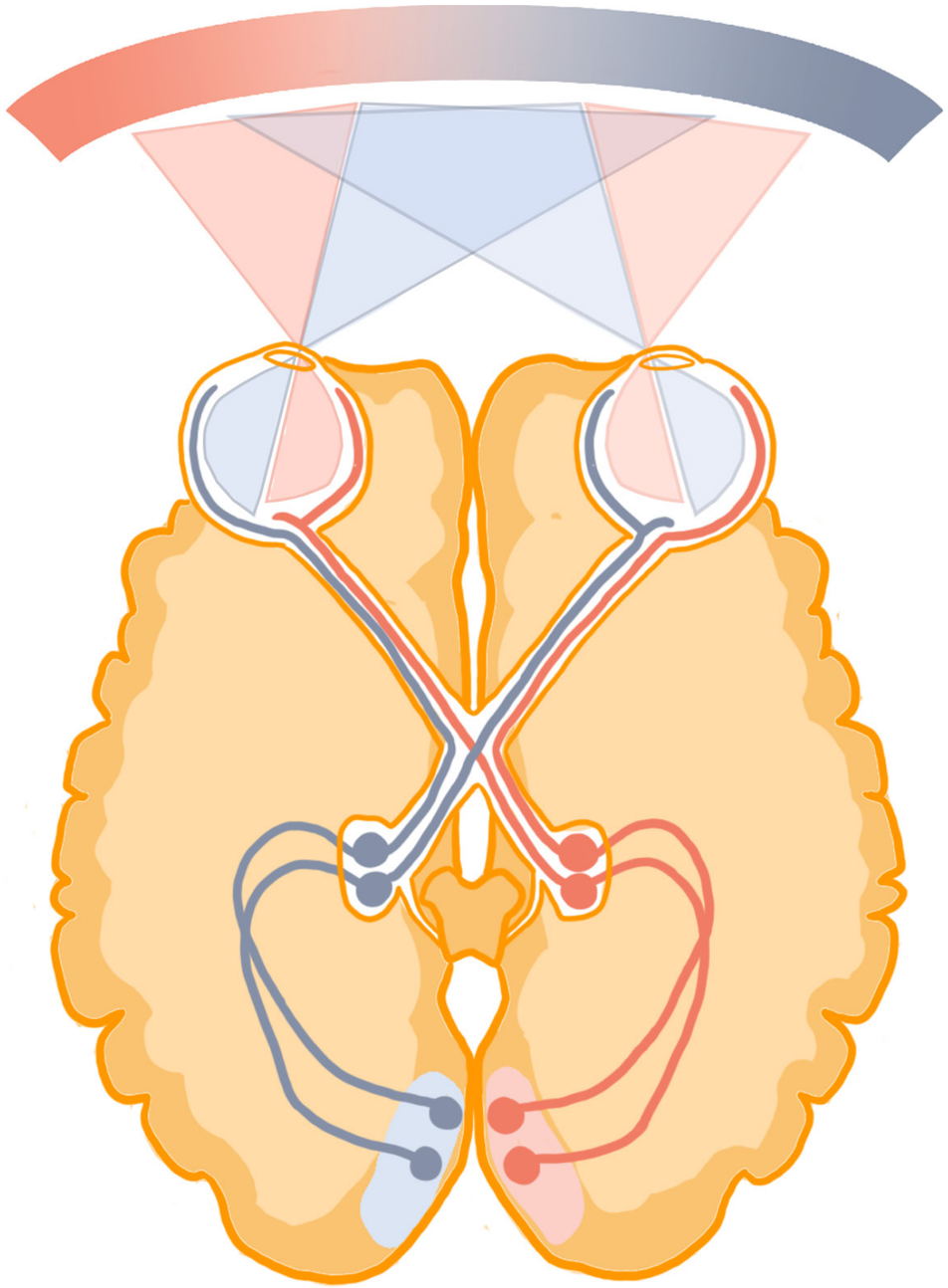
The Retina-Geniculate-Striate System

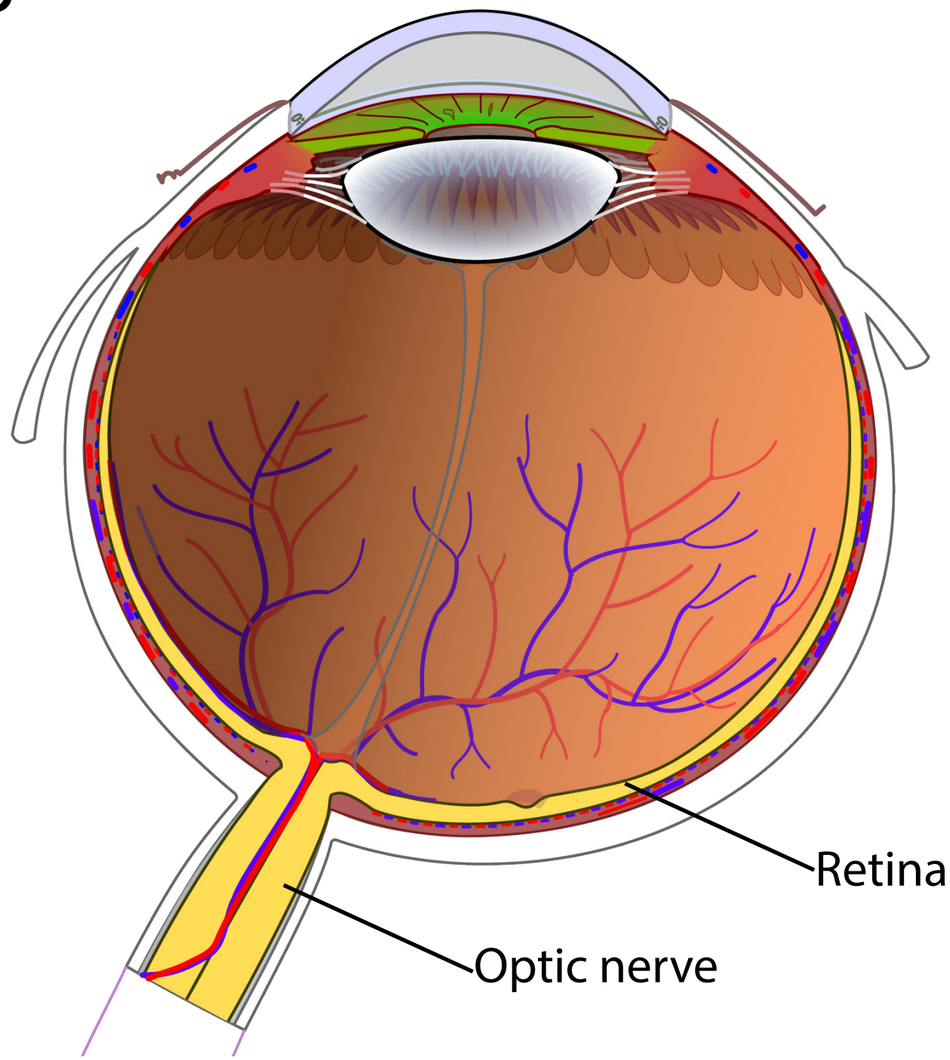


steven j. barnes

- Describe the key structures in the retina-geniculate-striate system.
- Neural signals from each retina arrive in both ipsilateral and contralateral cortex. Explain with a diagram.
