

Examination of Vision



Dr Steve Colley
RPH + Freo Hospital
Aug 2014
www.eyapps.com.au

Eye Examination

- Taking a detailed history is the first step in eye examination. Important eye history includes;
 - rapidity of symptoms
 - presence of trauma
 - prior eye surgery
 - use of contact lenses
 - treatment already initiated

Eye Examination

- The mainstay of the eye exam is the Snellen visual acuity.
- In people with refractive errors it is important to obtain the best pinhole acuity.
- For example a Snellen acuity of 6/18 means the patient can read at 6m what the “normal population” can read at 18m.



Equipment

- The equipment required to examine the eye and visual system includes the direct ophthalmoscope, a torch, and fluorescein.

Ophthalmologists will use a a mounted fixed focal length b microscope called a slit lamp.



As an aside...

- Beware the unilateral red eye



Afferent (sensory) System

- Light is transduced in the retina and then transmitted to the primary visual cortex via the optic nerve (CN II).
- The cornea is innervated by the nasociliary branch of the ophthalmic division of the trigeminal nerve (CN V).

Efferent (motor) System

- The internal efferent system consists of the iris (and ciliary body) (CN III) .
- The external efferent system consists of the extraocular muscles (CN III,IV,VI) and the levator palpebrae superioris (CN III), Mullers muscle (sympathetics) (and orbicularis oculi) (CN VII).

Examination of the Afferent System

- Mnemonic for examining CN II (optic nerve) - **AFRO**.
- **A**cuity, **F**ields, (Pupil) **R**eflexes, **O**phthalmoscopy.
- Corneal sensation is tested in the non-anaesthetised eye with a wisp of cotton or a tissue.

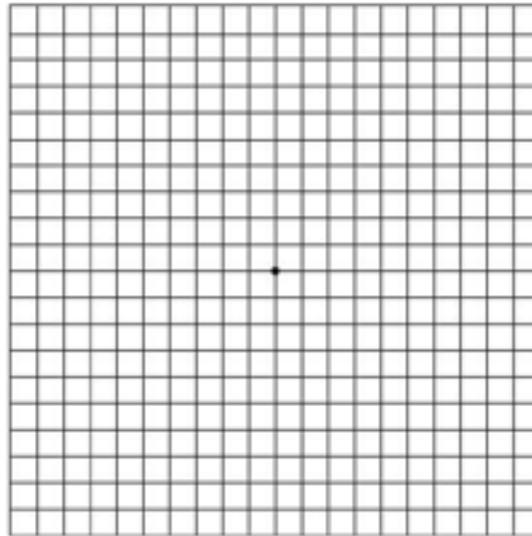
Visual Acuity



Confrontational Visual Fields

- Many significant neurologic field defects can be found with simple confrontation techniques.
- Finger Counting. Between one and five fingers is presented and the number varied. The fingers are presented in a static fashion 20 and 30 degrees from fixation.
- Subjective visual fields. Patient covers one eye and focuses on the centre of the examiner's face usually the nose. Scotomas not easily identified on perimetry are recognized as a central dimming by the patient when viewing the examiner's face.

Amsler Grid



Testing Yourself with the Amsler Grid

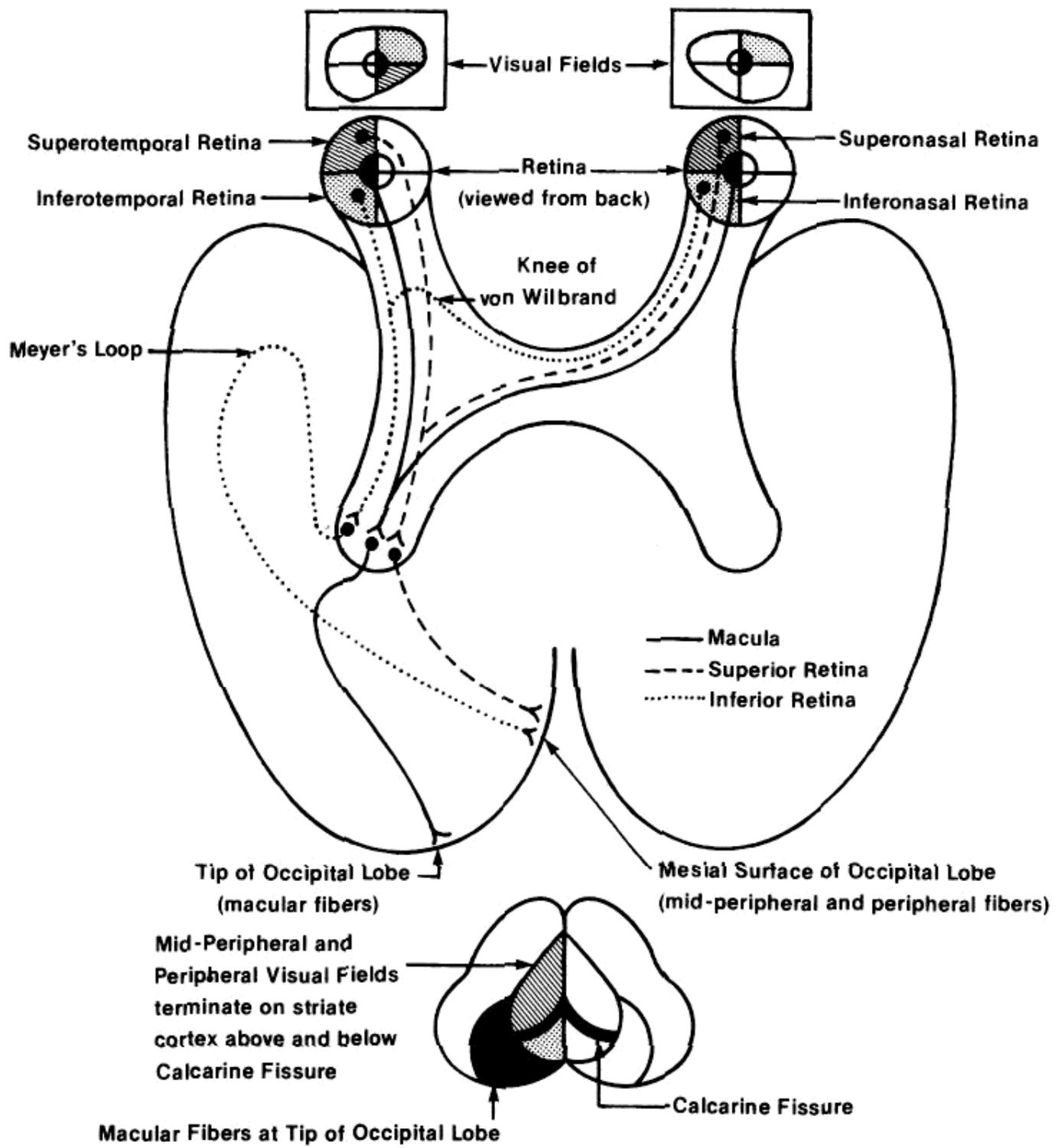
The grid should be at about the same distance from your eyes that any other reading material would be.

Cover one eye, then focus on the dot in the center.

