regardless of the time for which the target is presented. Temporal summation breaks down above a fixed duration, ranging from 0.1 s for scotopic luminances to 0.03 s for photopic luminances. For presentation times longer than the critical duration, presentation time has no effect, the ability to detect the flash being determined by the difference in luminance between the flash and the background.