

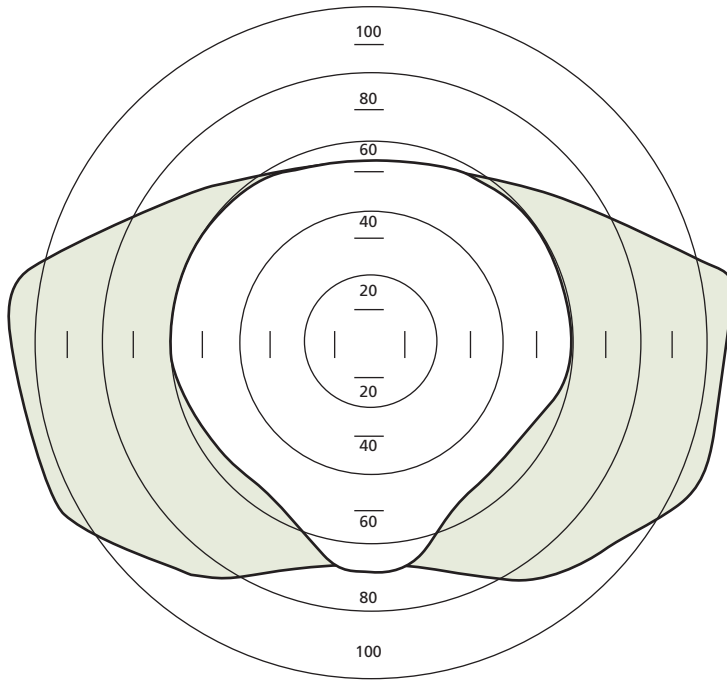
## Chapter 2: Vision

### 2.1 The structure of the visual system

The visual system consists of the eye and brain working together. Functionally, the visual system is an image-processing system that extracts specific aspects of the retinal image for interpretation by the brain.

#### 2.1.1 The visual field

Humans have two eyes, mounted frontally. Figure 2.1 shows the approximate extent of the visual field of the two eyes in humans, measured in degrees from the point of fixation. The enclosed white area can be seen with both eyes. The shaded area to the left is visible to the left eye only. The shaded area to the right is visible to the right eye only.



**Figure 2.1** The binocular visual field expressed in degrees deviation from the point of fixation. The shaded areas are visible to only one eye (after Boff and Lincoln, 1988).

Given this limited field of view for a fixed position, it is necessary for the two eyes to be able to move. There are two ways this can be done; by moving the head and by moving the eyes in the head. Humans have a limited range of head movements but a wide range of eye movements.

#### 2.1.2 Eye movements

The movement of the eye in its socket is controlled by six extra-ocular muscles arranged in opposing pairs. The pattern of eye movements used when examining a visual scene consists of a series of fixations and saccades. Fixations are attempts to keep the retinal image of the object of interest on the fovea. Figure 2.2 shows a pattern of fixation points for two people examining the seams on a pair of briefs.