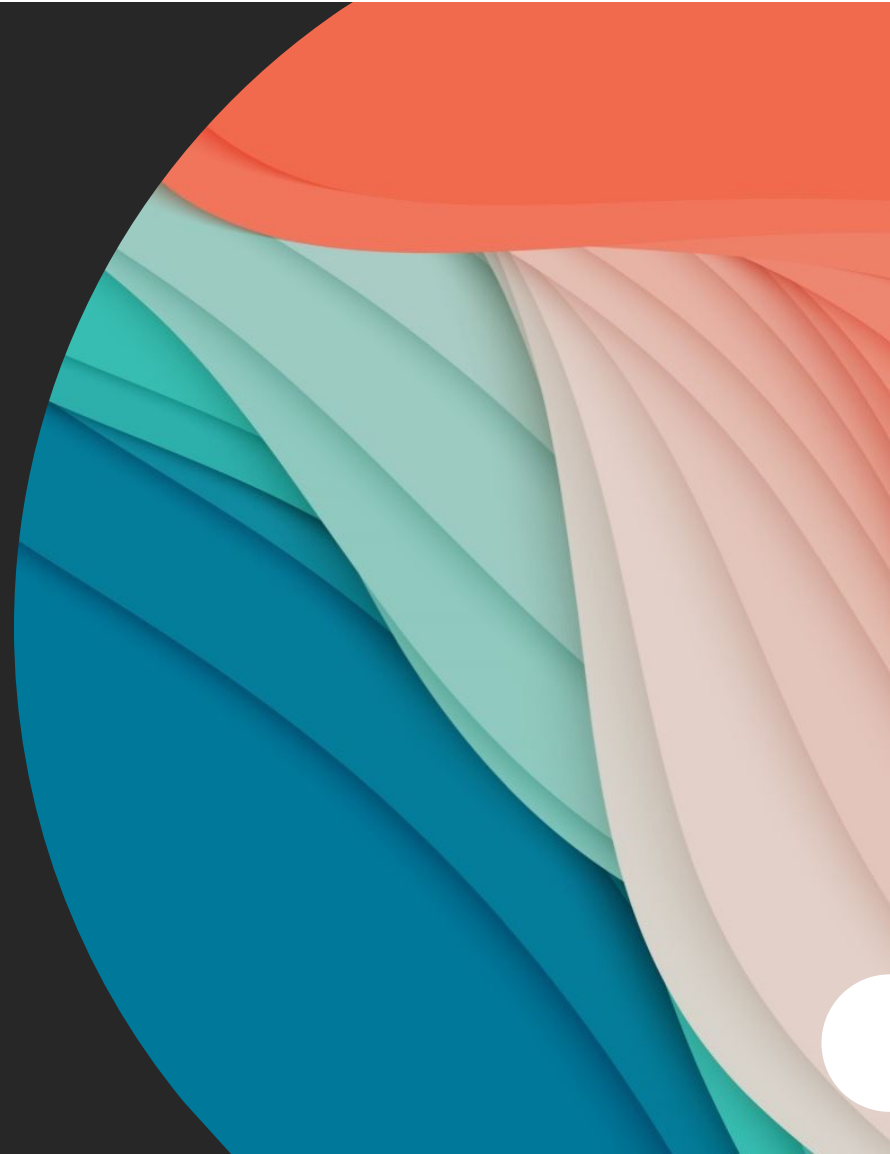


Visual Perceptual Deficits with Traumatic Brain Injury

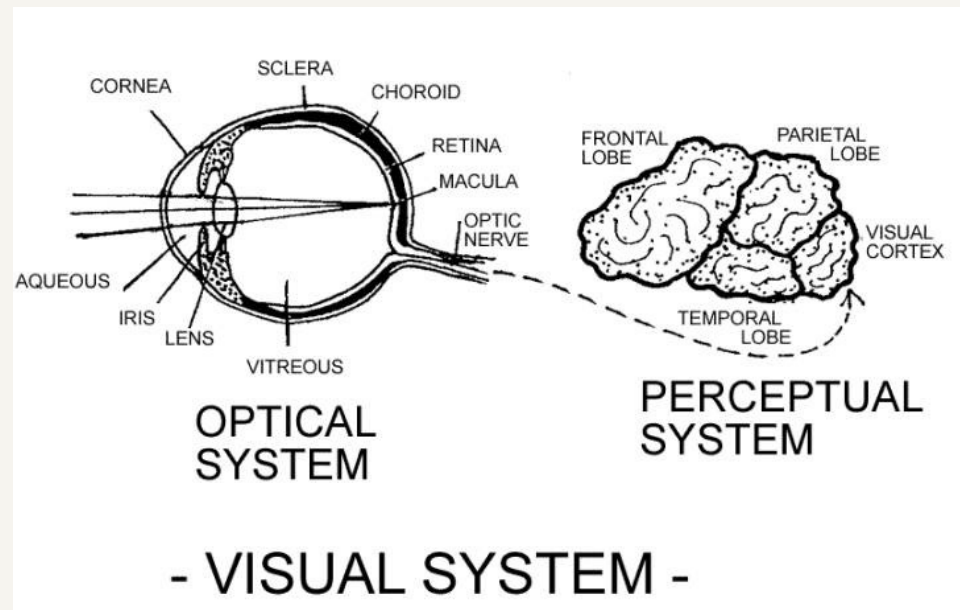
Taline Abrahamian Boroyan
MS, OTR/L



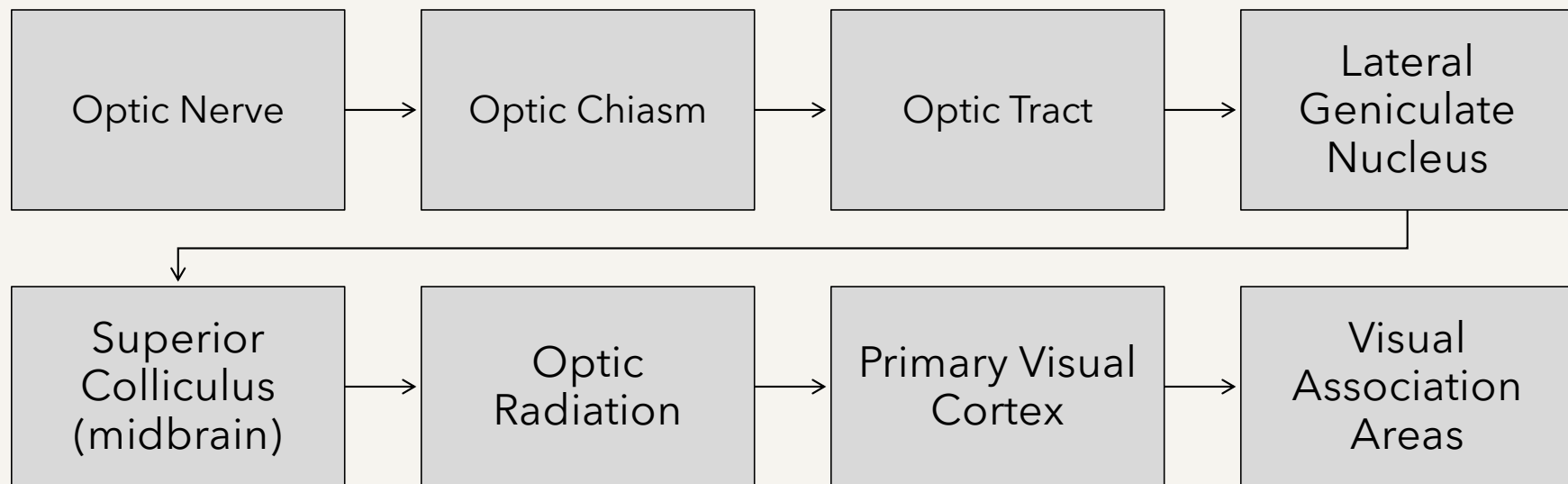
Objectives

- Understanding of the visual system and visual deficits
- Understanding of visual-perceptual relationship
- Comprehension of visual-perceptual deficits related to TBI
- Comprehension of occupational therapy evaluation and treatment of visual-perceptual deficits related to TBI

