Evaluation and Intervention for Hemianopia in Adults Following Acquired Brain Injury
Lesson 1

Introduction

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This Lesson will Cover

- Common types of vision impairment following acquired brain injury
- Some specific challenges experienced by persons with vision impairment from ABI
- Some specific characteristics of homonymous hemianopia
- Differences between adults and children
- Framework for assessment and intervention

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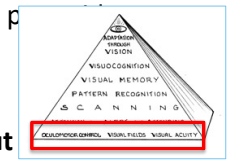
Changes in Visual Processing Following Acquired Brain Injury

- Primarily result from changes in 5 levels of the hierarchy involved in **delivering** high quality visual input to cortex
  - **3 Basic visual functions** at the foundation of the p
    - **Acuity**
    - **Oculomotor control**
    - **Visual field**
  - Plus 2 processes that help us **acquire visual input**
    - **Visual attention**
    - **Visual scanning**
- Impairment at these lower levels alter the **quality and quantity** of visual input coming into the brain
- Which in turn reduces ability to
  - Identify and categorize objects through **pattern recognition**
  - Create a library of visual **memories** in the posterior cortex
  - And use **vision to achieve goals**



Warren, 1993

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Vision Impairment from ABI

- Common types of ABI **that cause** vision impairment
  - Stroke
  - Traumatic brain injury
  - Brain tumor
  - Brain infection
- Common **types of vision impairment** from ABI
  - Hemianopia and other visual field deficits
  - Impaired high contrast and low contrast acuity
  - Oculomotor impairment
  - Neglect

Berthold-Lindstedt et al. 2017; Rowe et al. 2019

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Vision Impairment from ABI

- Limitations associated with vision impairment
  - Difficulty completing **vision-dependent** activities
  - Slow processing **speed**
  - **Errors** in decision making
  - **Fatigue**
  - **Dropping out** of occupations especially I-ADLS

Mennem et al. 2012; Berthold-Lindstedt et al. 2019; Hazelton et al. 2019; Warren 2009; Rowe et al. 2019

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In General…

- Experience greatest difficulty with activities completed in **dynamic** and "busy" environments
  - Activities that take place outside the home
    - Driving, shopping, sports, community events and spaces (restaurants, venues, theaters etc.)
- Person avoids **participating** in activities in these environments
  - Prolongs adjustment to disability
  - Impacts wellness

de Haan et al. 2015; Hazelton et al. 2019; Warren 2009

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Challenges Addressing Vision Impairment in Clients with ABI

- Vision loss is a **hidden impairment**
  - Generally, only observe c**onsequences** of vision impairment
  - Mimics deficits in the performance skills it supports
    - Motor
    - Cognitive processing
    - Communication
  - Client often presents an ambiguous picture
    - Difficult to tease out the visual impairment
    - May not be apparent until other skills improve
  - Critical to collaborate with other professionals
    - Must have good communication with the eye doctors: ophthalmologist (MD) and optometrist (OD)
    - All members of rehab team must communicate/work together

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Challenges Addressing Vision Impairment in Clients with ABI

- Older client may show combination of neuro and age-related impairment
  - **Neuro-related** impairment
    - Resulting from the brain injury
    - Or from a neuro-degenerative disease
      - Parkinson's disease
      - Alzheimer's dementia
      - Multiple sclerosis
  - **Age-related** impairment
    - Normal changes in vision due to aging
    - Or from a prevalent age-related eye disease (ARED)
      - Age-related macular degeneration (AMD)
      - Open angle glaucoma (OAG)
      - Diabetic retinopathy (DR)

Kunse et al. 2017; Ekker et al. 2017; Costello 2016; Voleti & Hubschman 2013

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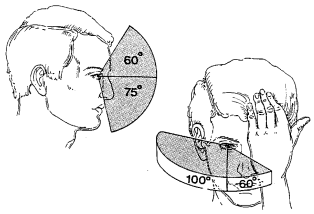
Homonymous Hemianopia (HH)

- Most commonly occurring **visual field deficit** following **ABI**
- The **only** neurological vision impairment Medicare classifies as a low vision condition
  - Low vision programs often provide indepth rehabilitation that includes reading and return to driving



