

2.1.6 The central visual pathways

Signals from the retina are transmitted to the visual cortex of the brain over the central visual pathways (Figure 2.8).

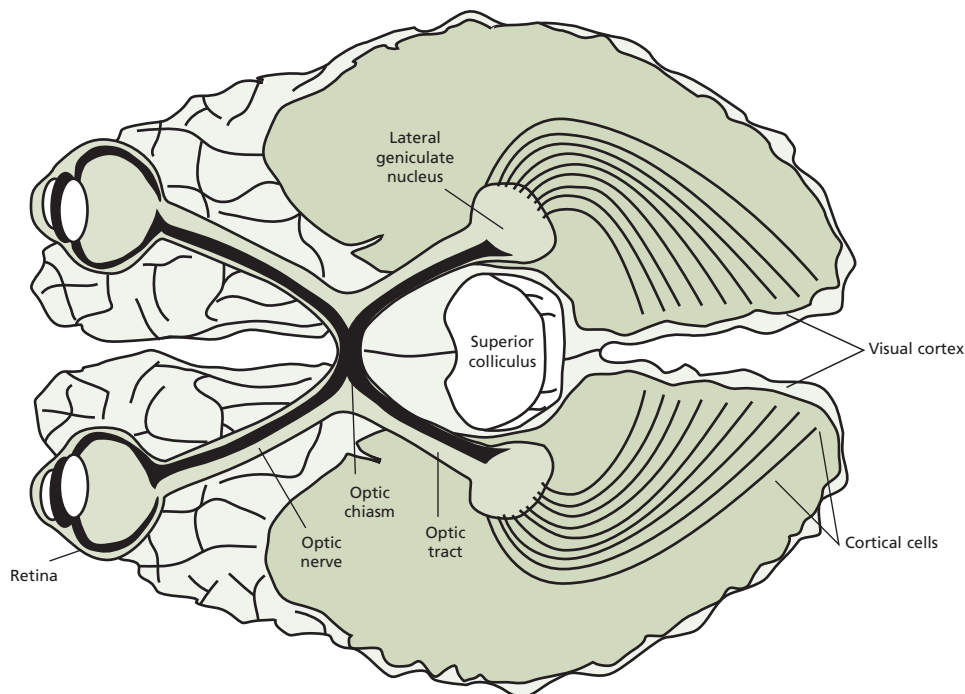


Figure 2.8 A schematic diagram of the pathways from the eyes to the visual cortex (from the IESNA Lighting Handbook)

The optic nerves leaving the two eyes are brought together at the optic chiasm where the nerves from each eye are split and parts from the same side of the two eyes are combined. This arrangement ensures that the signals from the same side of the two eyes are received together on the same side of the visual cortex. The pathways then proceed to the lateral geniculate nuclei. Somewhere between leaving the eyes and arriving at the lateral geniculate nuclei, some optic nerve fibers are diverted to the superior colliculus, responsible for controlling eye movements, and to the suprachiasmatic nucleus which is concerned with entraining circadian rhythms. After the lateral geniculate nuclei, the two optic nerves spread out to supply information to various parts of the visual cortex, the part of the brain where vision occurs. The visual cortex is located at the back of cerebral hemispheres. About 80% of the cortical cells are devoted to the central ten degrees of the visual field, the centre of which is the fovea, a phenomenon that again emphasises the importance of the fovea.

2.1.7 Colour vision

Human colour vision is trichromatic. It is based on the L, M and S cone photoreceptors. Figure 2.9 shows how the outputs from the three cone photoreceptor types are believed to be arranged. The achromatic channel combines inputs from the M- and L-cones only. Its output is related to luminance. The other two channels are opponent channels in that they produce a difference signal. These opponent channels are responsible for the perception of colour. The red-green opponent channel produces the difference between the output of the M-cones and the sum of the outputs of the L- and S-cones. The blue-yellow opponent channel produces the difference between the S-cones and the sum of the M- and L-cones.