

## Visual Field

GALGOTIAS  
UNIVERSITY

# Definition

- The visual field refers to the total area in which objects can be seen in the side (peripheral) vision while you focus your eyes on a central point .
- or it is the portion of the subject's surroundings that can be seen at one time.

# Normal limits

— 60° superiorly .

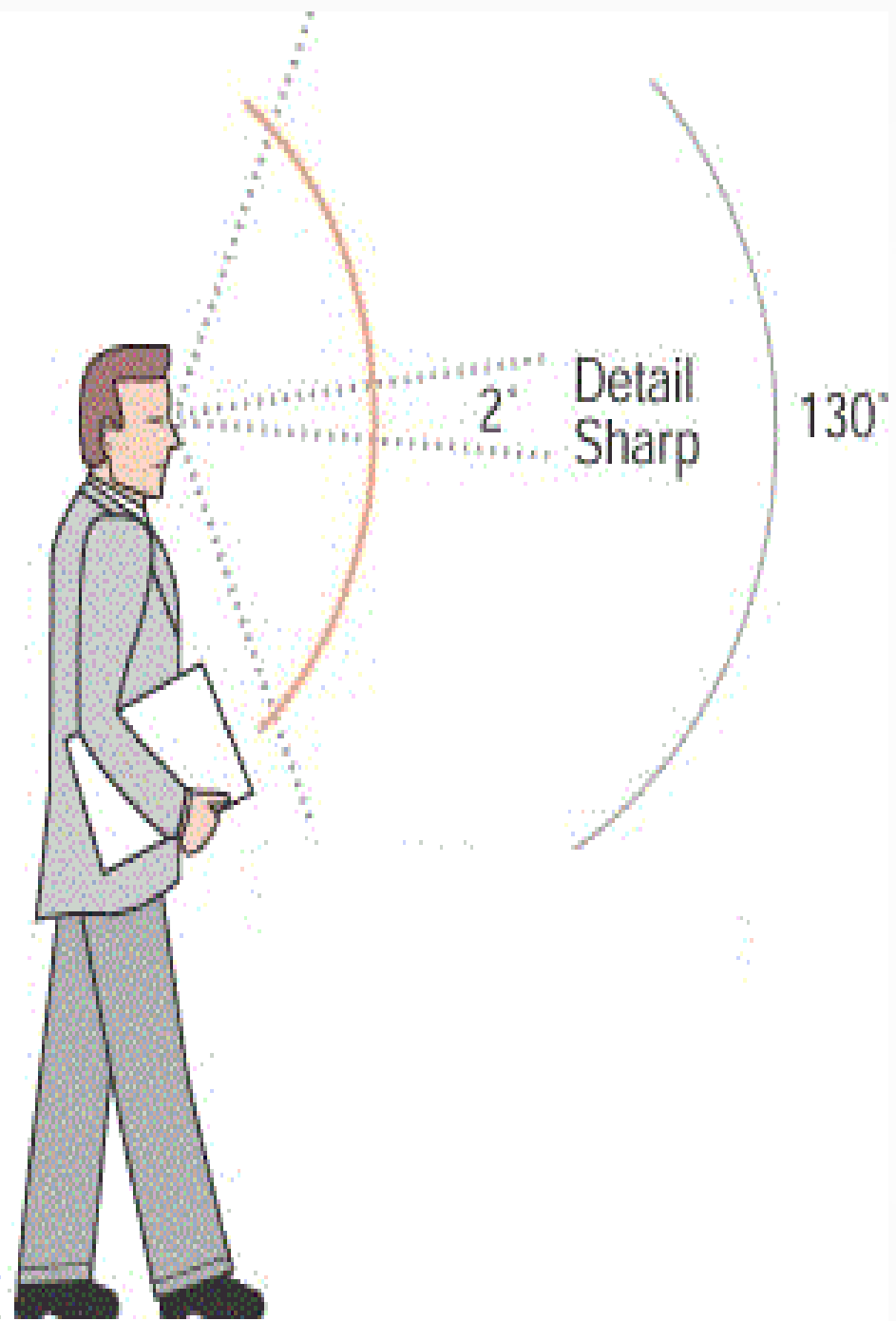
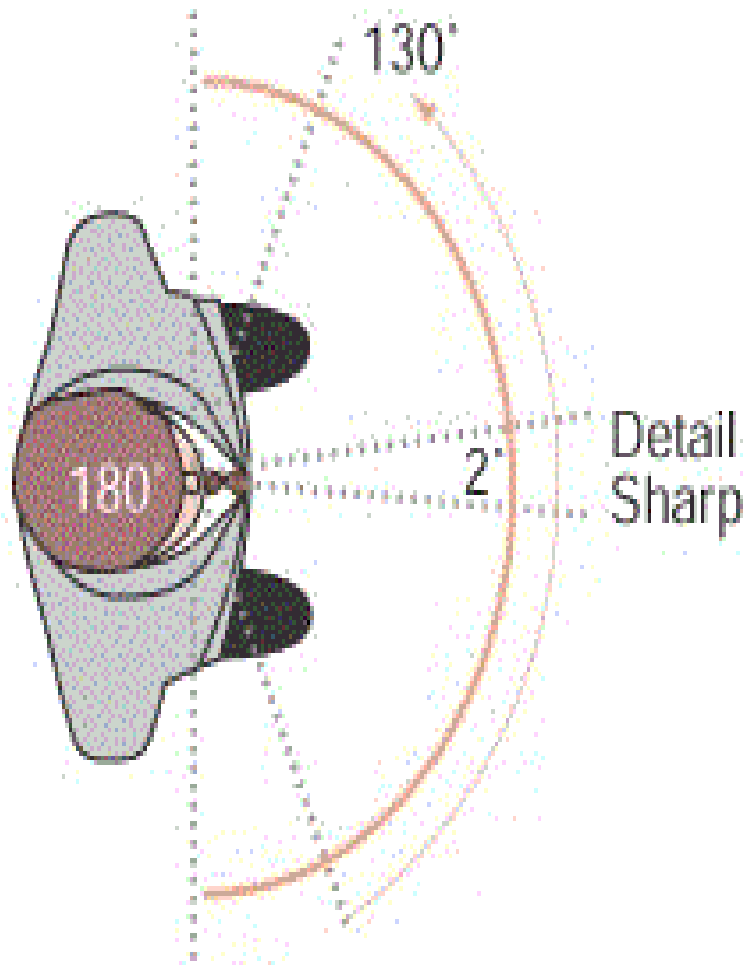
— 60° nasally .

