

**Definitions:**

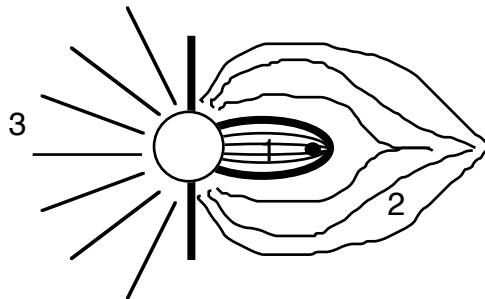
Homonymous:	Same side of VF affected in each eye
Bitemporal:	Opposite temporal sides of VF affected in each eye
Complete:	Entire VF area affected (ex. complete hemianopia)
Incomplete:	A portion of the field is spared
Congruity:	Tendency for homonymous field defects to be symmetrical (Similar size, location, shape in each eye's field)

**An Approach to Visual Field Analysis: Joel Glaser**

Territory I:	• Retinal rods and cones
Territory II:	• Retinal ganglion cell (RGC), nerve fiber layer (NFL) and optic nerve
Territory III:	• Optic chiasm
Territory IV:	• Optic tract, lateral geniculate body (LGB), optic radiations, visual cortex

**Details:**

- Territory I:
- Retinal rods and cones
  - Outer retinal layers with bipolar cell connections
  - Visible on fundus examination:
    - Choroidal disease (ischemia, scars)
    - Photoreceptor disease (RP – ring scotoma @ 30-50°)
    - RPE disease (macular degeneration)
- Territory II:
- Retinal ganglion cell (RGC) and axons in nerve fiber layer (NFL) and optic nerve (includes inner retinal layers)
  - Respects the horizontal midline
  - Field defects follow the NFL architecture:



- 1) Papillo-macular (PM) bundle
  - Central scotoma: Involves macular area RGC or axons
  - Cecocentral scotoma: Involves RGC or axons arising both from the fovea and from the retina between the fovea and the disc
- 2) Arcuate bundles
  - Altitudinal defect spares nasal radiations thus temporal field is normal across the midline (not so with cortical lesions, for example)
- 3) Nasal radial nerve fiber bundle
  - Points toward the blind spot (not fixation as with LGB)

- Lesion produces a wedge pattern in the temporal VF

Territory III: • Optic chiasm

- Anatomy:
  - Nasal fibers (including nasal half of macula of each eye) cross the chiasm, to the contralateral optic tract while temporal fibers remain uncrossed. Thus chiasmal lesions produce a bitemporal hemianopia due to interruption of decussating nasal fibers
  - Lower retinal fibers project through the optic disc and chiasm to lie laterally in the tracts; upper retinal fibers lie medially (90° rotation)
  - Inferonasal retinal fibers cross in the chiasm and course anteriorly 4 mm in the contralateral optic nerve (Wilbrand's knee) before turning back to join uncrossed inferotemporal fibers in the optic tract (lesions produce a "junctional scotoma")

Territory IV: • Optic tract, lateral geniculate body (LGB), optic radiations, visual cortex

- Respects the vertical midline
- Retrochiasmatal lesions result in contralateral homonymous hemianopias
- Congruity increases with more posterior lesions
- Fixation may be spared
- Example: classic "Meyer's loop" – "pie-in-the-sky" homonymous quadrantanopia from anterior temporal lobe lesion
- Optic tract anatomy:
  - Nasal fibers (including nasal 1/2 of macula) cross in chiasm, to contralateral optic tract; temporal fibers remain uncrossed; Thus bitemporal hemianopia created by lesion
  - Lower retinal fibers project through the optic nerve and chiasm to lie laterally in the tracts; upper retinal fibers lie medially (there is a 90° rotation of fibers from the nerve through chiasm and into the tracts)
  - Inferonasal fibers cross in the chiasm and course anteriorly 4 mm in the contralateral optic nerve (Wilbrand's knee) before turning back to join uncrossed inferotemporal fibers in the optic tract (Lesion produces a "junctional scotoma")
- Optic tract defect criteria:
  - Incongruous homonymous hemianopia
  - Bilateral retinal NFL atrophy or optic atrophy ("bow-tie")
  - Pupillary abnormalities:
    - Relative APD on the side opposite the lesion (eye with no temporal VF loss)
    - Wernicke pupil: Light stimulation of "blind" retina causes no pupillary constriction while light projected on "intact" retina produces normal pupillary constriction
    - Behr's pupil: Anisocoria with larger pupil on the side of the hemianopia (probably does not really exist)

Analysis:

- 1) Is there a hemianopic defect?
  - Homonymous = Territory IV
  - Heteronymous = Territory III
- 2) Is there a NFL defect?
- 3) If neither 1 or 2: Territory I lesion exists
- 4) For a quadrantic VF defect, does the defect go to fixation (Territory IV) or to the blind spot (Territory II)