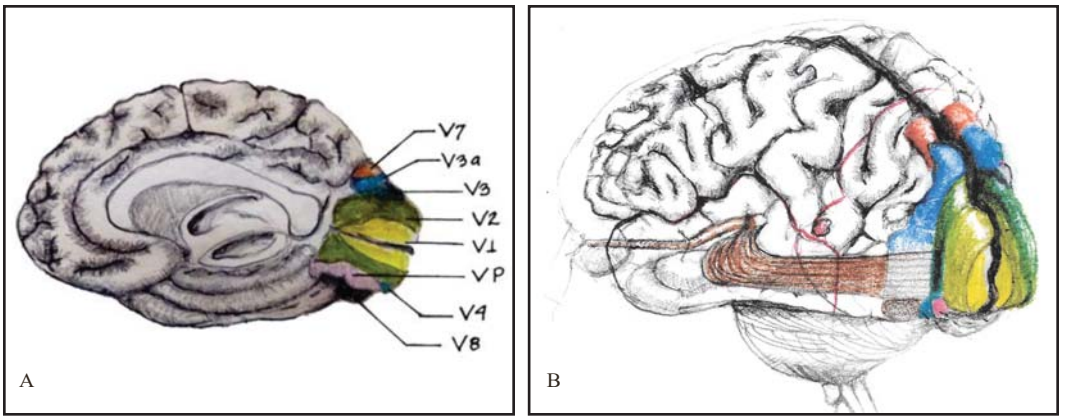

Figure 1-3. Illustration of primary visual cortex and visual association cortex in the occipital lobes. (A) Sagittal view; (B) view of primary visual cortex and visual association cortex. In V1, the neural receptive fields are small. The neurons fire in response to a horizontal line or the edges and borders of letters and objects. In V2 and V4 of the visual cortex, the receptive fields are larger than in V1. The neurons fire in response to more specific objects such as letters and faces.

projects to the lower lip (lingual gyrus) of the CS (Helvie, 2011). Visual input from the peripheral retina projects to the posterior CS at the occipital pole (Zeki, 1993). The horizontal meridian (the imaginary line that separates the upper and lower visual fields) is represented by cells deep within the calcarine sulcus (Fahle, 2003).

The Prestriate Cortex

The area of the occipital lobe anterior to V1 is the prestriate cortex or *association cortex* (Brodmann, 19). This is where visual detail is processed. Divisions of the association cortex are labeled V2, V3, V3a, V4d, V4v, V4C, V8 and so on (see Figure 1-3) (Devinsky and D'Esposito, 2004; Roelfsma, 2006). Together these areas form a narrow band bordering the primary visual cortex in each hemisphere (Ratcliff & Ross, 1981). These labels reflect the segregation of detailed information, the different visual functions these areas undertake (e.g., V3: global motion detection; V5: local motion detection) (Possin, 2010) and their distinct projections within the cortex (Baker, 2000; Tong, 2003). There is a direct correspondence between points on the retina, layers of the LGN, points in V1, and divisions within the visual association cortex. This reflects the retinotopic organization referred to earlier. Elements of form are bound together in the association cortex in a process called *perceptual binding.* The ability to segment or group and then bind features leads to form recognition (Farah, 2000; Wolf, 2007), which is necessary for letter recognition and the activation of letter codes. Interconnections between areas of the visual cortex that represent the center of the visual field present the viewer with an uninterrupted scene as gaze crosses the vertical midline (Hubel, 1995).

The Corpus Callosum

The corpus callosum is a bundle of sensory fibers that integrates the functions of the right and left cortical hemispheres. Information relating to vertical midline is communicated interhemispherically and integrated for motor, somatosensory, and written language systems through the corpus callosum, including binocular information that is necessary for stereopsis (depth perception) (Gazzaniga, 2000; Hubel, 1995; Miller et al., 1999; Saint-Amour, Lepore, Lassonde, & Guillemot, 2004). We know from split-brain studies that damage to the corpus callosum will result in impaired recognition of the printed word, because input to the right hemisphere