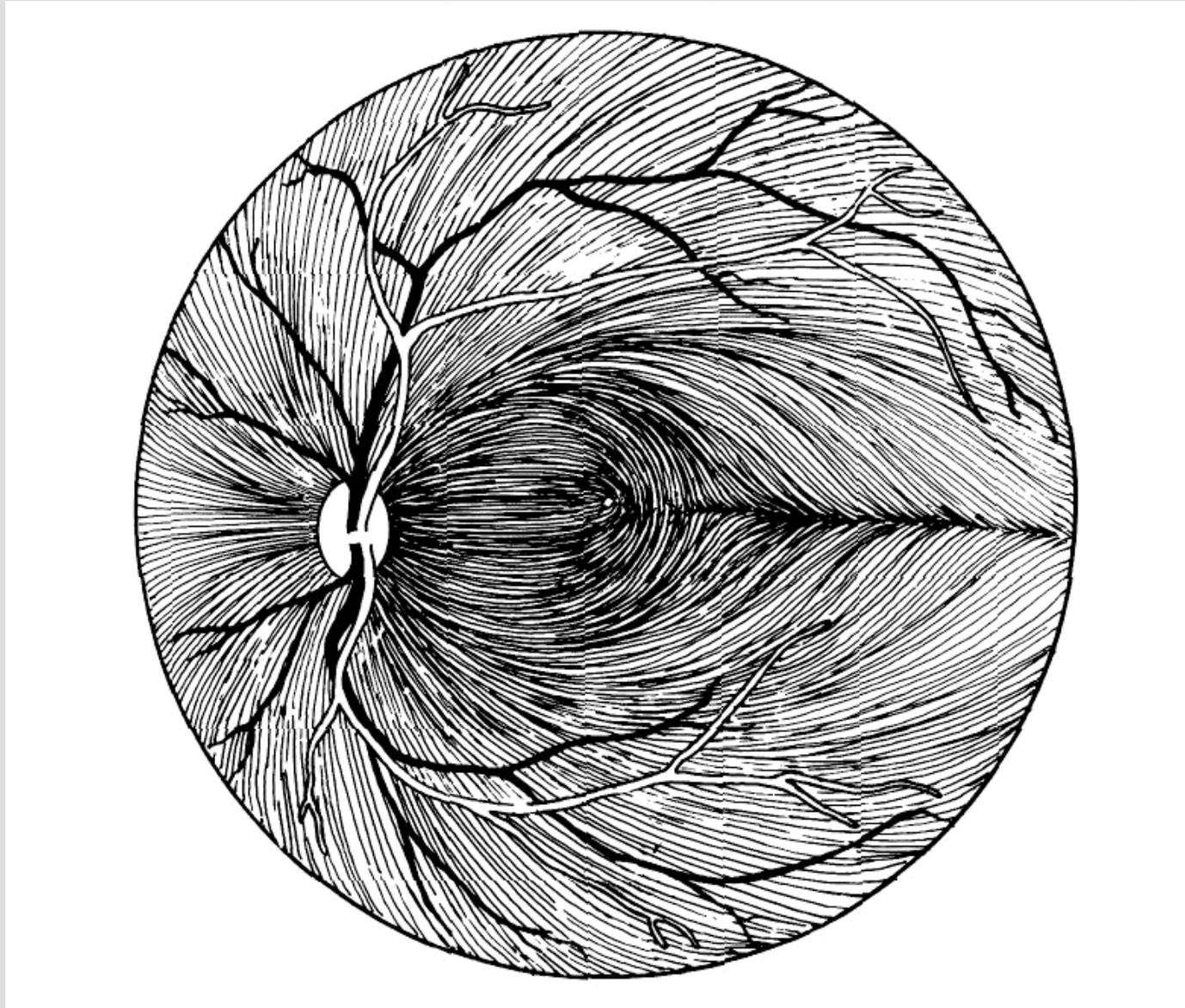
- Do any of the lines look wavy, blurred or distorted? (All lines should be straight, all intersections should form right angles and all the squares should be the same size.)
- Are there any missing areas or dark areas in the grid?
- Can you see all corners and sides of the grid?

Repeat with the other eye.

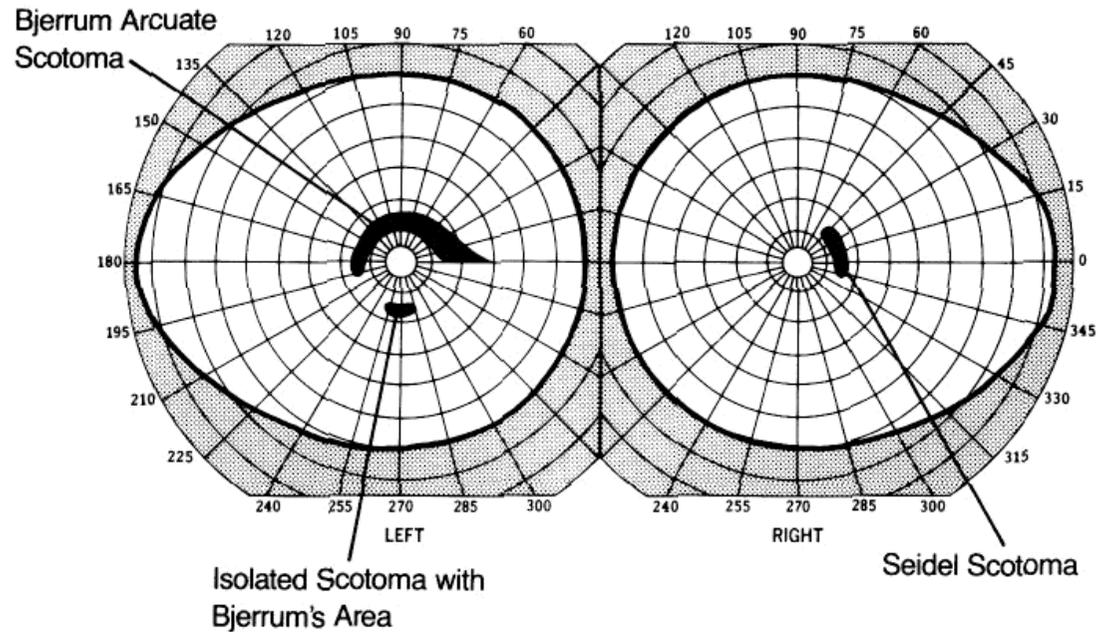
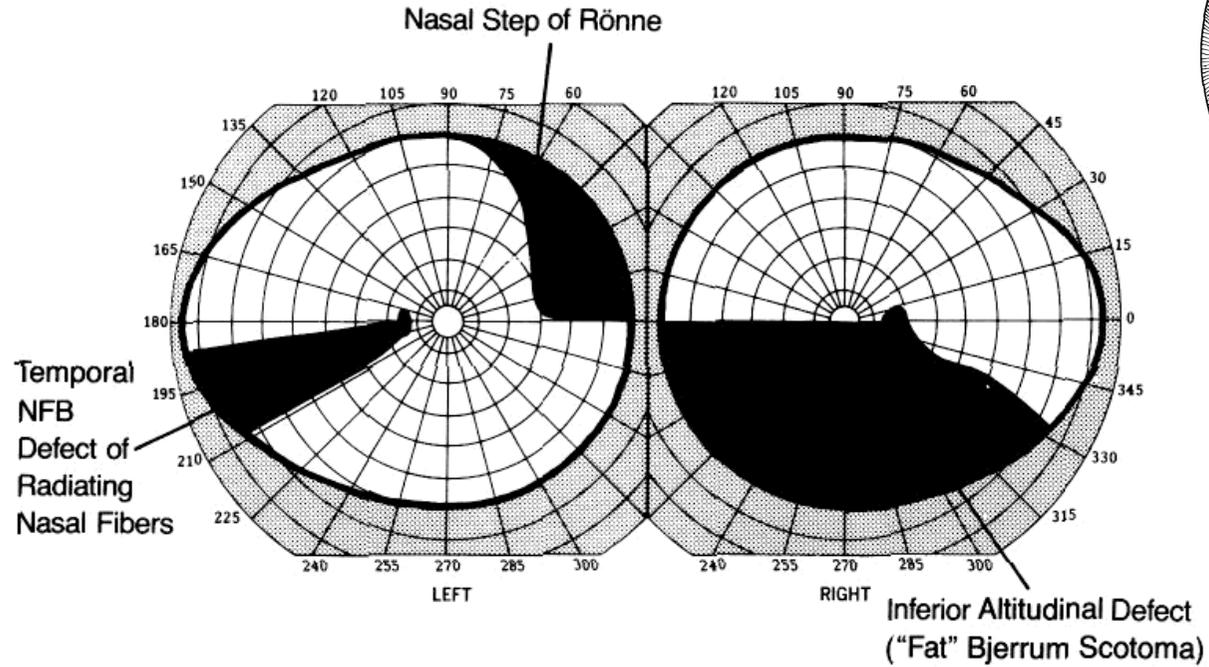
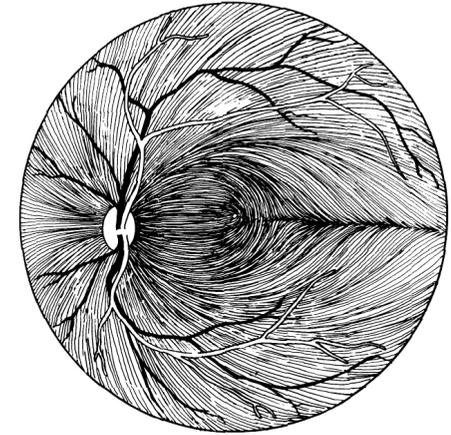
VERY IMPORTANT: Report any irregularity to your eye doctor immediately. You can mark areas of the chart that you've not seeing properly and bring it with you to your eye exam.