- Describe the receptive field properties of lateral geniculate and primary visual cortex neurons.

Learning Goals

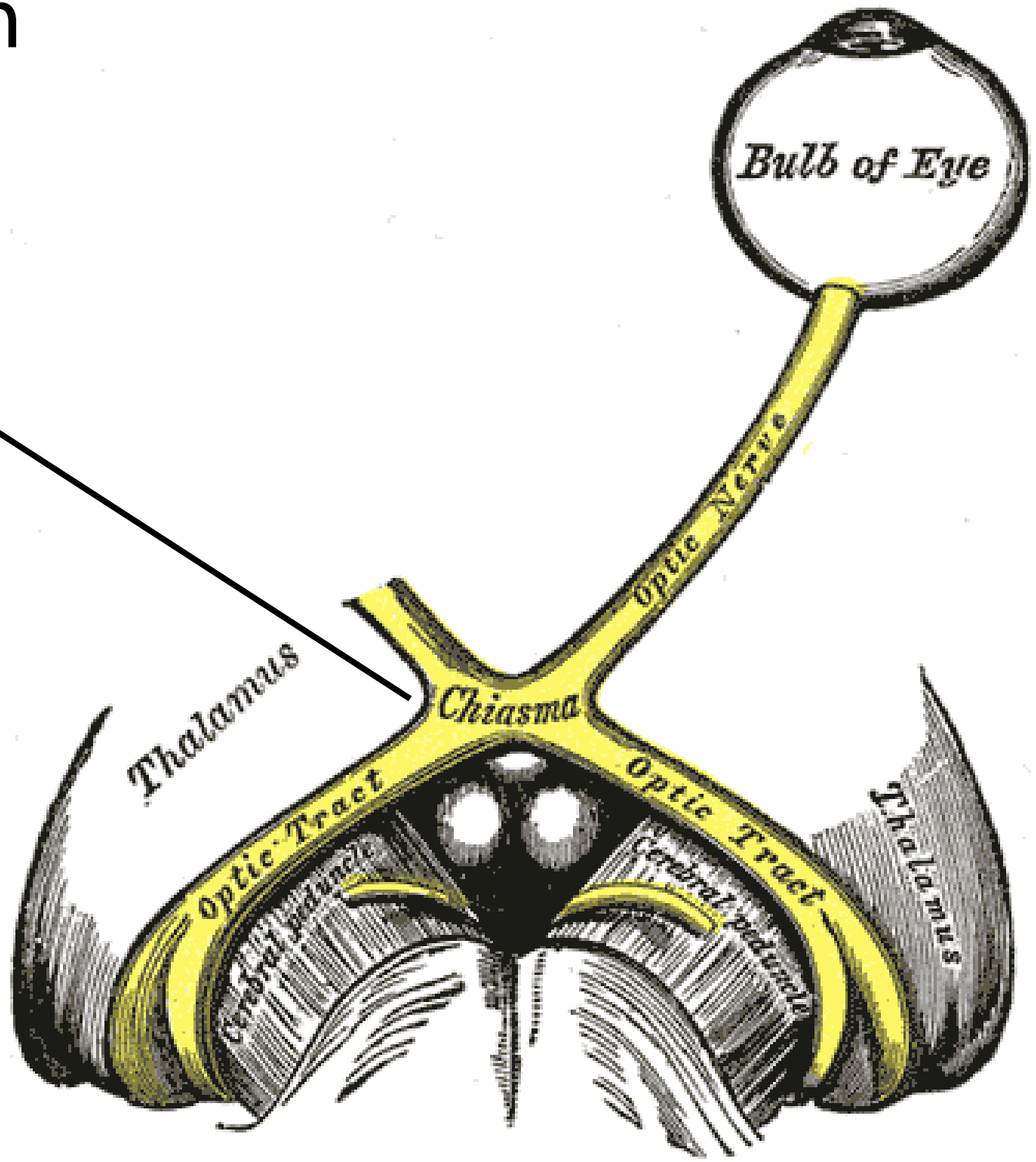
The axons from ganglion cells located in the retina leave the eyes as the optic nerve.