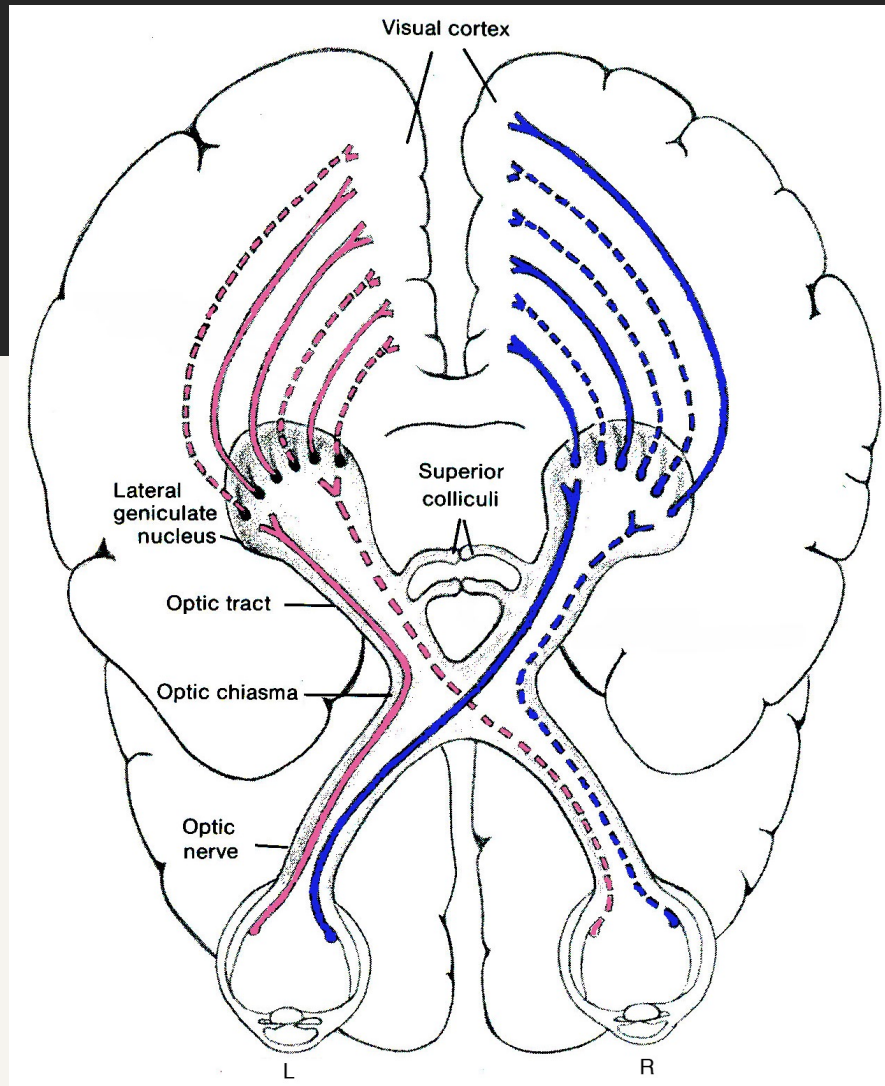
The Visual System



The Visual Pathway



The Visual Pathway



Visual Field Deficits

- Lesion location

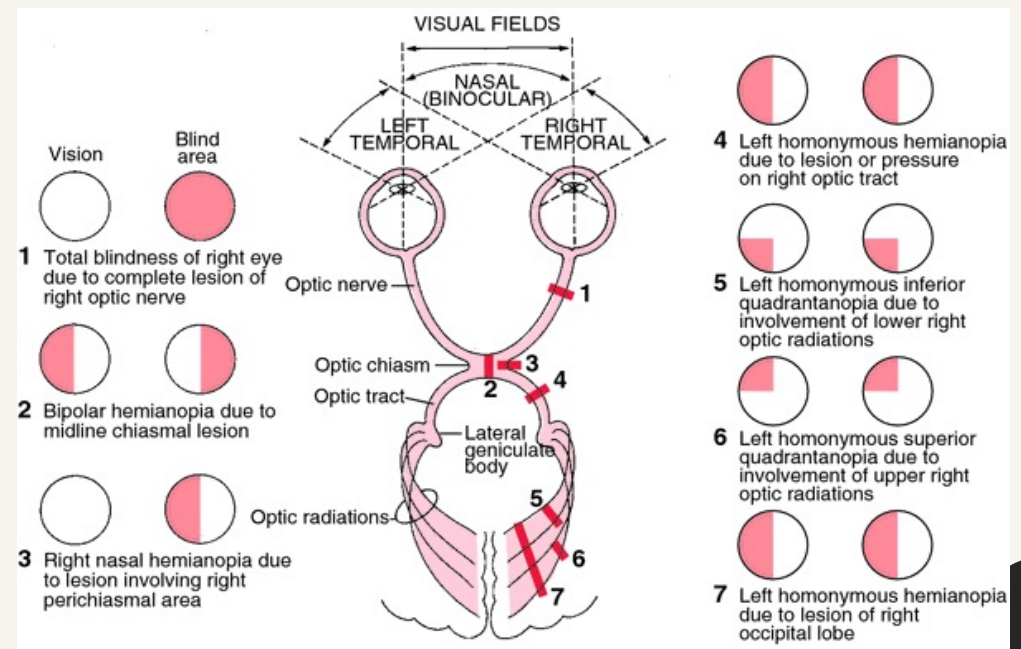
Optic nerve - total blindness one eye

Optic chiasm (bilateral) - bipolar hemianopia

Rght optic chiasm - right nasal hemianopia

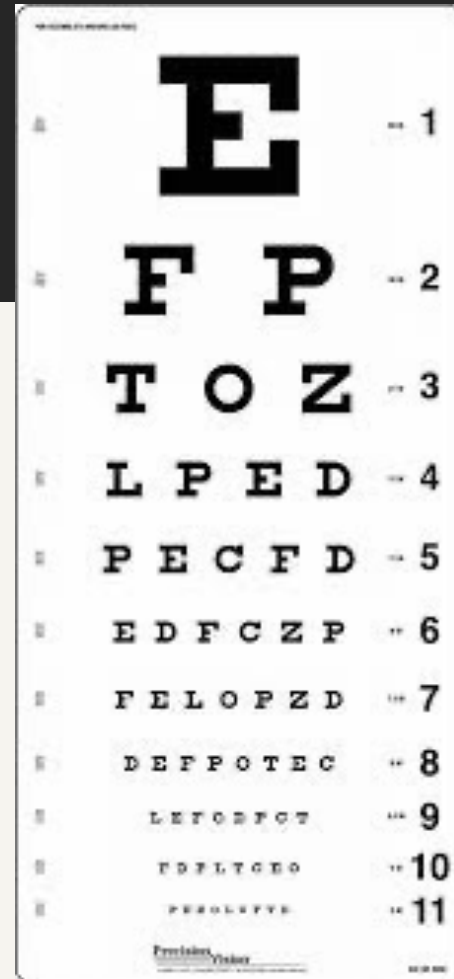
Optic tract - left homonymous hemianopia

Optic radiation - homonymous quadrantopia or hemianopia based on area of radiation



Visual Skills

- Visual acuity - the ability to interpret information and characters, measured by distance
- Saccades - rapid movement of the eye between two points
- Pursuits - smooth movements between two points
- Accommodation - focusing on object as its distance varies
- Convergence - turning the eyes inwards towards each other to focus
- Binocular coordination - the two eyes working together



Visual Perceptual Skills

- Primary visual skills:

Oculomotor control

Visual fields

Visual acuity

- Visual cognition - the ability to mentally manipulate visual information and integrate it with other sensory information
- Visual memory - to retain a picture in the mind's eye
- Pattern recognition - identification of the important features of an object
- Scanning - the systematic path taken by the eye to record information
- Visual attention - the shift and comparison between visual stimuli
- Clinical implications - a study done in 2000 tested people with brain injury on their basic visual skills and visual perceptual skills. 23 of the 30 participants had at least one visual skill deficit and 14 of them scored low on the visual perceptual test.