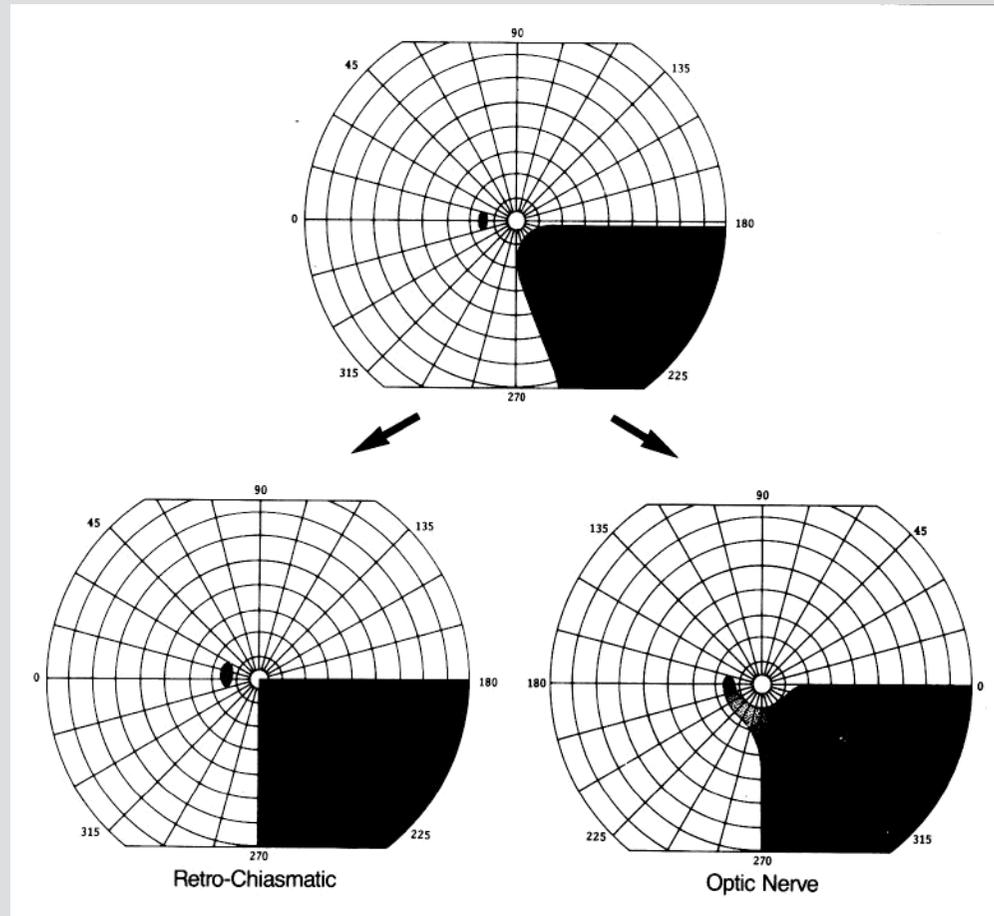
Nerve Fibre Layer Pattern



Glaucoma

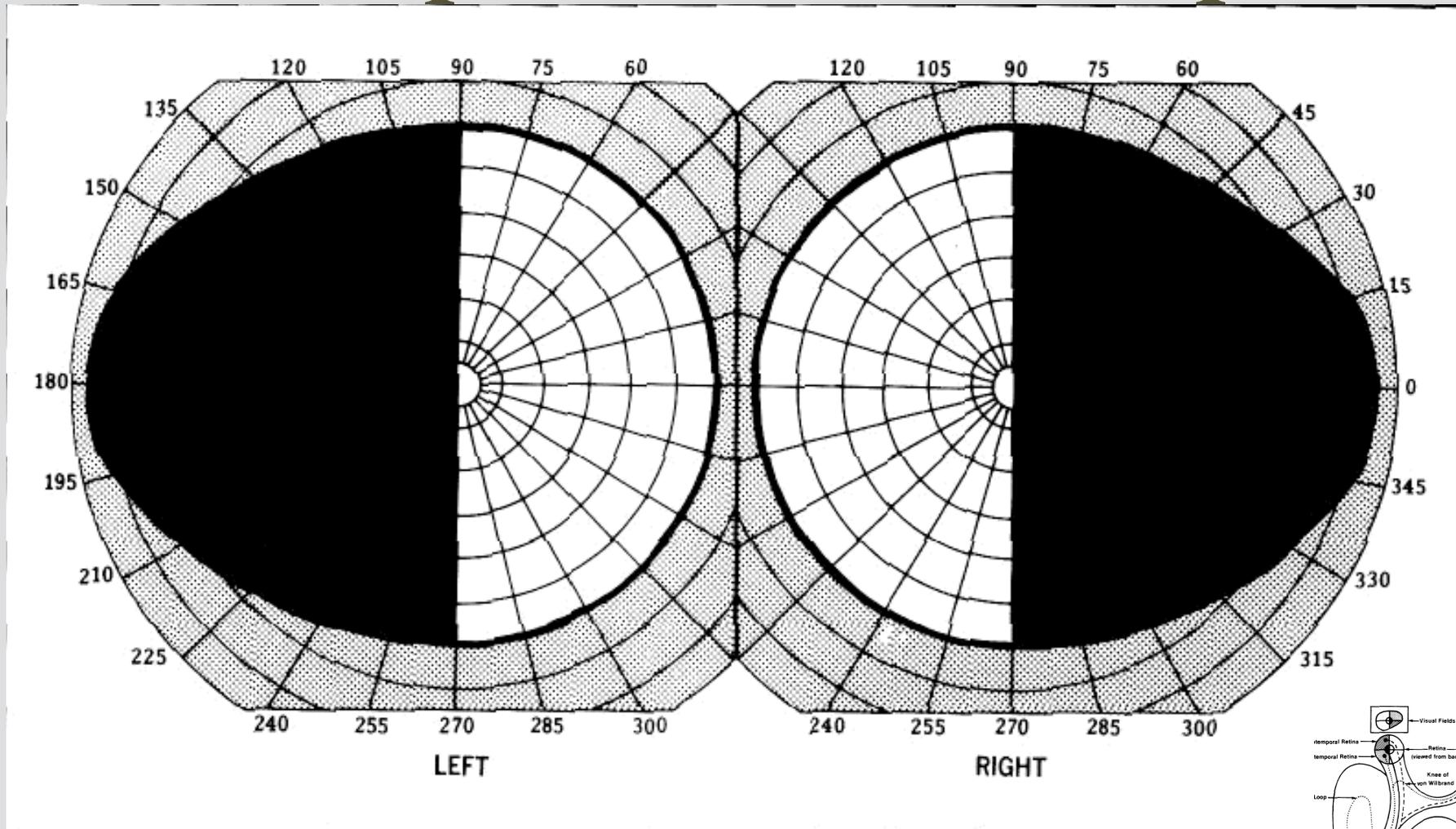


Quadrantic Field Defect

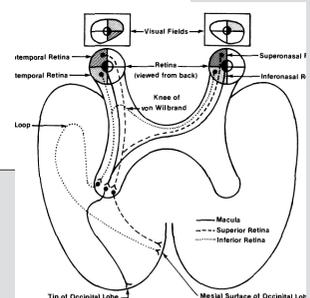


- Does the field defect go to fixation (retrochiasmatic lesion) or to the blind spot (optic nerve lesion).

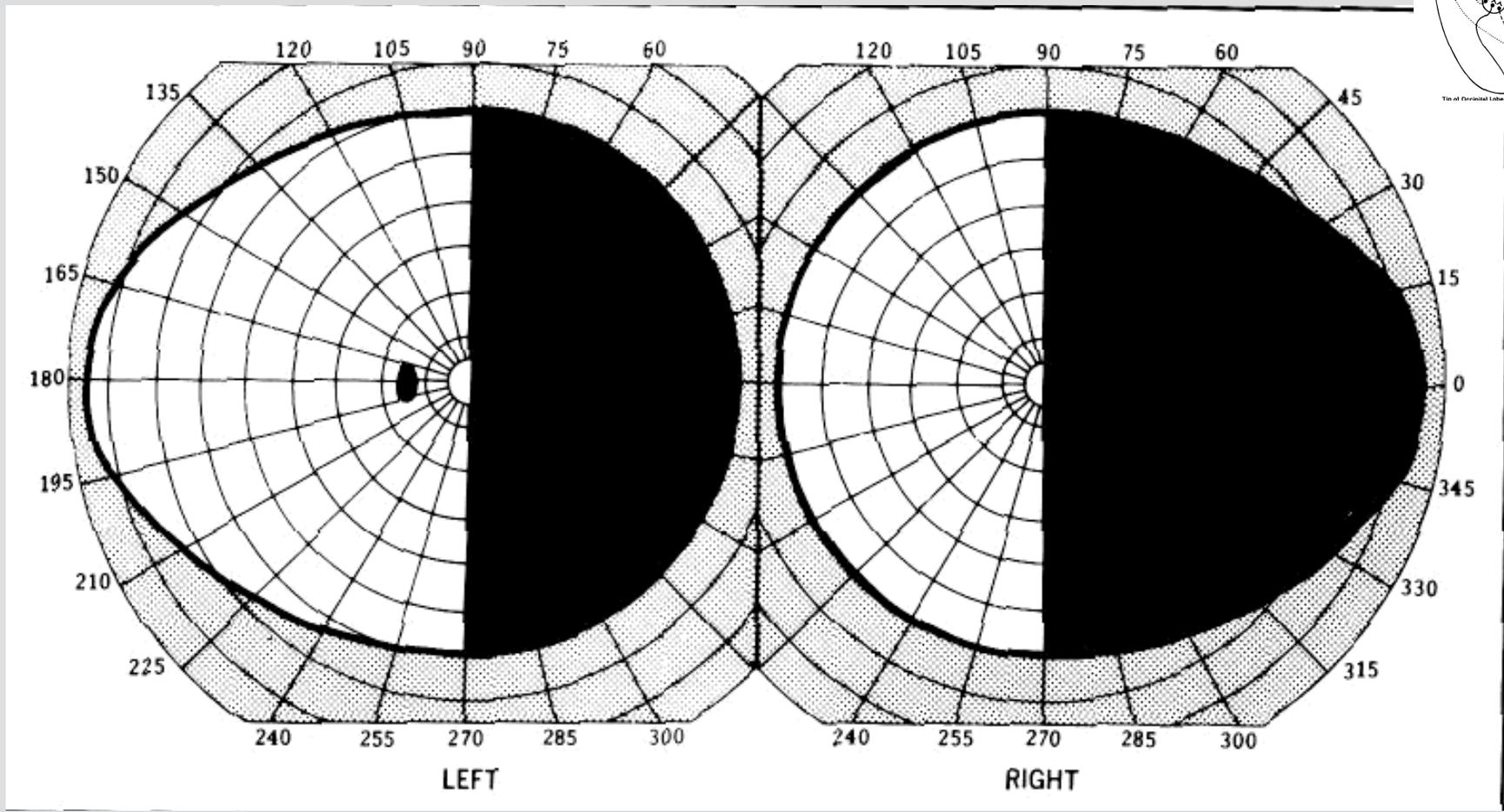
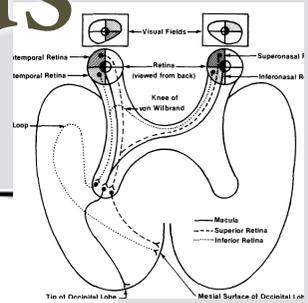
Bitemporal Hemianopia