The spot where those ganglion cell axons leave your eye is a blind spot.

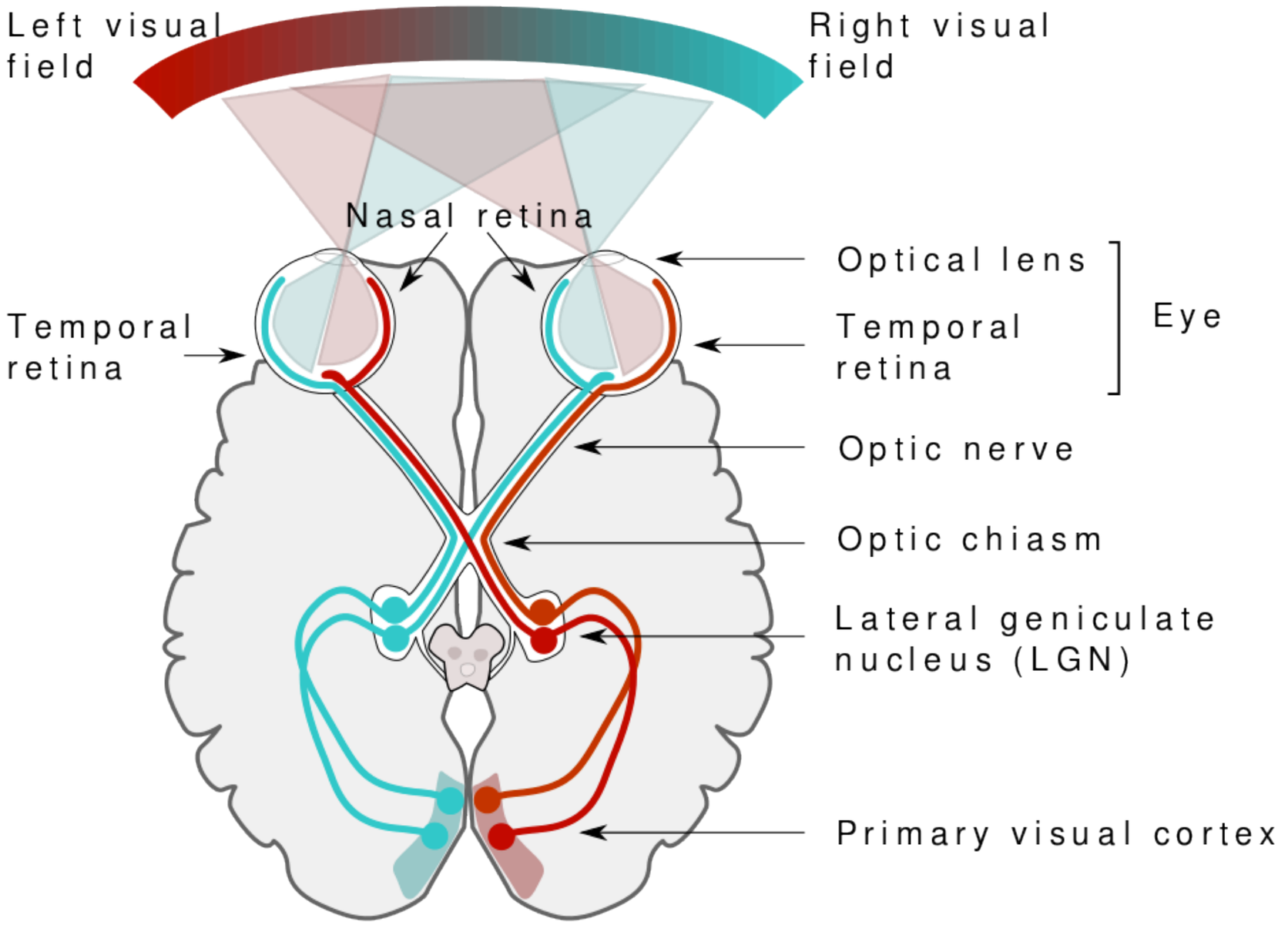
Ganglion Cell Axonal Projections

After leaving the eyes, the optic nerves come together to form the x-shaped optic chiasm.