— 75° inferiorly .

— 100° temporally

\* The macula corresponds to the central 13 degrees of the visual field; the fovea to the central 3 degrees.

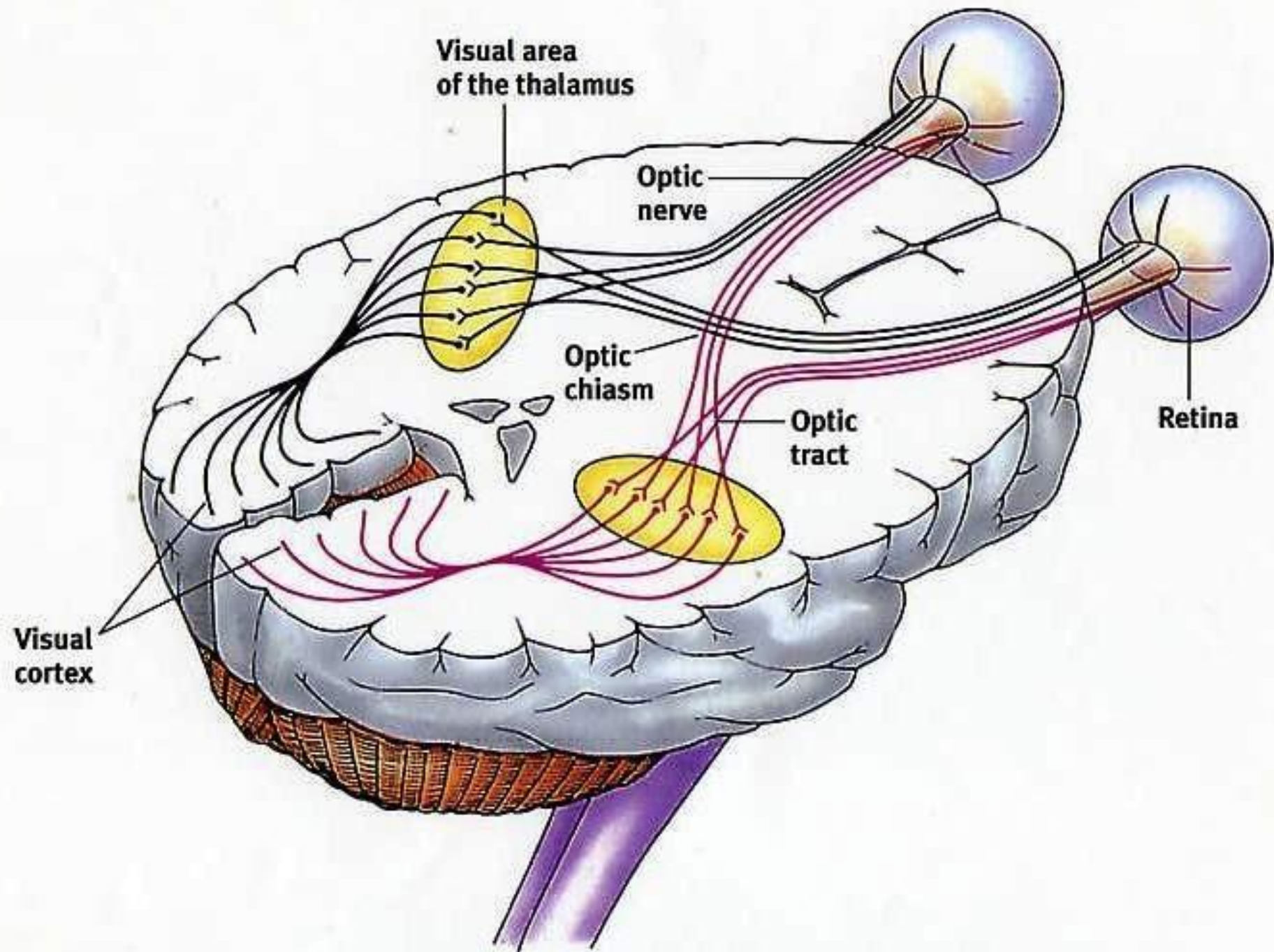
\*\* the visual field is limited by size of retina and margins of the orbit .



# Visual (optic nerve) pathway.

The neurons from each eye form the two optic nerves that transmit visual information to the brain. After leaving the back of the eye, it travels to the optic chiasm, located just below and in front of the pituitary gland. In the optic chiasm, the optic nerve fibers emanating from the nasal half of each retina cross over to the other side; but the nerve fibers originating in the temporal retina do not cross over.

From there, the nerve fibers become the optic tract which continues to the lateral geniculate nucleus. From the lateral geniculate body, fibers of the optic radiation pass to the visual cortex in the occipital lobe of the brain. The visual cortex ultimately interprets the electrical signals produced by light stimulation of the retina, via the optic nerve, as visual images.