- Interruption to decussating nasal fibres in the chiasm

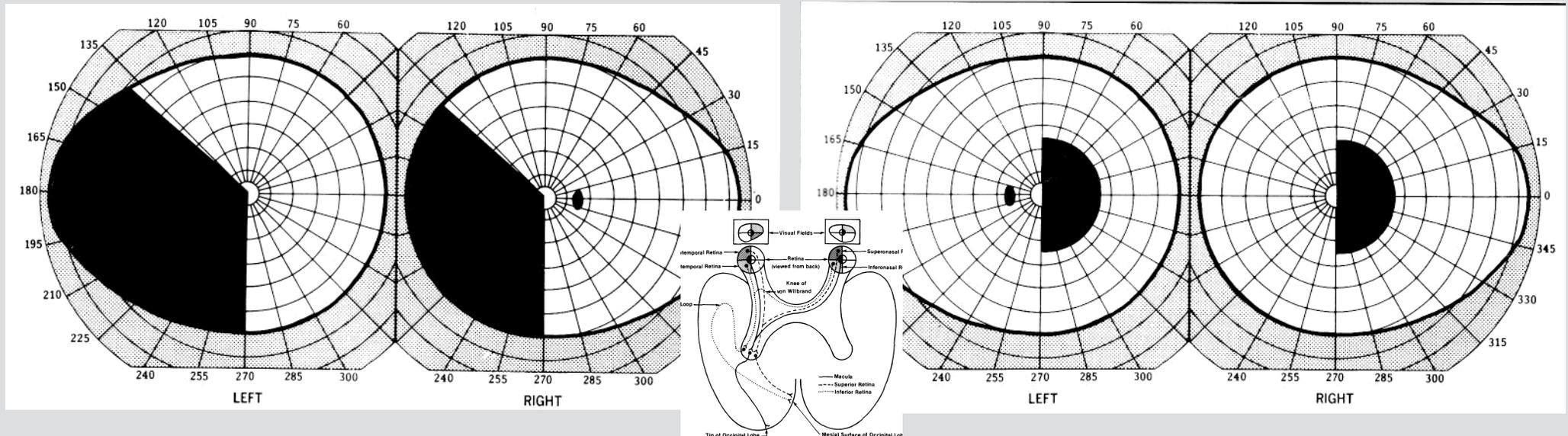


Complete Homonymous



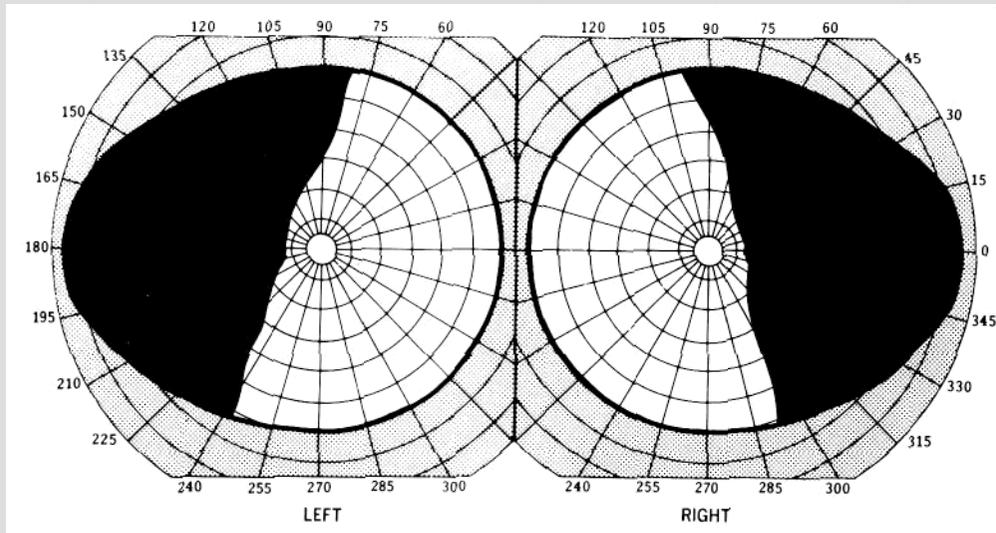
- Cannot be categorised by “congruity”. Optic tract or cortex lesion.

Congruous Homonymous Hemianopia



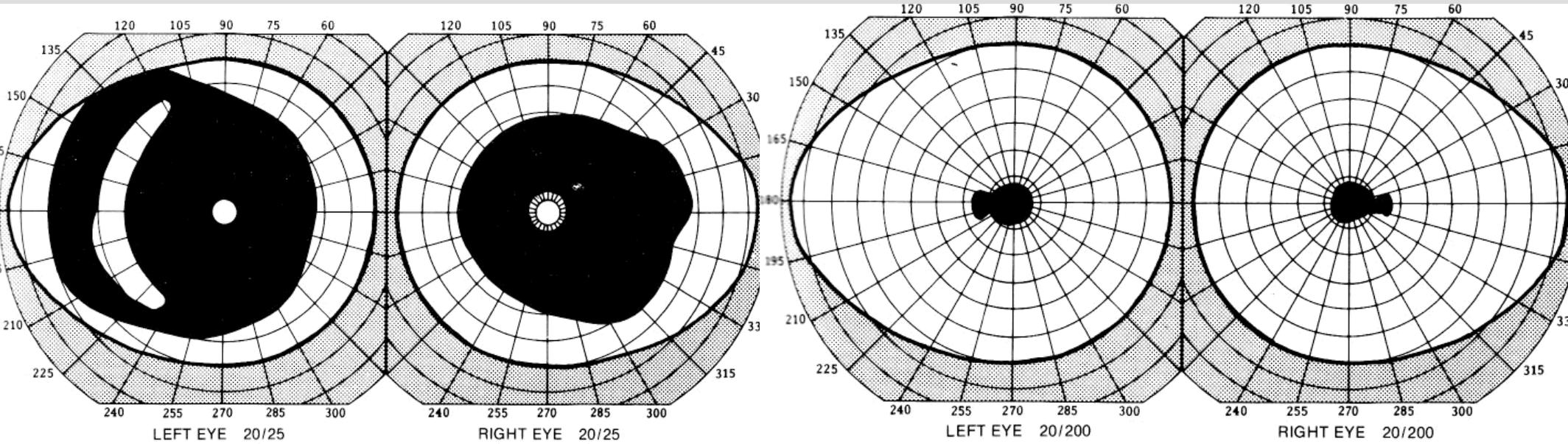
- The more posterior a retro-chiasmatic lesion the greater the congruity. “Macular” fibres terminate at the occipital pole.