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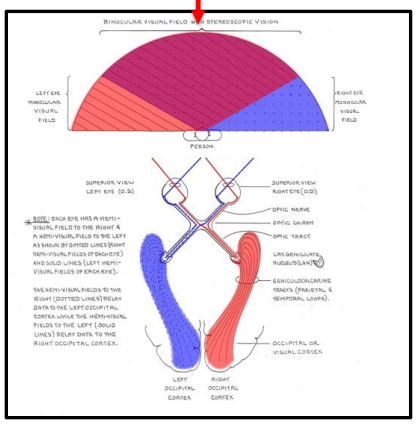
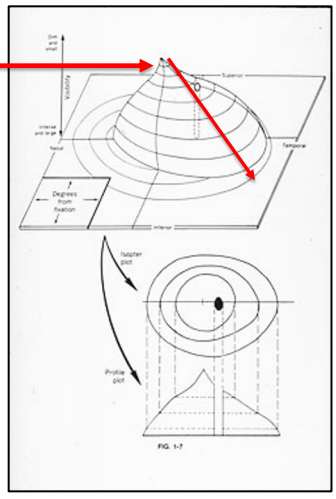
The Visual Field

Binocular Field



Fovea



The Hill of Vision

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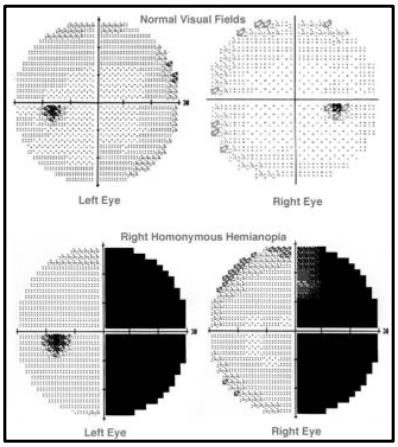
Homonymous Hemianopia

- Causes loss in **½ of visual field** in each eye
- **Most common** form of VFD following **PCA stroke**
- And most studied in terms of recovery, affect on occupation and intervention



Rowe et al. 2013; Wolberg & Kapoor 2021

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Recovery

- **Some improvement** possible in the first 1-3 months after onset
  - 40-60% experience some recovery of field
    - More likely to occur in lower visual field
- **Recovery slows down** with time
  - Generally little recovery beyond 4-6 months
- Considered a **permanent deficit**
  - Medicare classifies it as a **low vision** condition

Zhang et al. 2006; Celebisoy et al. 2011; Agarwal & Kedar 2015

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Kids vs. Adults

- Causes
  - Adults: Stroke (63%), TBI (12%), Hemorrhage (11%)
  - Children: TBI (34%), Tumor (27%)
- Prevalence is likely underestimated in children
  - Young children rarely complain of field loss
    - Children with congenital HH frequently diagnosed in early adulthood
  - Discovered because
    - Parent/ health care providers observed behavior
    - Physician suspects that brain injury could cause a field loss
- Child may develop intermittent exotropia in the eye on HH side
  - Functional adaptation used to expand field of view?
    - Significant consideration in whether to complete strabismus surgery

Crawford & Golomb 2018; Koenraads et al. 2016; Van Waveren, et al. 2013; Kedar, 2006

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Framework for this Course

- A client's visual performance is not significant in terms of how it deviates from an established norm but how it interferes with functional ability
- OT evaluation should focus on identifying the client's strengths and weaknesses in using vision to participate in occupations
- Intervention is needed only when the client's ability to use vision prevents or interferes with performing a necessary or desired occupation
- Intervention should focus on maximizing strengths and minimizing weakness in the client's ability use vision to participate in occupations

biVABA Assessment Manual- Preface page 4

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Key Lesson Take Aways

- HH is a primary sensory impairment characterized by vision loss in ½ of visual field in both eyes
- HH is considered a low vision condition because it generally creates a permanent impairment
- HH is often a hidden condition that can occur alone without other significant impairment
- HH in children occurs from different causes and expresses itself differently than in adults
- Assessment focuses on identifying the client's strengths and weaknesses
- Intervention focuses on enabling the client to use their current vision to participate in occupations