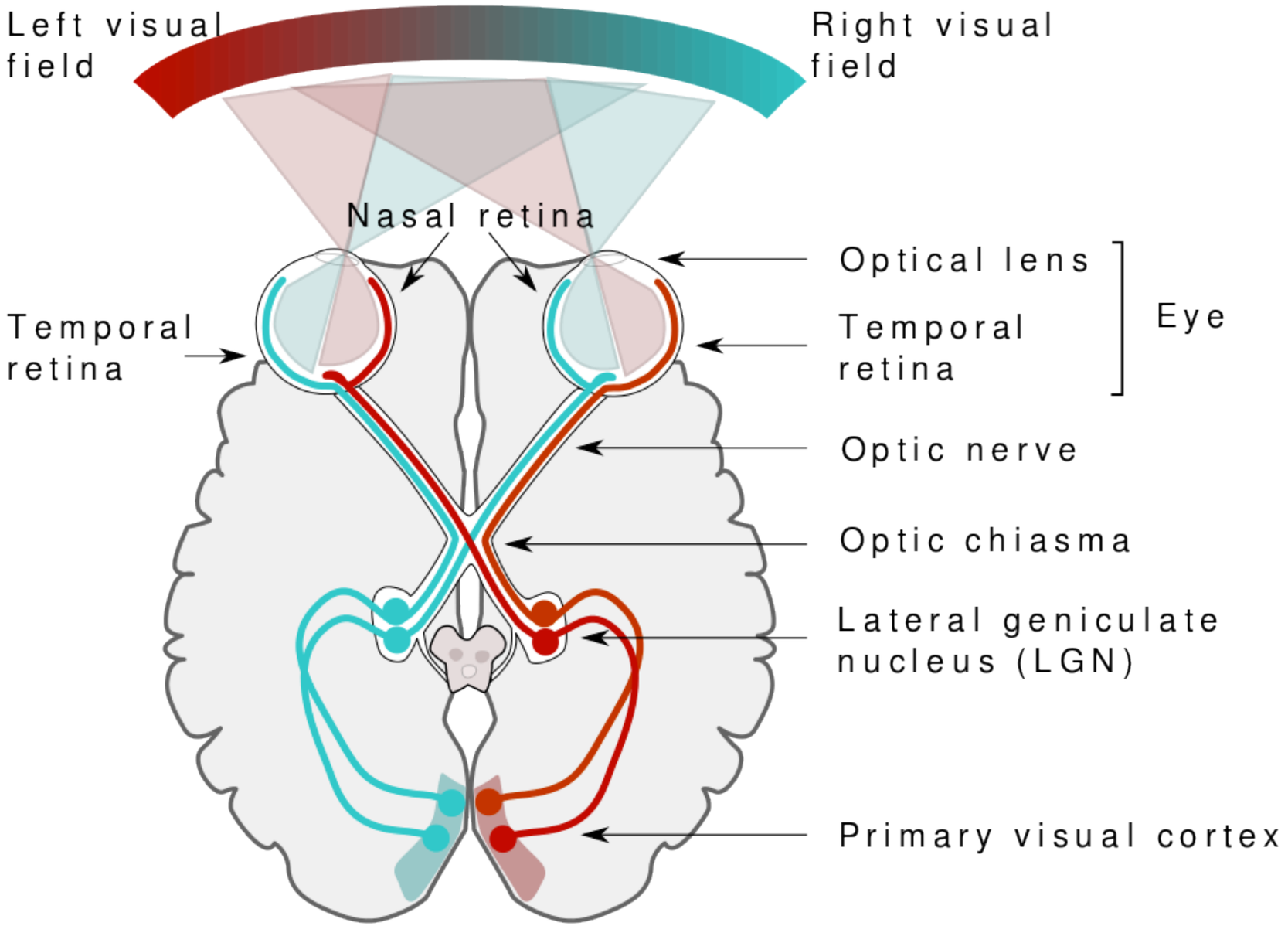
Ganglion Cell Axonal Projections

The axons of retinal ganglion cells in the nasal hemiretina of each eye project to the contralateral lateral geniculate nucleus (LGN) of the thalamus.