Pseudo-bitemporal



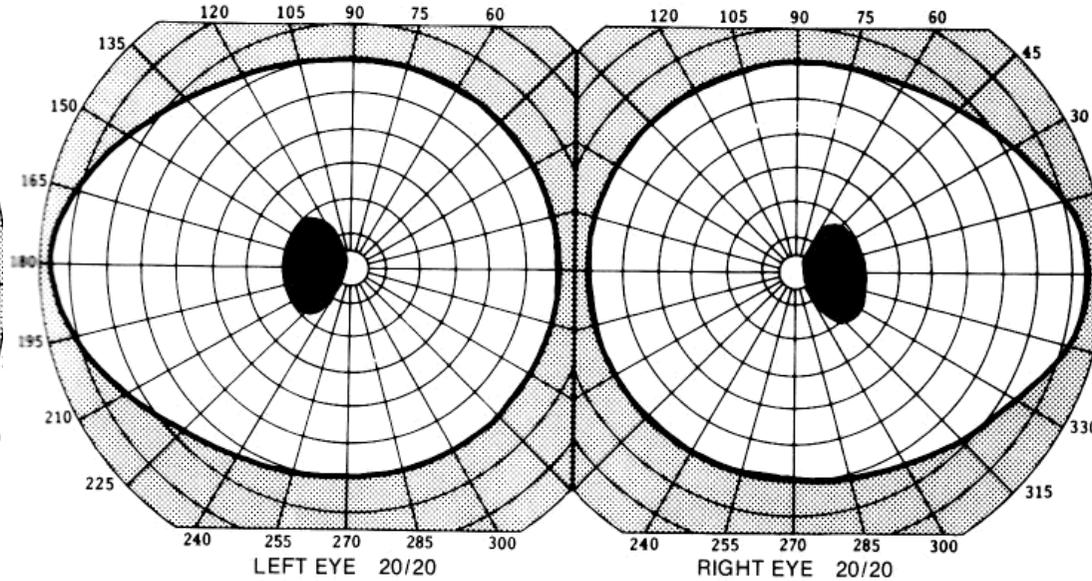
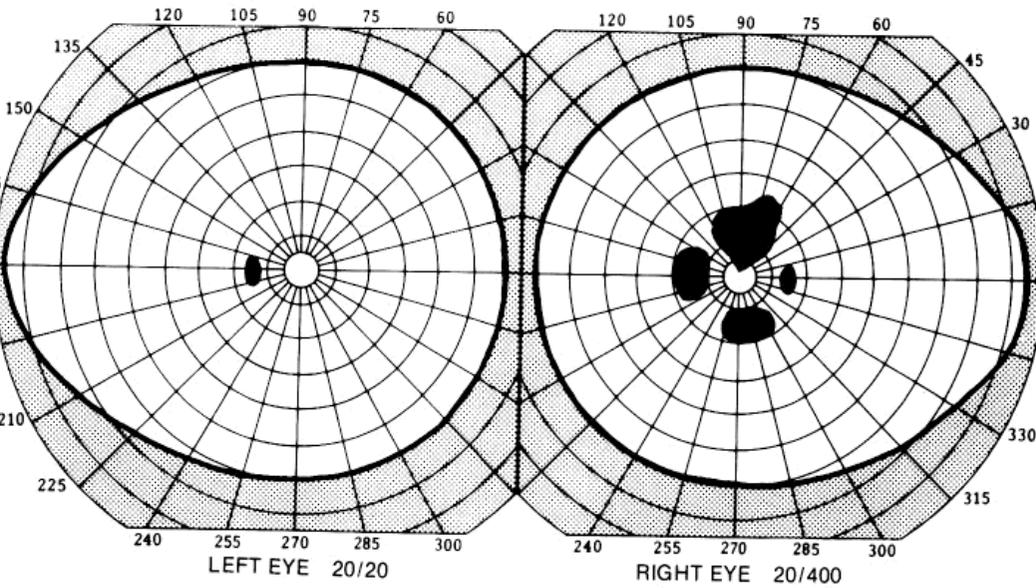
- Don not respect the vertical midline and are not due to lesions of the visual pathway.
- May be due to refractive errors, tilted discs, overhanging eyelids.

Other field defects



- Retinitis pigmentosa or advanced glaucoma
- Toxic optic neuropathy

Other field defects



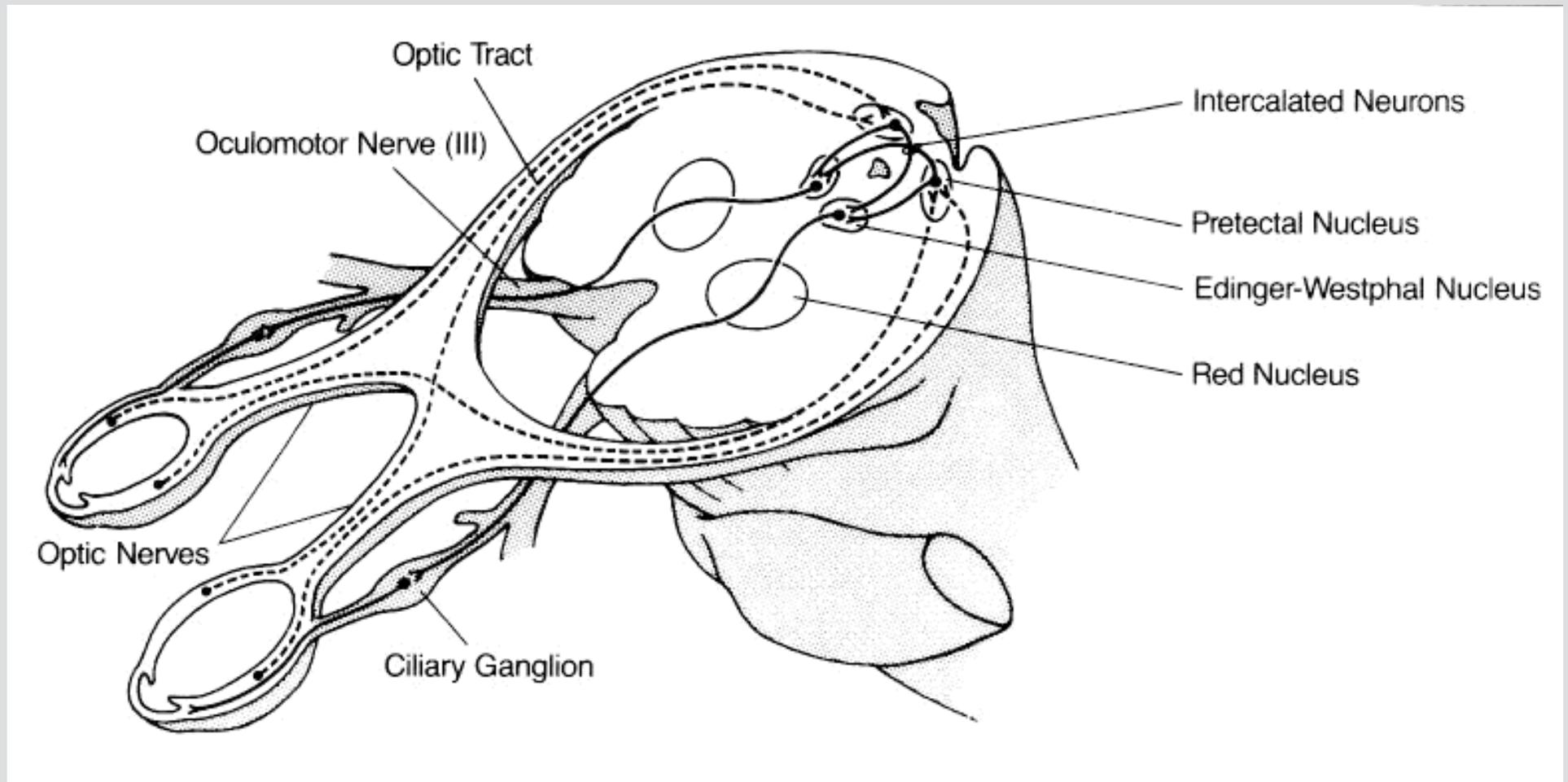
- Macular disease

- Papilloedema

Pupil function

- Pupils Equal & Reactive to Light & Accommodation (PERLA).
- The swinging flash light test can detect anterior afferent pathway defect due to the difference in stimulation between the direct and consensual light responses.
- Efferent defects result in unequal pupils (anisocoria), or poorly reactive pupils if bilateral.

Pupil function



Relative Afferent Pupil Defect



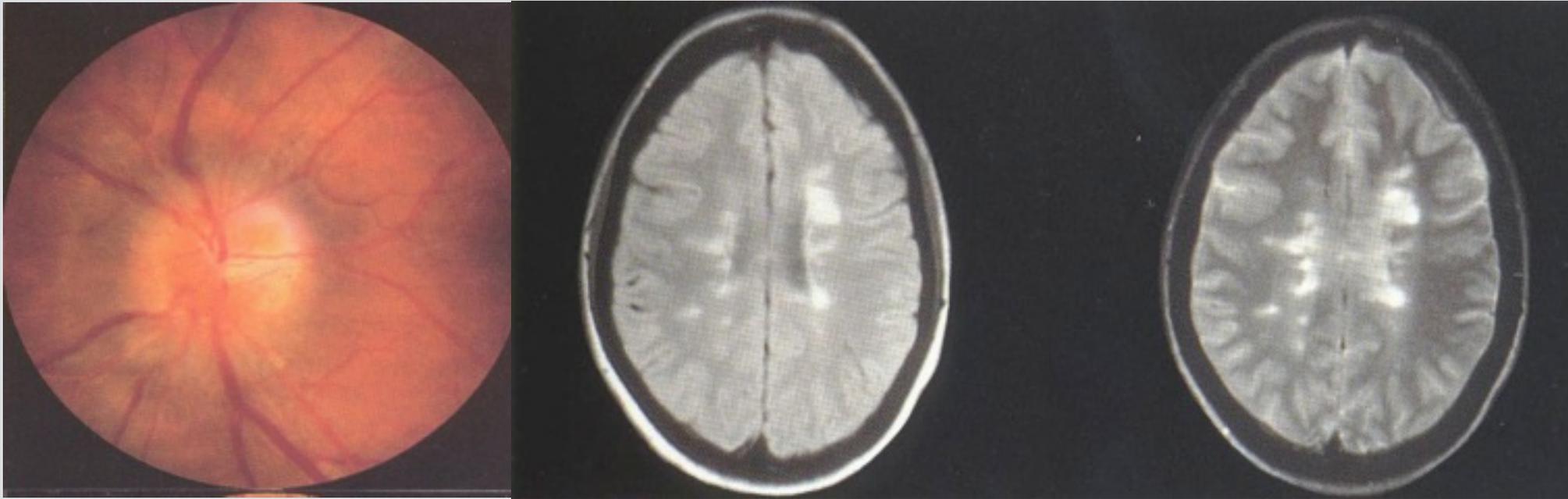
- A left Marcus-Gunn pupil (left RAPD).