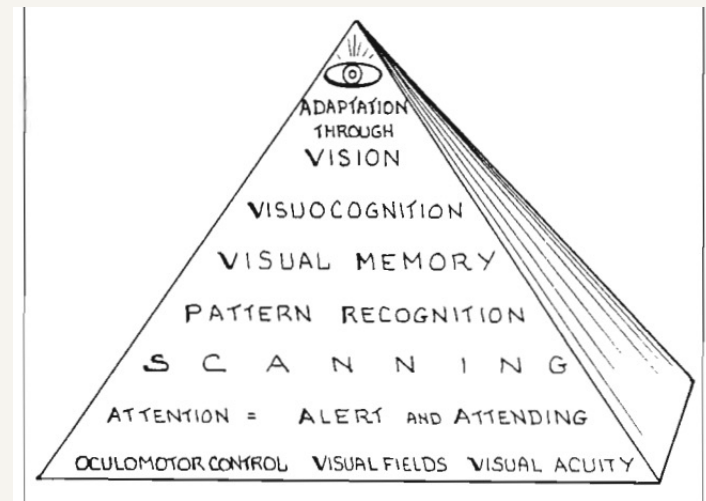
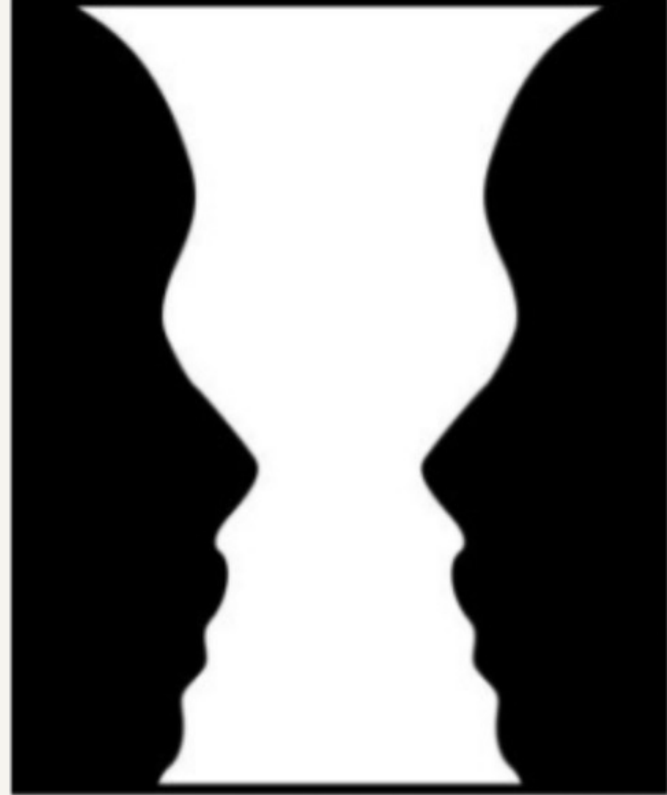


Figure 1. Hierarchy of visual perceptual skill development in the central nervous system. Drawing courtesy of Josephine C. Moore, PhD, OTR.



Visual Deficits by Lobe

| Frontal | Parietal | Temporal | Occipital (more likely to have permanent vision loss) | Cerebellum |
|--|--------------------------------------|--|--|---------------------------------------|
| Unable to rapidly focus from one target to another | Left sided spatial neglect | Difficulty placing words or pictures into categories | Agnosia | Ataxia, dysmetria, dysdiadochokinesia |
| Increasingly distracted and reactive to irrelevant stimuli | Spatial relations impairment | Difficulty organizing auditory information | Homonymous visual field loss | Nystagmus |
| Impaired visually guided reach (spatial awareness) | Visual field loss | Homonymous hemianopsia (if stroke in MCA territory) | Visual hallucinations | Intention tremors |
| | Right-left discrimination impairment | | Cortical blindness | Facial weakness |
| | Apraxia, Agraphia, Acalculia | | Seizures (triggered by visual stimuli such as flashing lights) | |

Evaluating the Patient

- Basic vision assessment
- Look for spatial errors and neglect during ADLs/IADLs
- Standardized Assessments