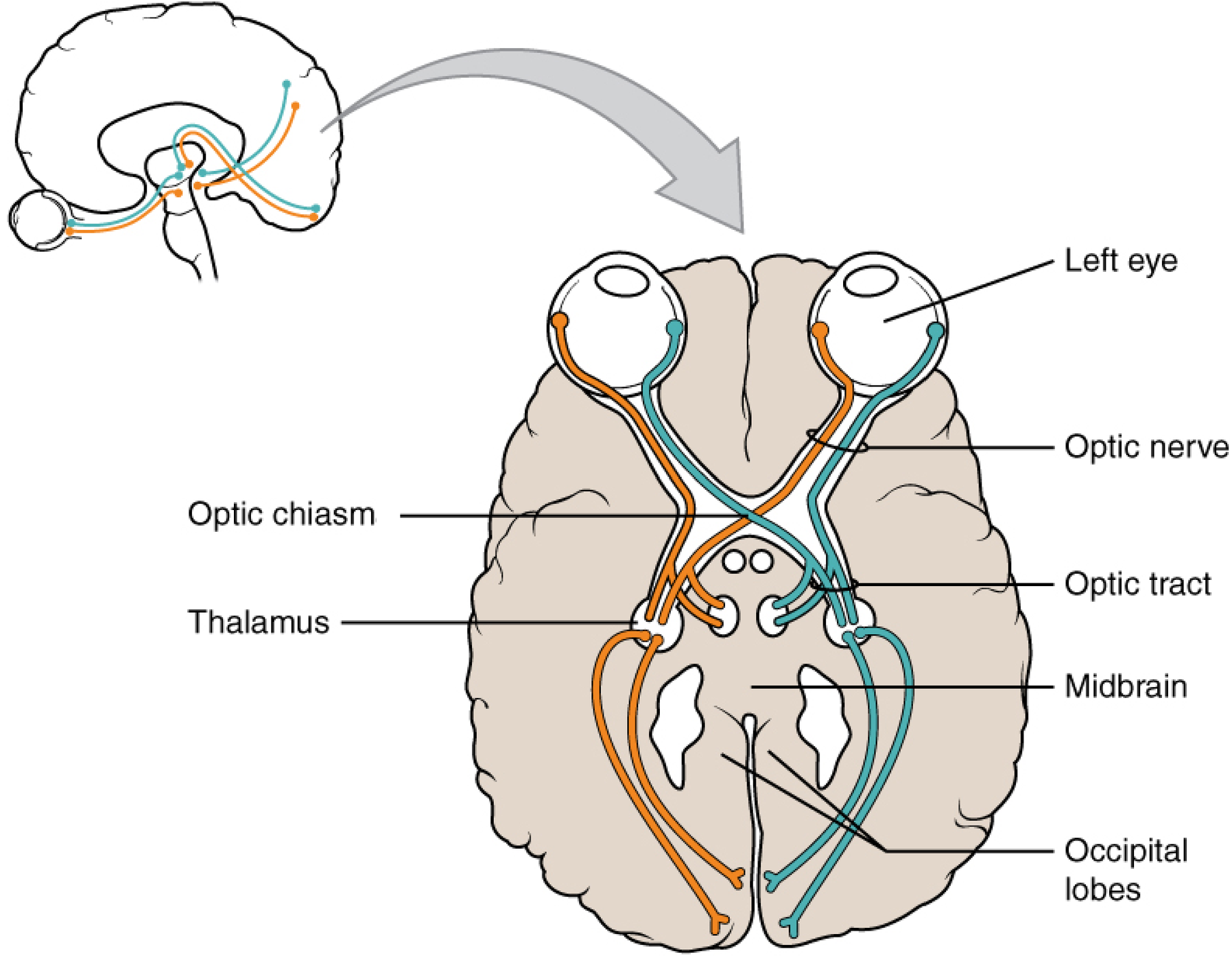


Ganglion Cell Axonal Projections

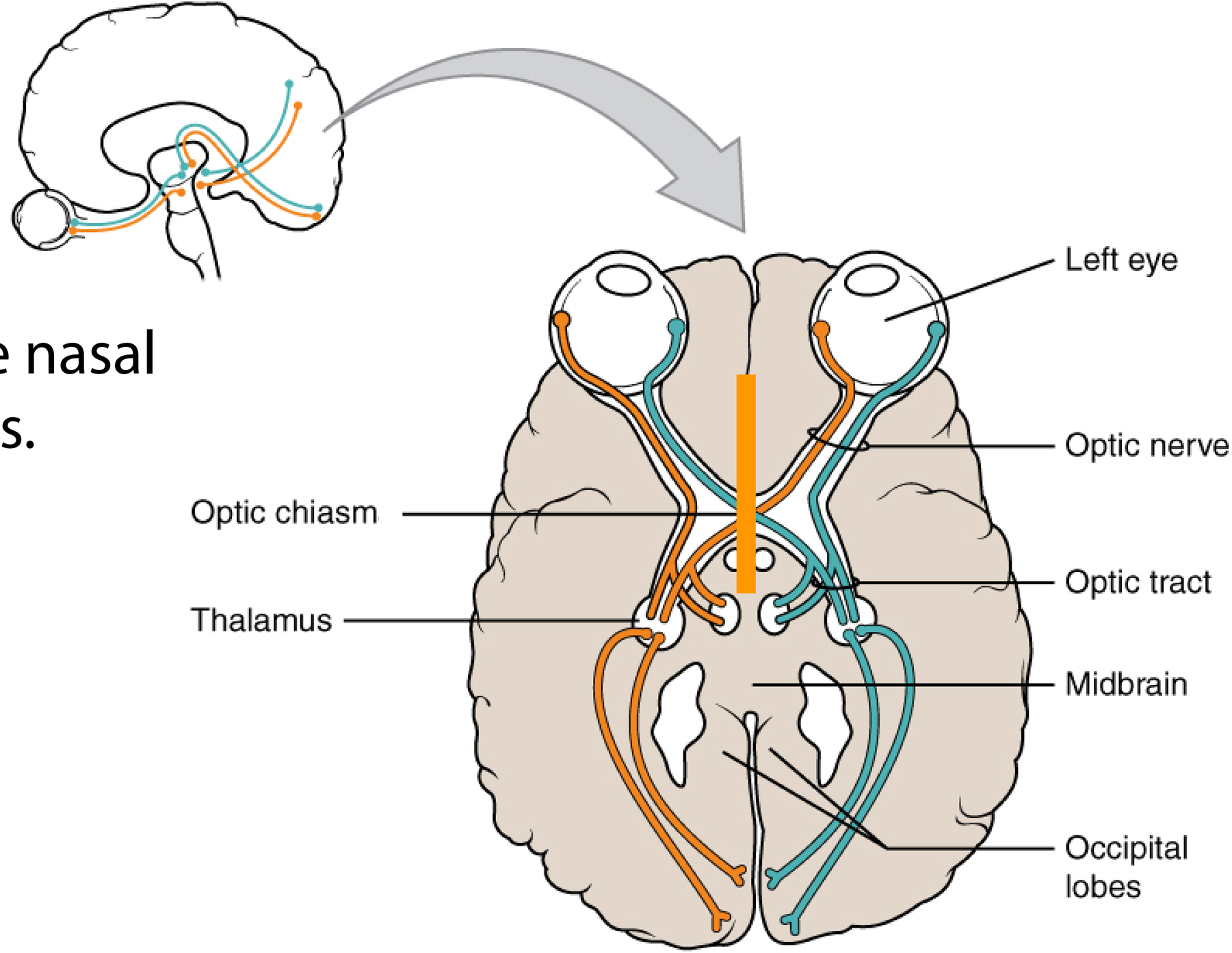
The axons of retinal ganglion cells in the temporal hemiretina of each eye project to the ipsilateral LGN of the thalamus.