Relative Afferent Pupil Defect



- An RAPD is usually associated with reduced Snellen visual acuity.
- Causes include central retinal artery occlusion, central retinal vein occlusion, retinal detachment, temporal arteritis and optic neuritis.

Relative Afferent Pupil Defect



Examination of the Afferent System

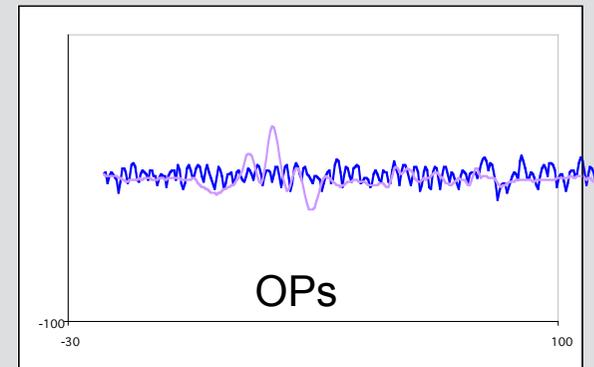
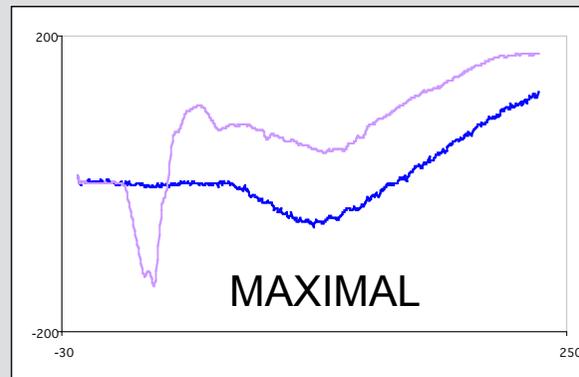
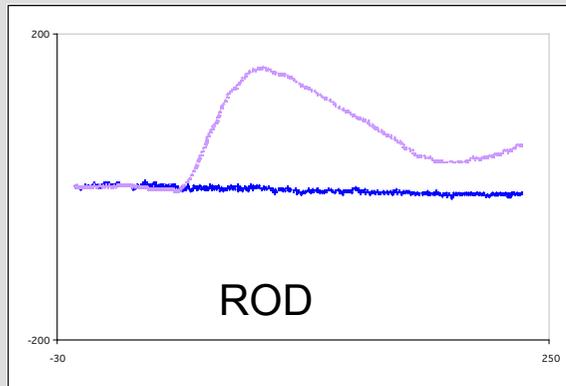
- Further examination of visual function includes colour vision testing (Ishihara plates or Hue testing), light and colour saturation (red desaturation) at the bed side.
- Other specialised tests include the electroretinogram (ERG) and visual evoked potentials (VEP).

Electroretinography (ERG)

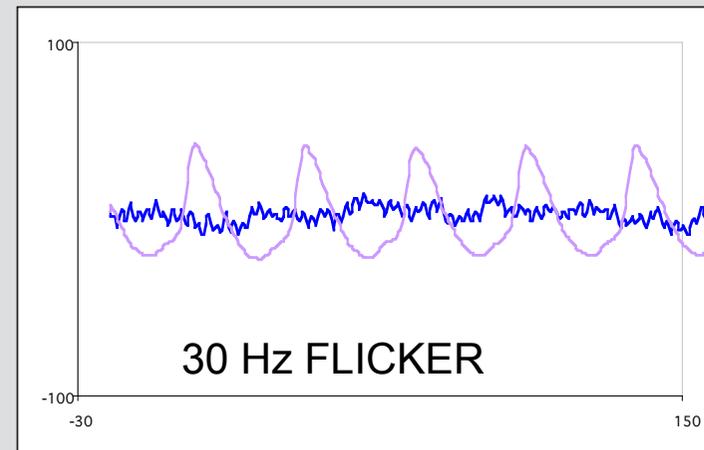
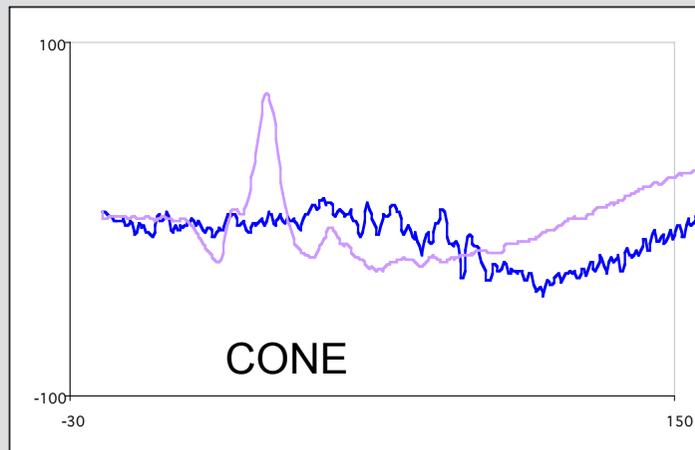
Scotopic ERGs