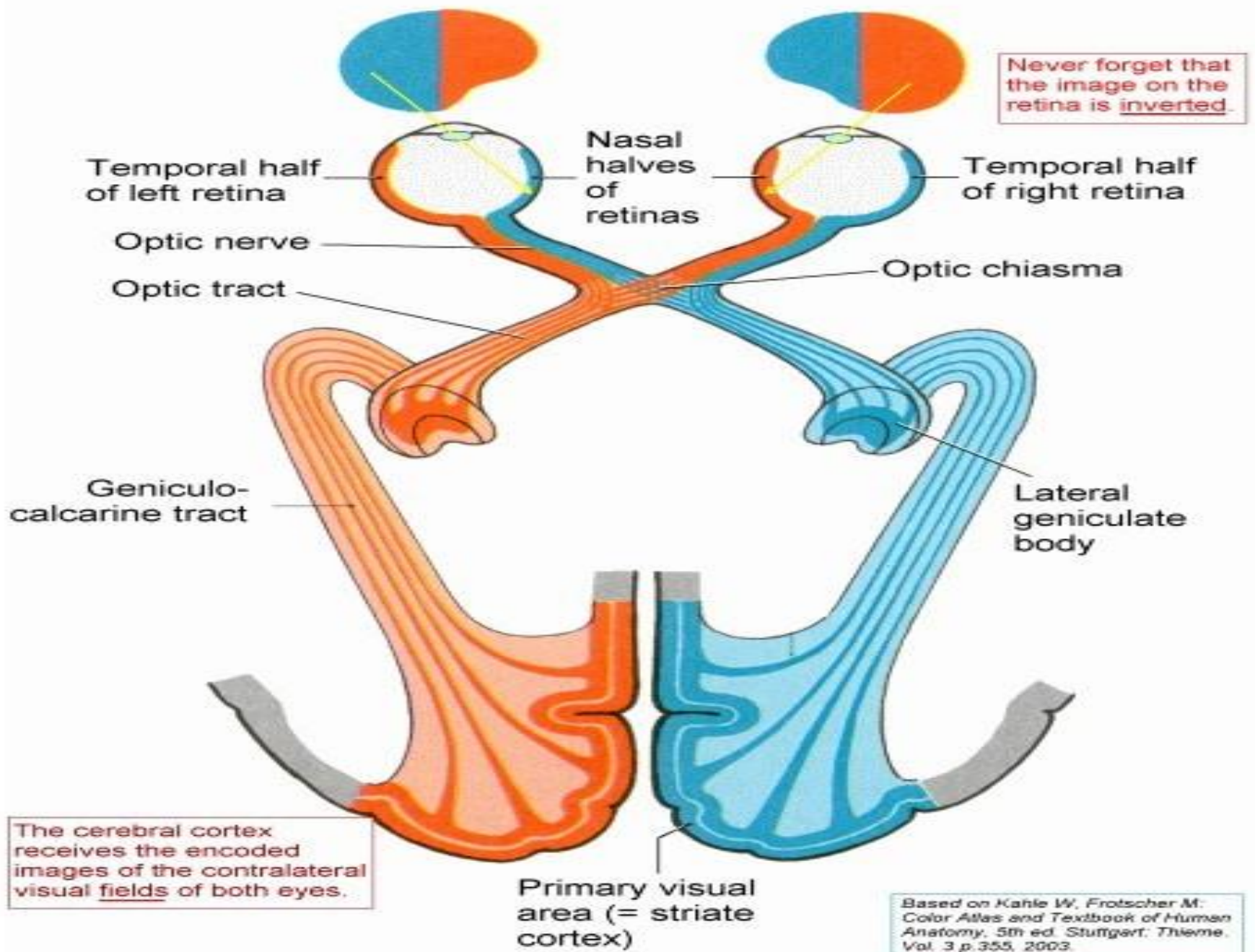




Visual field of left eye

Visual field of right eye

Never forget that the image on the retina is inverted.



The cerebral cortex receives the encoded images of the contralateral visual fields of both eyes.

Based on Kahle W, Frotscher M: *Color Atlas and Textbook of Human Anatomy*, 5th ed. Stuttgart: Thieme, Vol. 3 p.355, 2003.

# Examination of the visual field

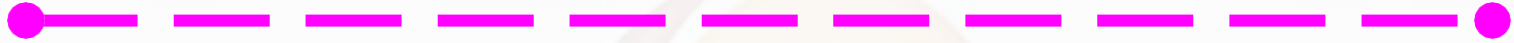
A visual field examination can detect dysfunction in central and peripheral vision which may be caused by various medical conditions such as glaucoma, stroke, brain tumours or other neurological defects.

## → Confrontation visual field testing

- \* Sit or stand about 50 cms away from the patient ask the patient to cover or close one eye and you close the one opposite ask the subject to stare at your eye or nose and you do the same .