Ganglion Cell Axonal Projections



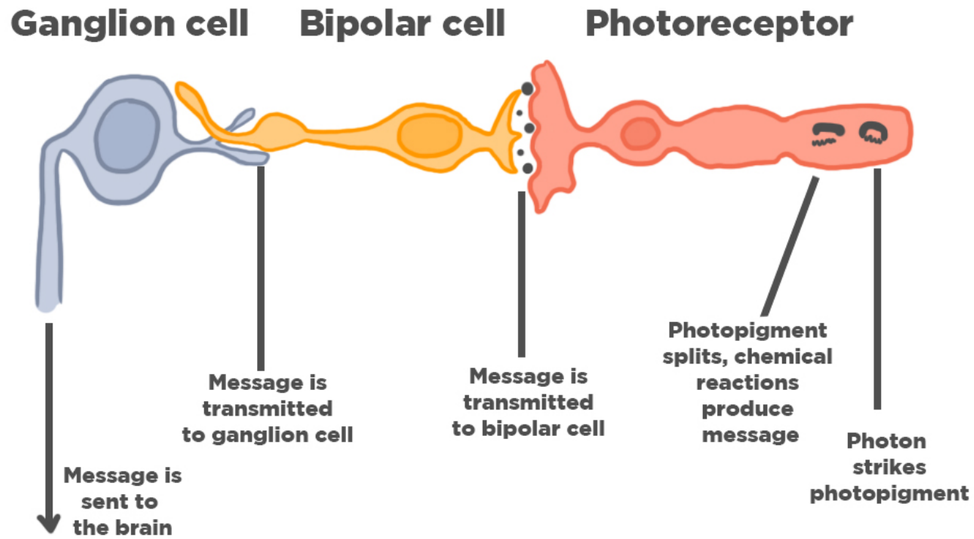
Ganglion Cell Axonal Projections

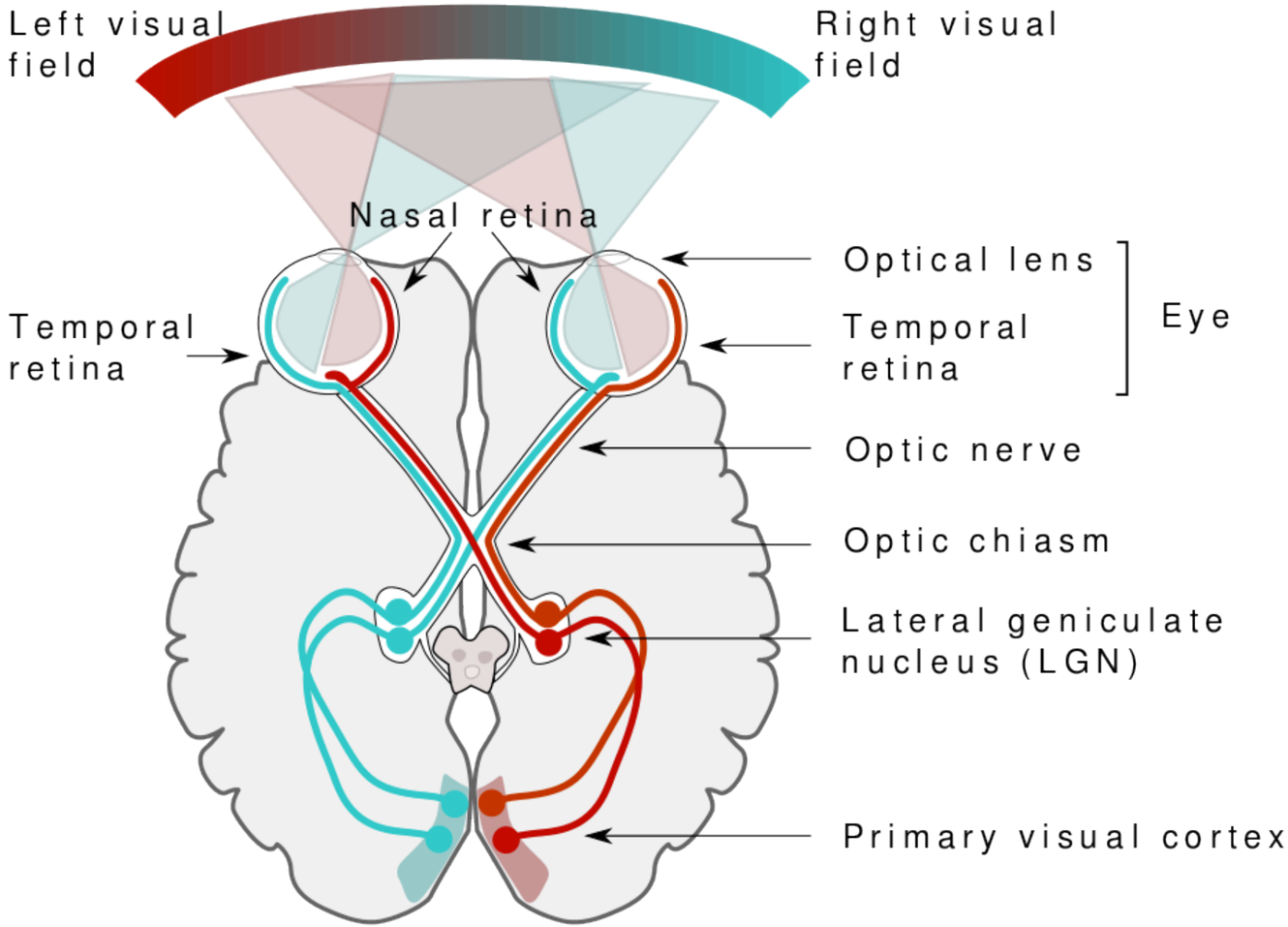


Blind in the nasal hemiretinas.