RP ———

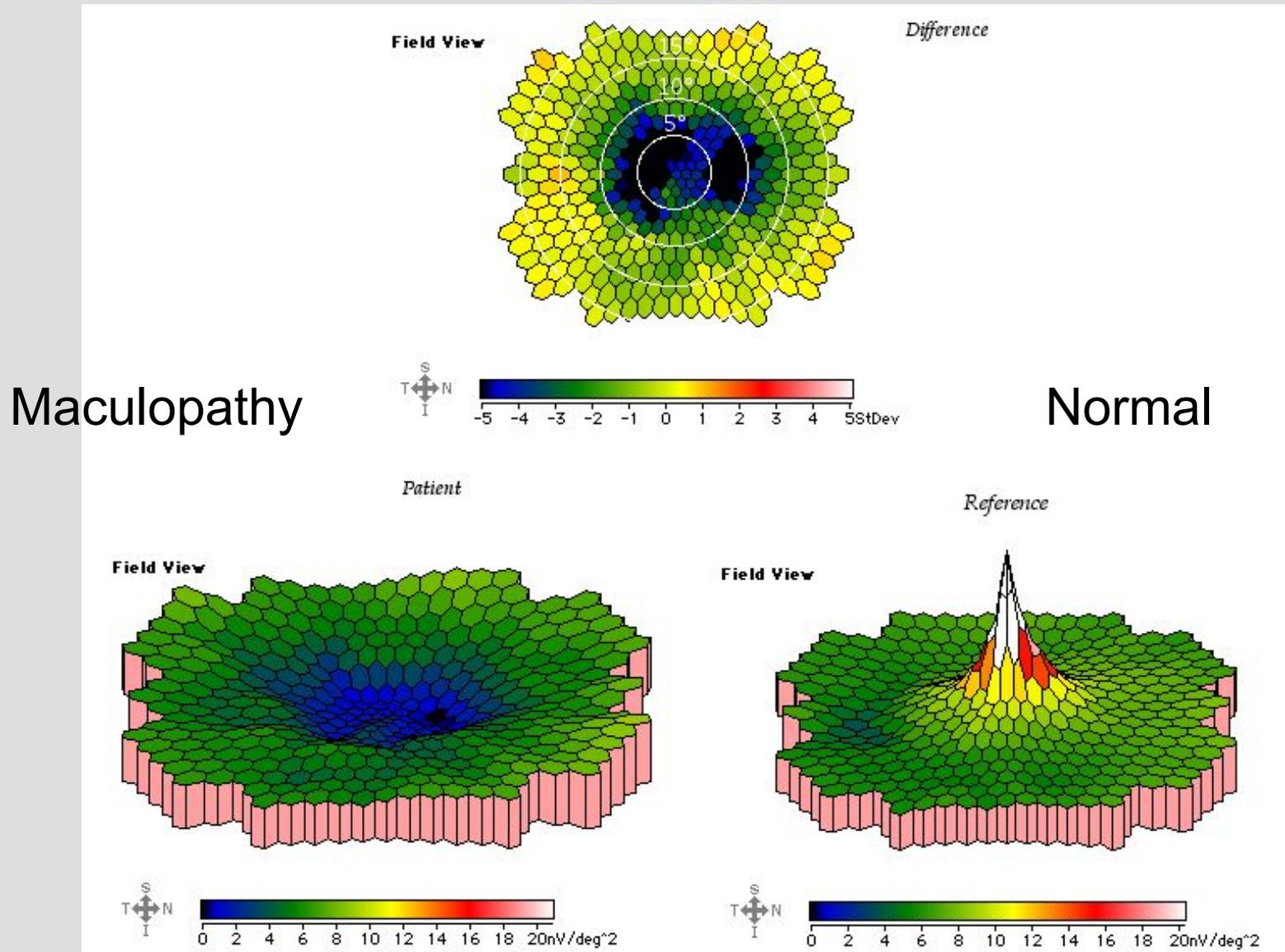
Normal ———



Photopic ERGs



Multifocal ERG



Examination of the Efferent System

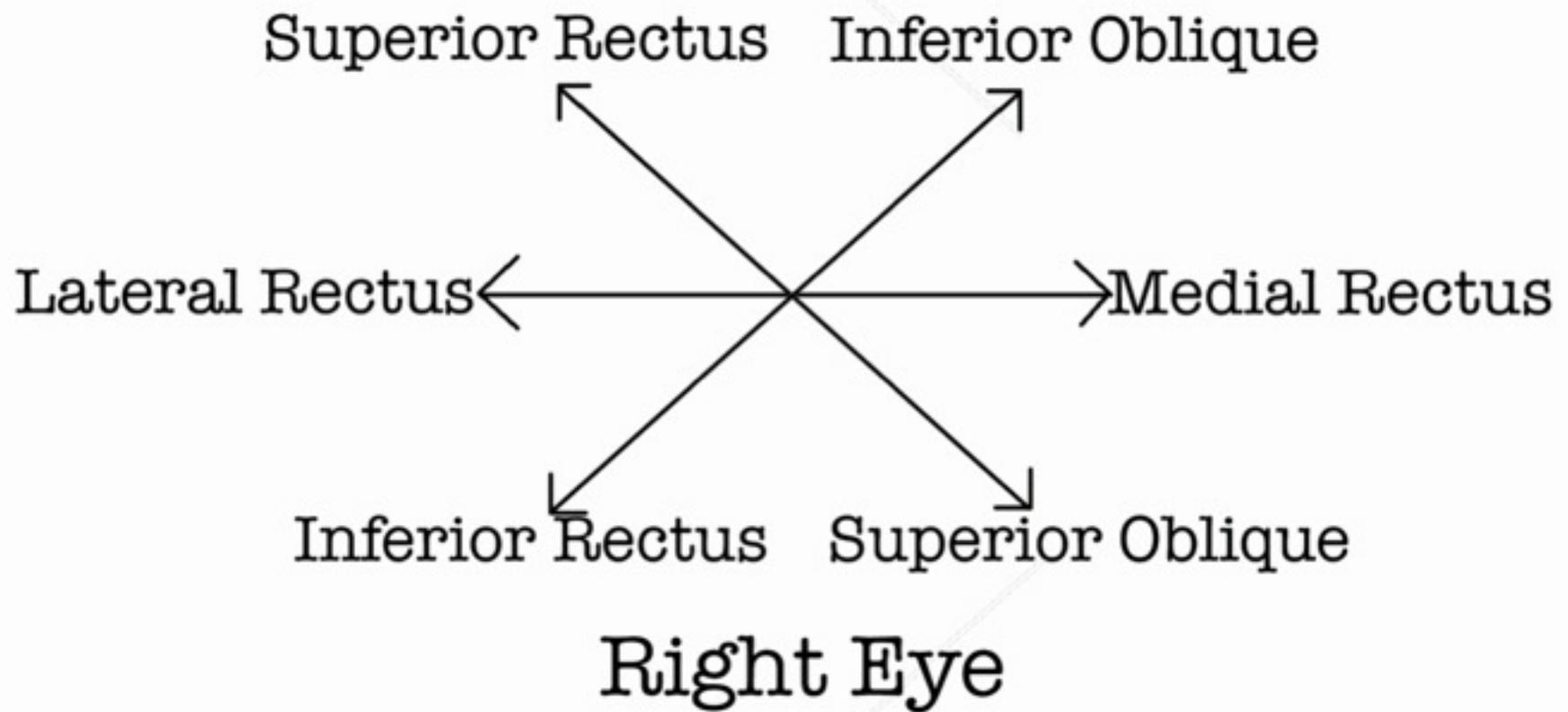
- Normal vision requires straight eyes.
- Misalignment of the eyes in adults results in double vision.
- Misalignment of the eyes in children under the age of 6 may result in amblyopia (“dull eye”).
- Restrictive disease in adults.

Squint

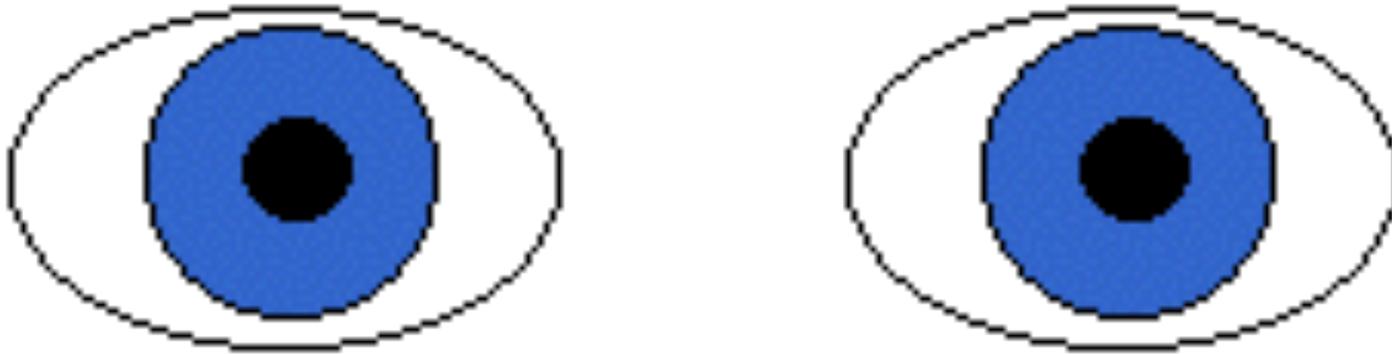


- A misalignment of the eyes is called a strabismus or squint.
- Test for squints with corneal light reflexes, cover testing and extraocular movements (EOM).

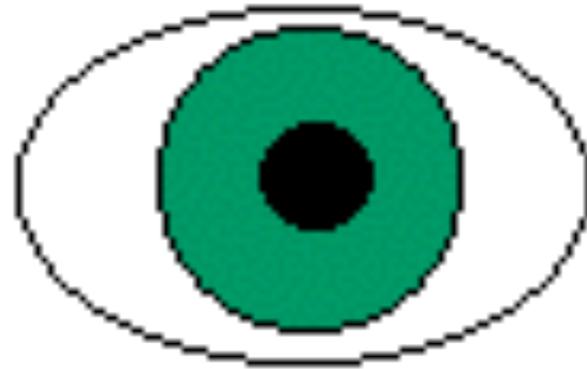
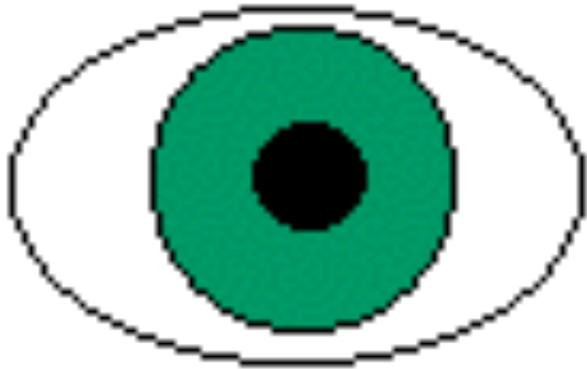
EOM - field of action



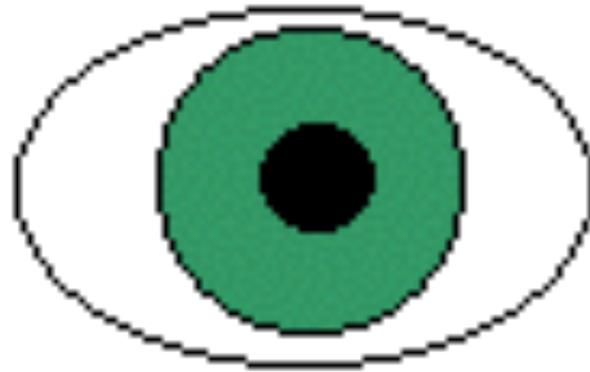
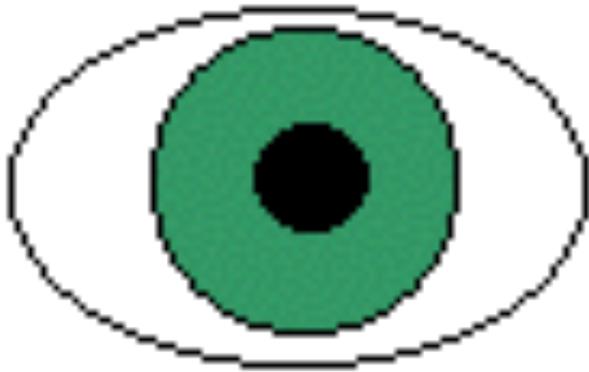
The cover-uncover test



