Visual field defects are filled-in by the brain

The Science behind the Tip

Contrary to long held beliefs, cortical maps in the brain are not rigid. Extensive reorganization (i.e. brain re-mapping) takes place after deprivation of sensory input due to peripheral damage. Cortical plasticity enables normal cortical cells that surround a lesion to assist the deprived ones, resulting in quite dramatic effects on a patient's perception. Phantom pain in an amputated limb is a striking example. Similarly, damage to the visual system activates long-range horizontal synapses between cells in the primary visual cortex that are normally in a subthreshold state. Thus, silenced areas in the visual cortex recover visually driven activity and as a result, the brain fills-in field defects.

The images with corresponding field tests demonstrate that glaucomatous defects are not perceived as black clouds because they are concealed by the brain in patterns and colours of the surround.

References


Contributor: Ann Hoste, Antwerp