Ganglion Cell Axonal Projections

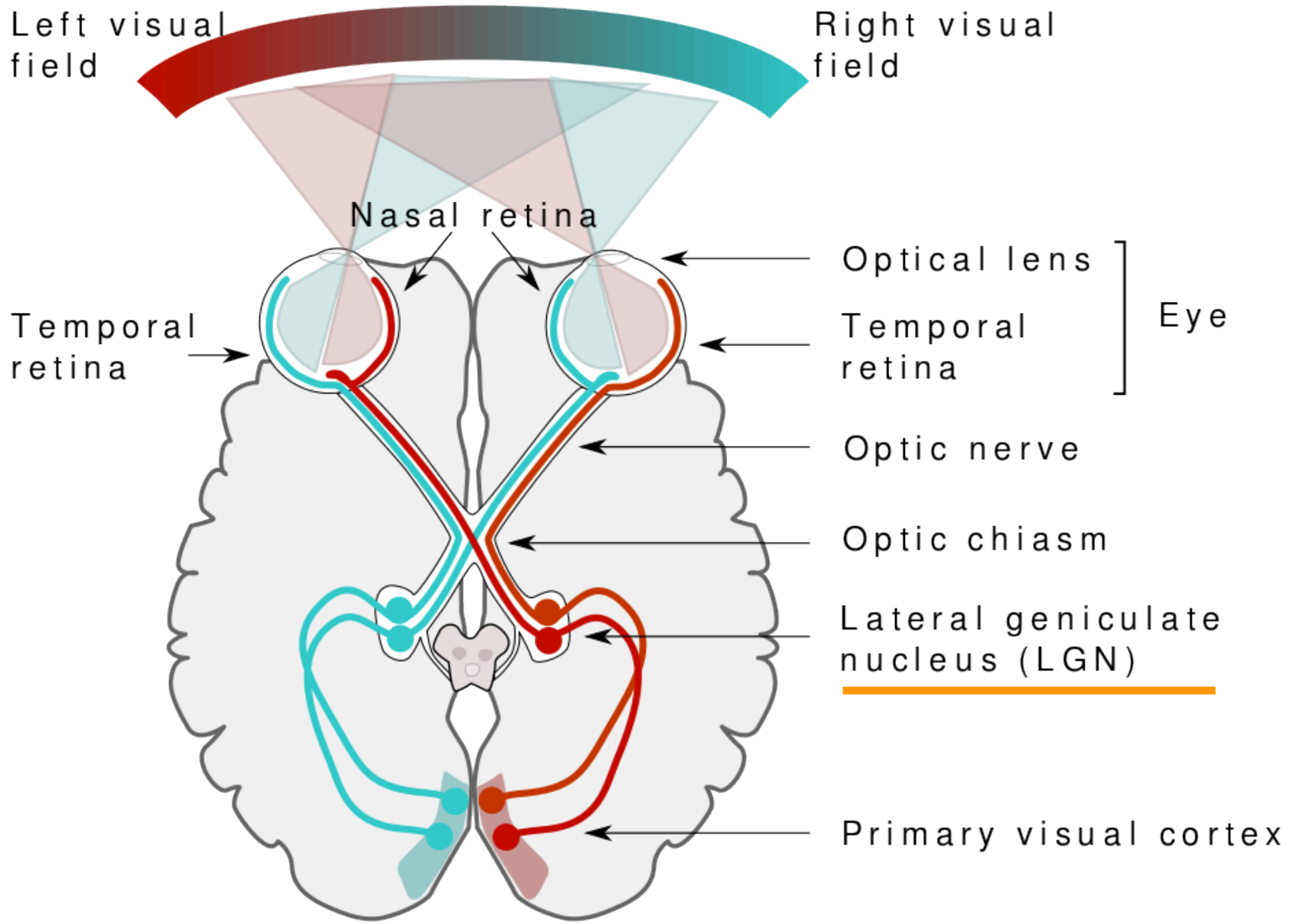
Retinal photoreceptors transduce light into a neural signal. Retinal ganglion cells integrate that information via center-surround antagonism.