## (Confrontation visual field testing (continued



- \* Starting at the top outer quadrant, move your fingers (or the pin) in from the side, wiggling them as they go, and ask the patient to tell you when he first see your fingers and, as you move towards the centre, whether they disappear.
- \* Repeat the process in each quadrant and for each eye separately. If you detect a defect, re-examine that area and define it further.
- \* This technique compares the patient's visual field with yours, so it does assume normal examiner visual fields!



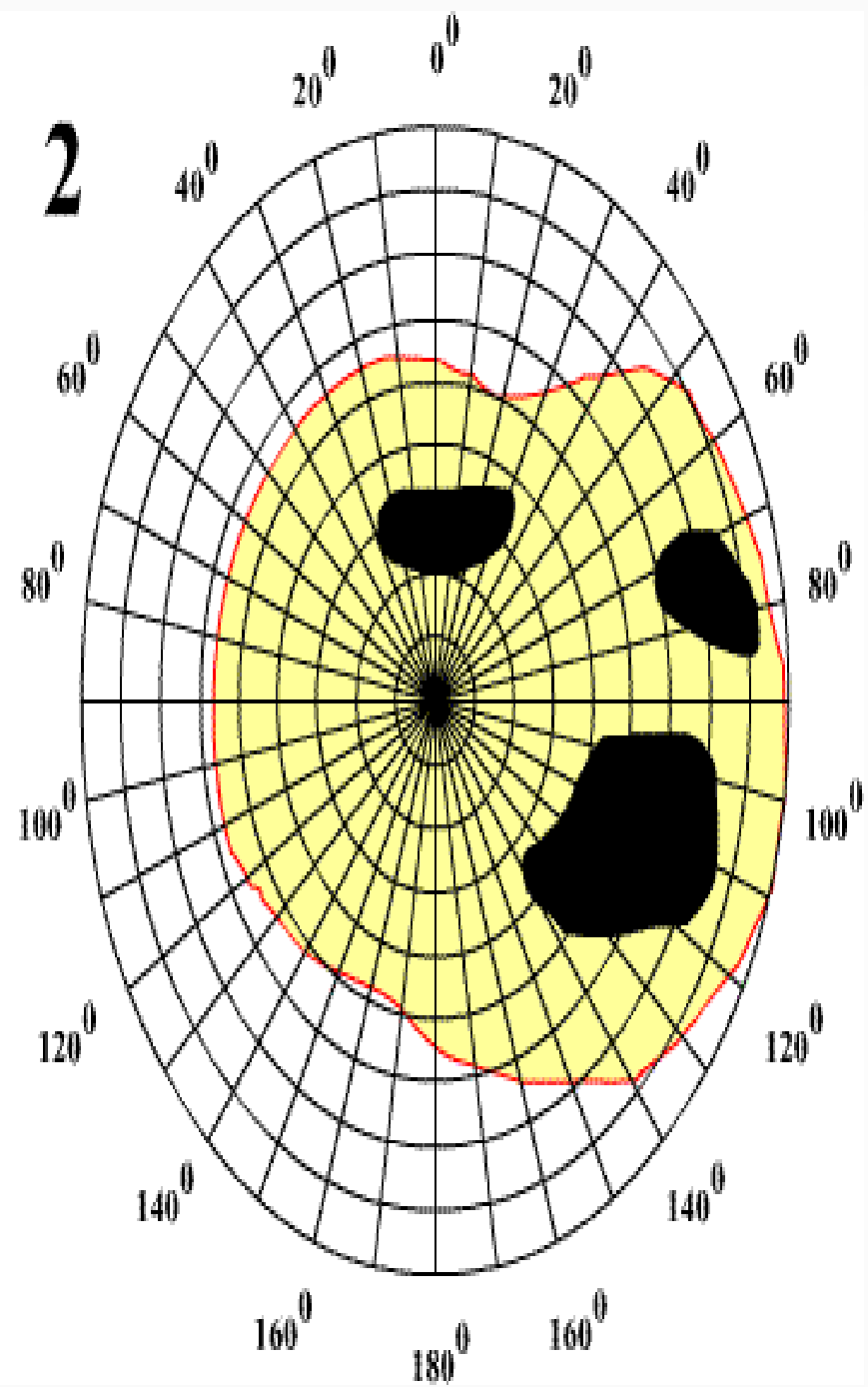
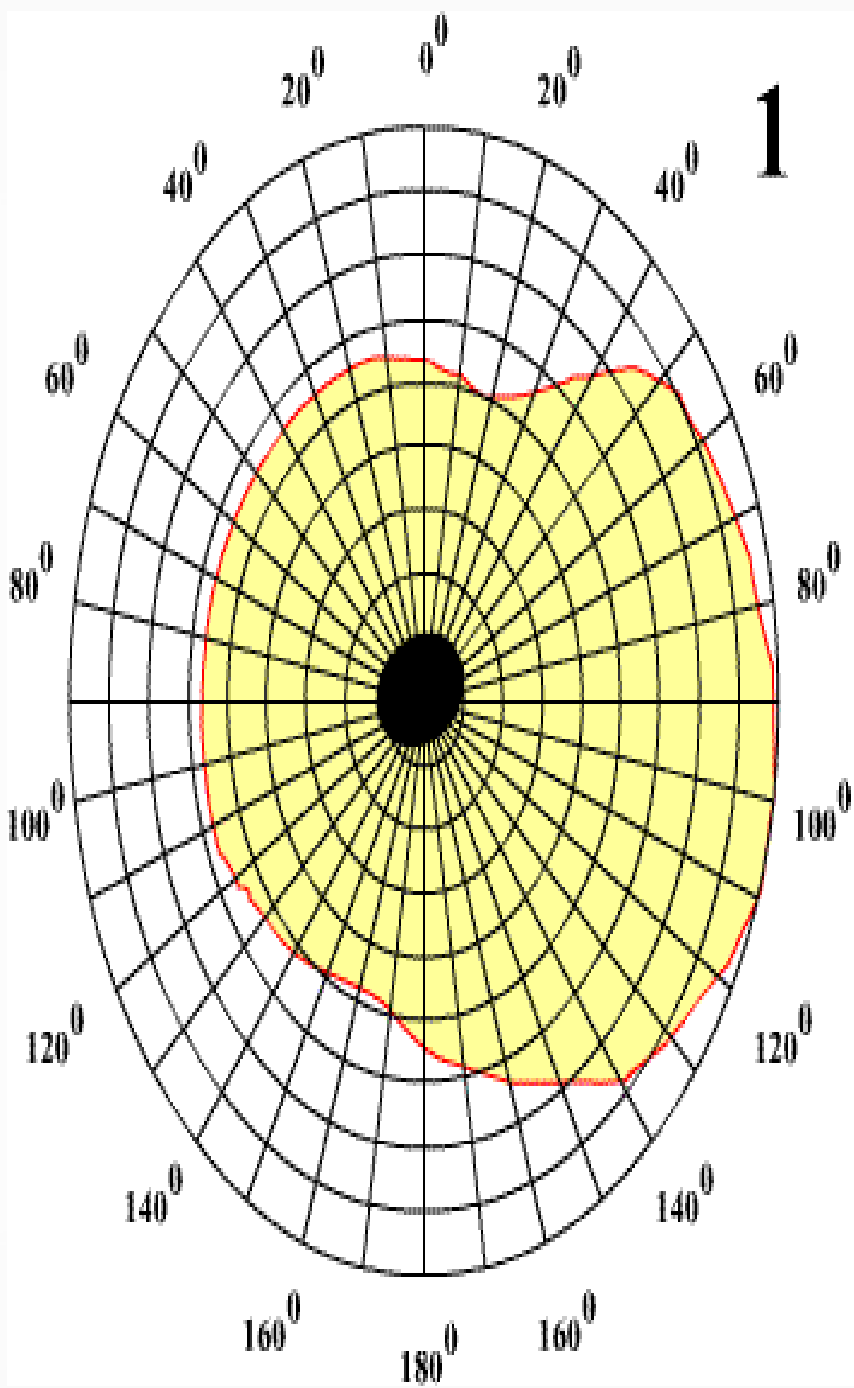
# Visual field defects