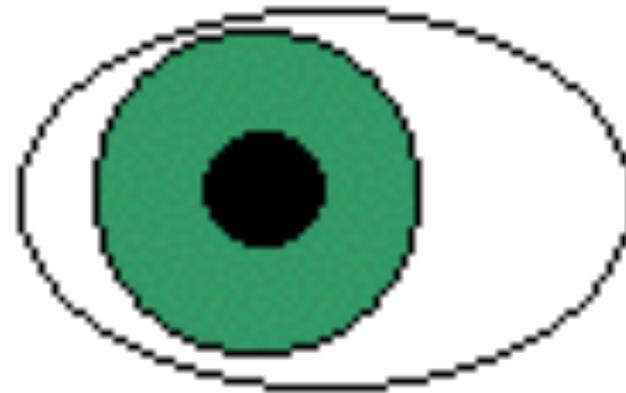
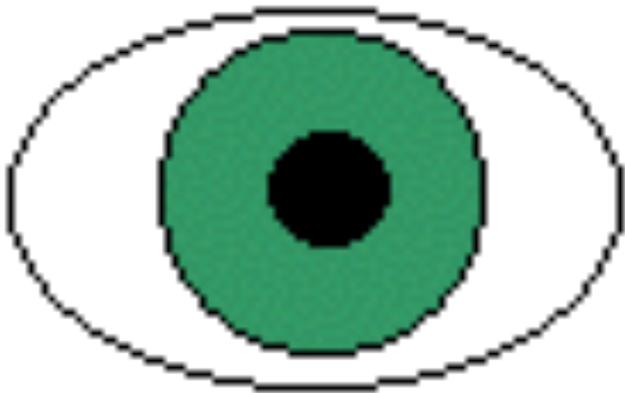
Alternate cover-test



Esophoria



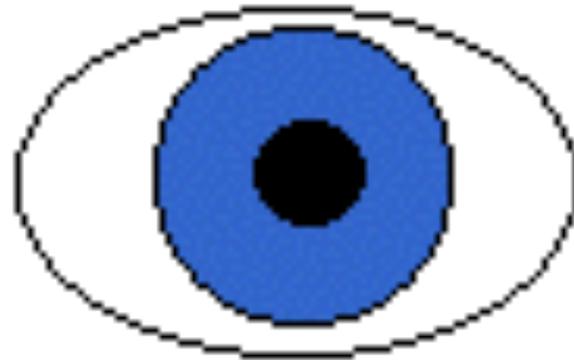
Esotropia



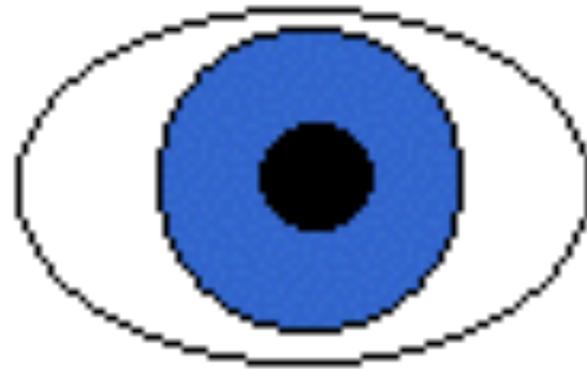
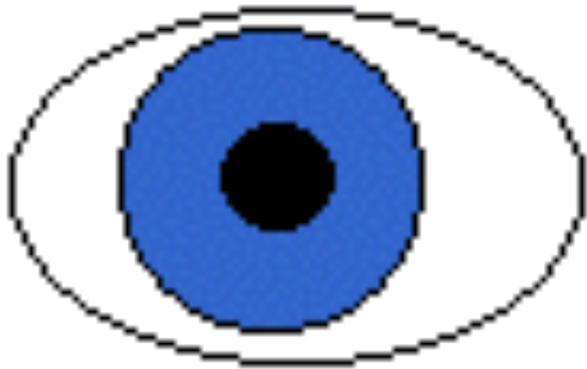
Sixth nerve palsy

Traumatic palsy
of the left
abducens nerve

Exophoria



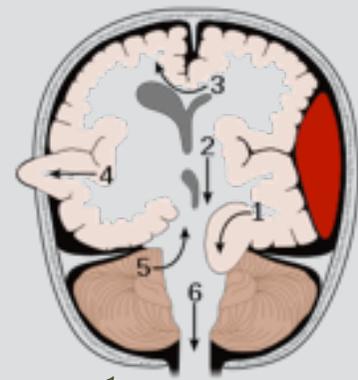
Exotropia



Third nerve palsy with aberrant regeneration



Third Nerve Palsy



- Rule of the pupil - a dilated non-reactive pupil in the presence of an eye that is “down and out” is highly suspicious for a posterior communicating artery aneurysm. Urgent imaging (MRA/CTA) is mandatory to rule this out.

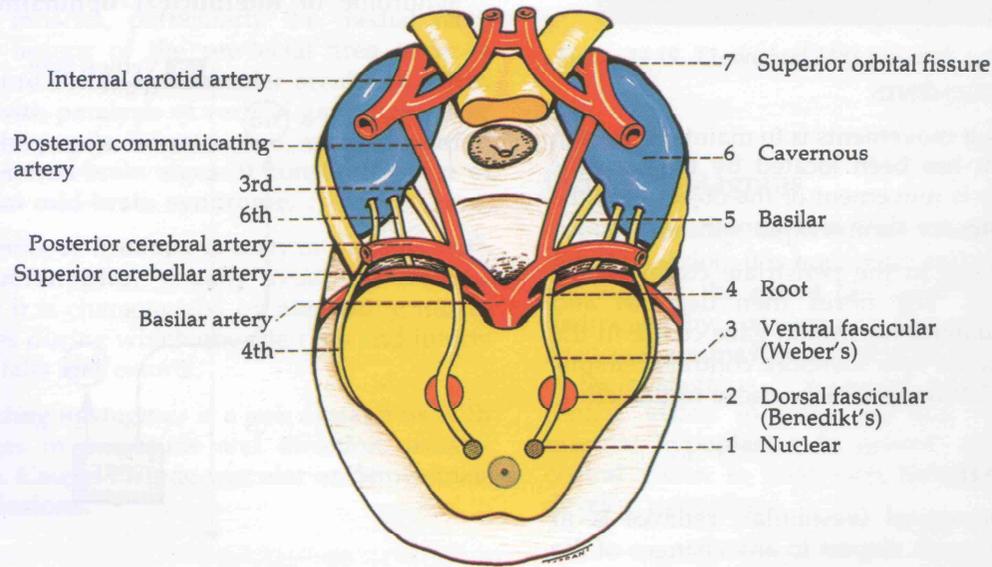


Figure 14.21 Anatomy of third nerve between mid-brain and cavernous sinus

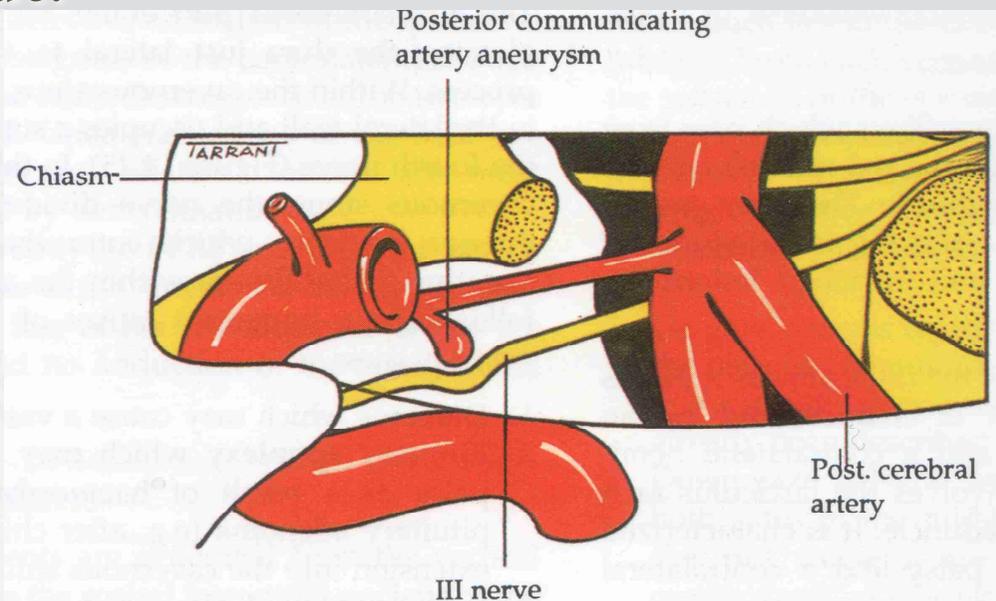


Figure 14.23 Compression of third nerve by posterior communicating aneurysm

Fourth nerve palsy



Summary

- A pinhole visual acuity is mandatory in examination of the visual system.
- Lesions along the visual pathway cause stereotypical field defects.
- Look for a Marcus-Gunn pupil before dilating the pupils.
- The cover test will help to detect extraocular muscle imbalances (especially in children who usually do not complain of double vision)

www.eyeaapps.com.au

