



Figure 2.2 The pattern of fixations made by two inspectors examining men's briefs held on a frame. S = start of scan path, C = end of scan of front and one side, rotation of frame and continuation of scan across back and sides, E = end of scan. Inspector M examines only the seams while Inspector D examines the fabric as well (after Megaw and Richardson, 1979).

Movement between the fixation points is made by saccades. Saccades are very fast, velocities ranging up to 1000 degrees/second depending upon the distance moved. Saccadic eye movements have a latency of about 200 ms, which limits how frequently the line of sight can be moved to about five movements per second. Visual functions are substantially limited during saccadic movements. Fixations and saccades both occur in a single eye, but movements in the two eyes are not independent. Rather, they are coordinated so that the lines of sight of the two eyes are both pointed at the same target at the same time. Movements of the two eyes that keep the primary lines of sight converged on a target, or which may be used to switch fixation from a target at one distance to a new target in the same direction but at a different distance, are called vergence movements. These movements are very slow, up to 10 degrees/second, and can occur as a jump movement or can smoothly follow a target moving in a fore-and-aft direction. Both types of movement involve a change in the angle between the two eyes.

2.1.3 Optics of the eye

Figure 2.3 shows a section through the eye, the upper and lower halves being adjusted for focus at near and far distances, respectively. The eye is basically spherical with a diameter of about 24 mm. The sphere is formed from three concentric layers. The outermost layer, called the sclera, protects the contents of the eye and maintains its shape under pressure. Over most of the eye's surface, the sclera looks white but at the front of the eye the sclera bulges up and becomes transparent. It is through this area, called the cornea, that light enters the eye. The next layer is the vascular tunic, or choroid. This layer contains a dense network of small blood vessels that provide oxygen and nutrients to the next layer, the retina. As the choroid approaches the front of the eye it separates from the sclera and forms the ciliary body. This element produces the watery fluid that lies between the cornea and the lens, called the aqueous humor. The aqueous humor provides oxygen and nutrients to the cornea and the lens, and takes away their waste products. Elsewhere in the eye this is done by blood but on the optical pathway through the eye, a transparent medium is necessary.