- \* Visual field defect :- a portion of visual field missing. This may be central or peripheral .
- There are many causes of visual field loss :-
  - — Central field loss occurs with:
    - ♣ Optic neuropathy
    - ♣ Macular degeneration
    - ♣ Macular holes
    - ♣ Cone dystrophies
  - — Peripheral field loss occurs with:
    - ♣ Retinitis pigmentosa
    - ♣ Chorioretinitis
    - ♣ Glaucoma
    - ♣ Retinal detachment
    - ♣ Lead poisoning

# Visual field defect

types of visual field defects:-

- **Scotoma** :- It is a blind spots surrounded by normal visual field. Types :-
  - **Central scotoma** :- Visual field loss appears in the central vision .
  - **Peripheral scotoma** :- Visual field loss appears in the peripheral region.

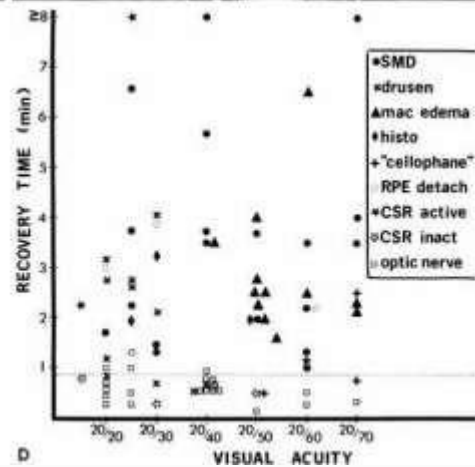


# Visual field defect

- **Hemianopia** :- binocular visual defect in each eye's hemifield.
  - **Bitemporal hemianopia** :- the two halves lost are on the outside of each eye's peripheral vision, effectively creating a central visual tunnel.
  - **Homonymous hemianopia** :- the two halves lost are on the corresponding area of visual field in both eyes, i.e. either the left or the right half of the visual field.
  - **Altitudinal hemianopia** :- upper or lower halves of visual field are lost; may be unilateral or bilateral.
  - **Quadrantanopia** :- ( incomplete hemianopia) Visual field loss in a quarter of the visual field of the eye. The defect is usually bilateral.



# PHOTOSTRESS RECOVERY TIME



- **Photostress** testing determines the rate of photoreceptorvisual pigment resynthesis by bleaching the foveal cone photopigments and causing a temporary state of retinal sensitivity perceived by the patient as **scotoma**.
- The time required to regain visual acuity after this bleaching provides an index of macularfunctioning.



# procedure

- 1) Measure distance visual acuity.
- 2) Ask the patient to remove their spectacles but keep them in their lap so that they can be quickly put back on again.
- 3) Occlude one eye hold your direct ophthalmoscope about 2-3 cm away from the patient's eye .
- 4) Turn on the light and ask the patient to look directly at the light for exactly 10 seconds.

- 5) **After 10 seconds remove ophthalmoscope** ,ask the patient to put their glasses back on and point on to the letters one line larger than the patients original visual acuity , ask the patient to read those possible letters as quickly as possible after the after image has disappeared .
- 6) Time how long it takes after removal of the bleaching light for the patient **to read at least two –thirds of the relevant letters.**
- 7) Repeat the measurement for the other eye if necessary.

# RECORDING

- Record the time taken in seconds to recover to within one line of prebleached visual acuity in seconds.



# INTERPRETATION

- Its generally suggested that any photostress recovery time longer than 50 seconds is abnormal, and suggests a macular disease rather than optic nerve abnormally.
- Of course , a normal photostress recovery time depends on the brightness of the light used , and it is best to obtain your own normal values with your own particular technique and instrumentation.

# MOST COMMON ERRORS

- Allowing a patient to lose fixation of the bleaching light
- Usually direct ophthalmoscope with batteries that are not fully charged.
- Having the patient wait until the letters are clearly visible rather than just visible.
- Timing inaccurately.

# References

- *Khurana. (2008). Theory and Practice of Optics and Refraction (2nd ed.)*
- *Clinical Procedures in Optometry*
- *A Hand Book of Basic Optometry & Refraction*
- *<http://medical-dictionary.thefreedictionary.com>*
- *Picture : Me + Internet (Google)*