An aspect of temporal thresholds relevant to lighting is the ability to detect flicker. Figure 2.12 shows the maximum frequency of a sinewave fluctuation at 100 percent modulation that is visible at different retinal illuminations, for visual fields of different sizes. Retinal illumination is measured in trolands which are the product of the luminance of the stimulus and the associated pupil area. For large field sizes, such as might occur when using indirect lighting, the maximum frequency increases linearly with retinal illumination in the scotopic state, shows little change in the mesopic state and increases linearly in the photopic state until saturation occurs.

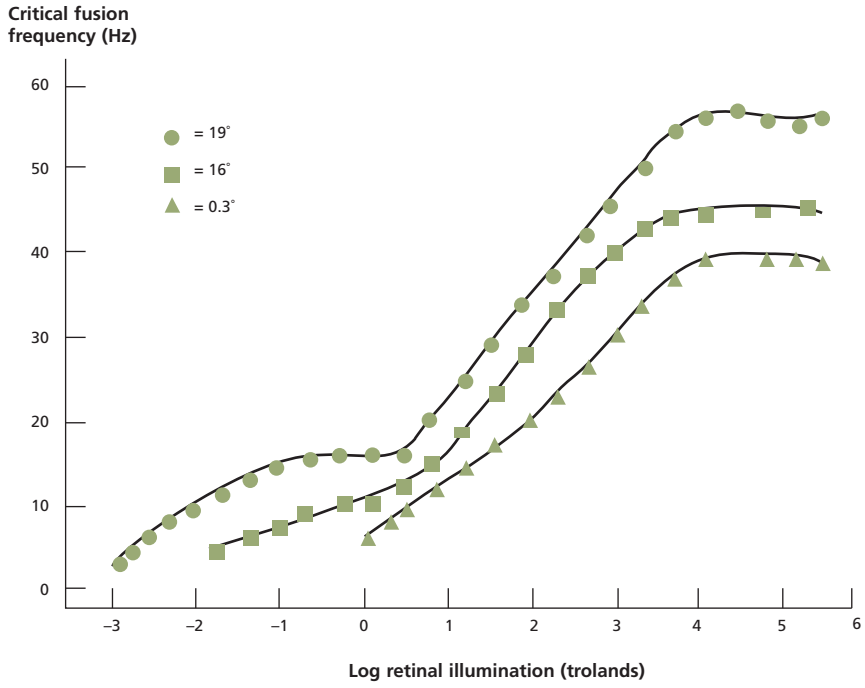

Figure 2.12 Critical fusion frequency plotted against log retinal illumination, for three different test field sizes (after Hecht and Smith, 1936)

2.3.5 Colour thresholds

Figure 2.13 shows the MacAdam ellipses, ten times enlarged, plotted in the CIE chromaticity diagram. Each ellipse represents the standard deviation in the chromaticity coordinates for colour matches made between the two parts of a 2–degree bipartite field with the reference field having the chromaticity of the centre point of the ellipse. The lighting industry uses four-step MacAdam ellipses as its tolerance limits for quality control in lamp manufacture.