

☒ | 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 state¹. Thus, silenced areas in the visual cortex recover visually driven activity and as a result, the brain fills-in field defects^{2,3}.



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 surround⁴.

References

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2. Ramachandran VS, Gregory RL. Perceptual filling in of artificially induced scotomas in human vision. *Nature*. 1991;350:699-702.
3. Safran AB, Landis T. Plasticity in the adult visual cortex: implications for the diagnosis of visual field defects and visual rehabilitation. *Curr Opin Ophthalmol*. 1996;7:53-64.
4. Hoste AM. New insights into the subjective perception of visual field defects. *Bull Soc Belge Ophtalmol*. 2003;287:65-71.