Occupational Therapy Adult Perceptual Screening Test

Bells Test

Star Cancellation Test

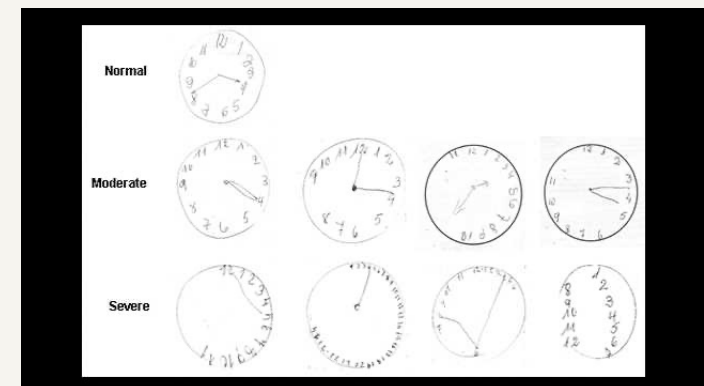
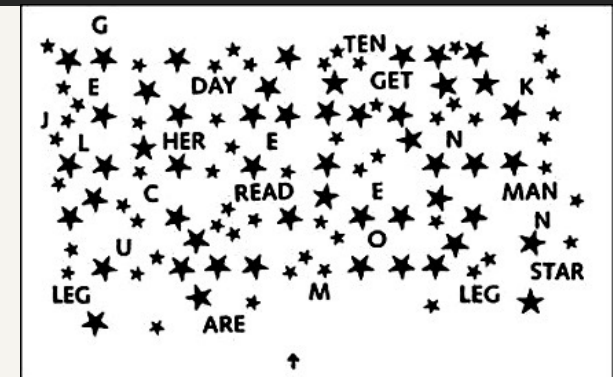
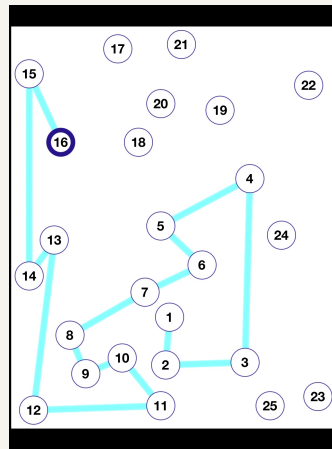
Clock Drawing Test

Baking Tray Task

Line Bisection Test

Comb and Razor Test

Trail Making Test



Treating the Patient

- Eye exercises – up, down, left, right. Start slow, stretching to end point, holding position, increase speed.
- Smooth pursuits – following moving object. Start by moving an object in a slow pattern, increase speed and make movements more random and less predictable.
- Saccades – rapidly moving gaze between two objects. Hold two objects, call out the name of one, then the other.
- Scanning – place markers (i.e. bright tape, post it note) on each corner of a doorway or wall. Locate each marker, start with small spaces and move on to bigger, wider spaces.
“lighthouse technique”
- Always education!!

Treating the Patient

- Locating items on a shelf
- Reading different fonts and colors
- Locating correct change during money management activity
- Draw pictures, use stencils
- Writing (start bigger with lined paper, get smaller)
- Navigating hallway and busy areas
- Navigating uneven surfaces
- Estimating distances
- Pouring liquids into cups
- Cup stacking
- Pack medication box
- Scavenger hunt
- Meal prep
- Card games
- Board games
- Sorting laundry
- Identifying road signs
- Always bring it back to ADL/IADLs

Treating the Patient

- Remember to refer to ophthalmology (diseases of the eye and eye surgery) and/or optometry (treats the visual system and associated structures) when necessary! Consulting with experts in the field can only help your patient.

- Adaptations

Occlusion for diplopia - total occlusion should be avoided except when diplopia is constant and does not improve with other adaptive strategies. Partial occlusion can be more effective.

Low vision aids - magnifiers, lighting changes, taping cues

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- Christy, Kara, & Huffine, Natasha. "Assessment and Intervention of Visual Perception and Cognition Following Brain Injury and the Impact on Everyday Functioning."

Email me!

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