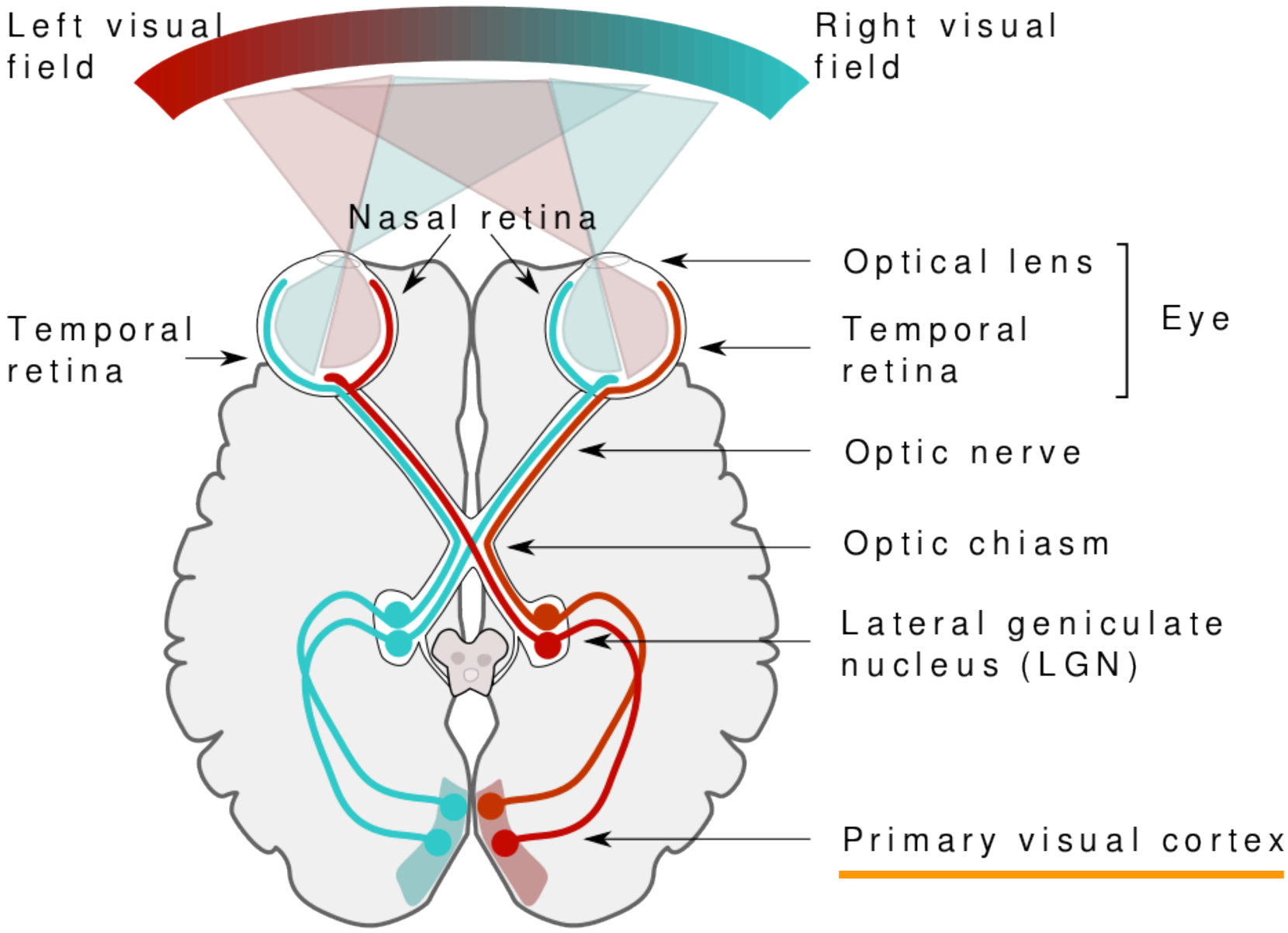
Retina-Geniculate-Striate System

Cells in the LGN of the thalamus also have center-surround antagonism--similar to that seen in the ganglion cells.



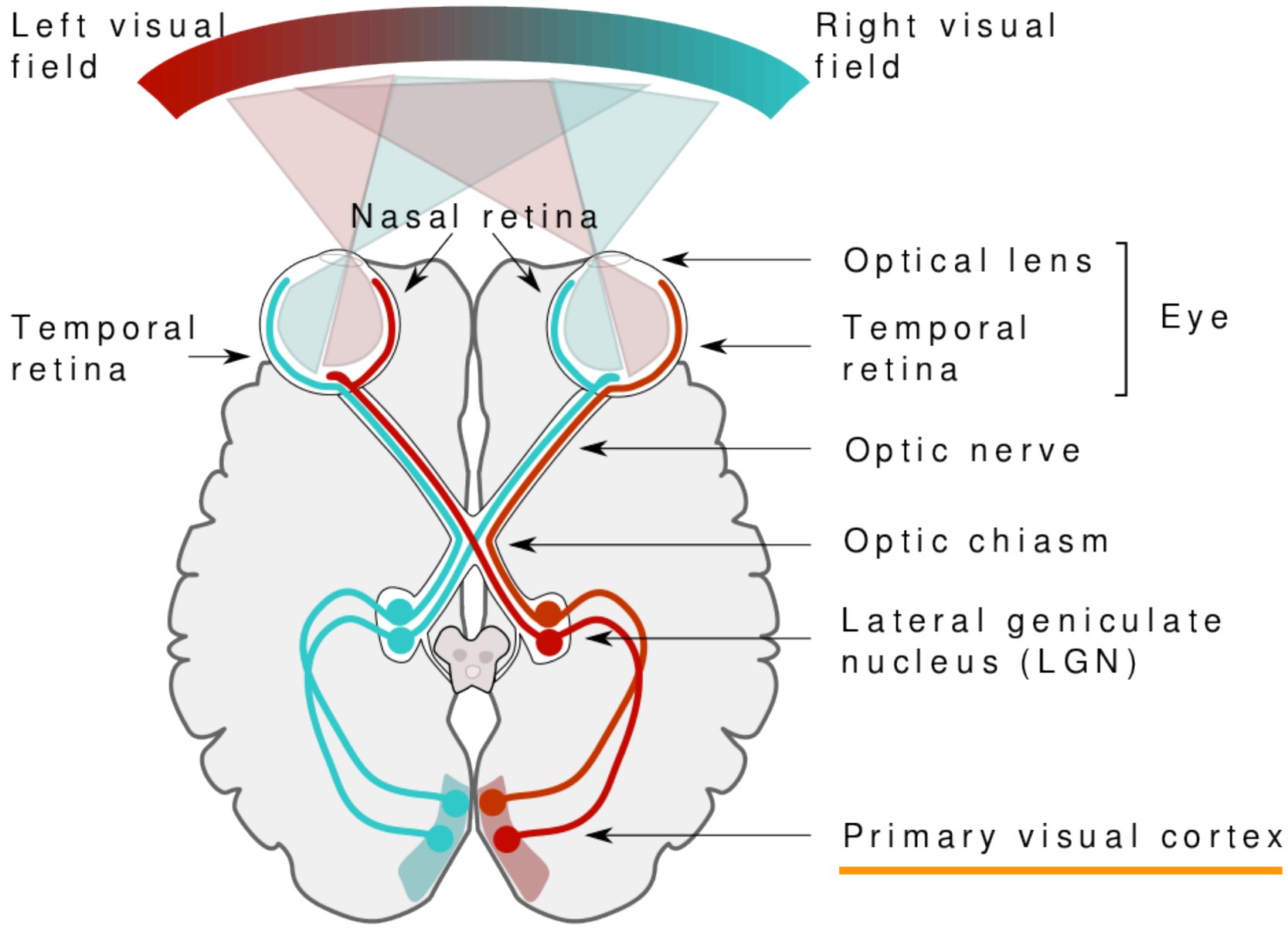
Retina-Geniculate-Striate System

Cells in lower layer IV of the Primary Visual Cortex (V1) also have center-surround antagonism, similar to that seen in LGN cells and retinal ganglion cells.



Retina-Geniculate-Striate System

Cells in V1, outside of lower layer IV, are sensitive to more complex sorts of information: They are sensitive to orientation, length, width, direction of motion, and binocular disparity.



Retina-Geniculate-Striate System