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Lesson 2

Key Anatomical Structures of the Visual Field and Pathway

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What we have learned so far

- Hemianopia is the most commonly occurring vision impairment caused by ABI due to stroke and TBI in adults and children
- Vision loss is mostly confined to one side of the visual field
- For most people, it creates a permanent impairment, and Medicare recognizes it as a low vision condition
- It can significantly affect the client's ability to complete daily occupations

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This Lesson will Cover

- Key anatomical structures of the visual pathway that creates the visual field

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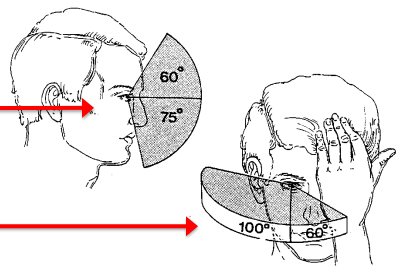
The Visual Field

- Area of visual world that can be seen when looking straight ahead
  - About 135 degrees vertically
  - About 160 degrees horizontally
- Constructed via a pathway that begins in the retina and terminates in the occipital lobe



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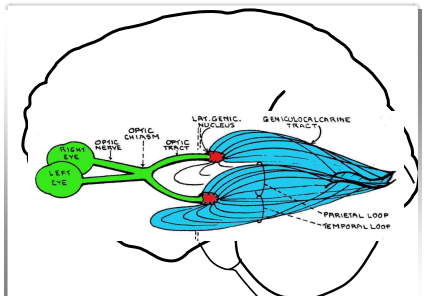
The Visual Field

- Created as visual input travels across the brain from the eyeball to the occipital lobe
- Key visual processing centers
  - Retina
  - Lateral geniculate nucleus
  - Geniculocalcarine tracts
  - Occipital lobe



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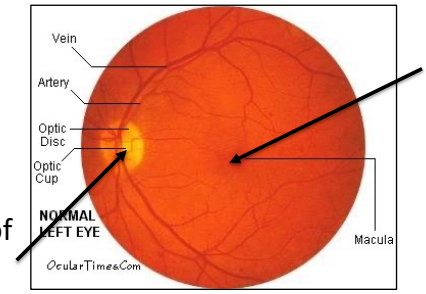
Key Anatomical Structures

- The retina
  - Lines the inner 2/3 of the posterior area of the eye
  - Made up of light sensitive photoreceptor cells that capture the initial pattern of light entering the eye
- First neural center for integration of visual input
  - Maps out the first representation of the visual field



Retina as viewed through an ophthalmoscope

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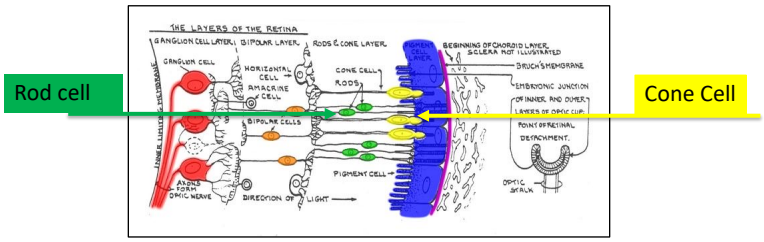

Rod Cells (Green)

- Concentrated in periphery
- Specialized to activate in low light and moving stimuli
  - More oblong shape so they can detect light coming from any direction
- Detect light/general shapes (no detail) to provide background information to **create context** for a visual scene - we have more rod cells than cone cells

Cone Cells (Yellow)

- Concentrated in fovea/macula
  - Three types: red, green, blue
- Specialized to capture visual details /color to identify objects
- Require **direct** stimulation/bright light
  - Therefore, person must look directly at an object in good lighting to to see it clearly and identify it

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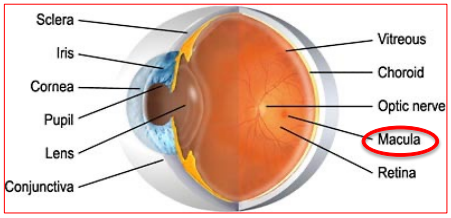
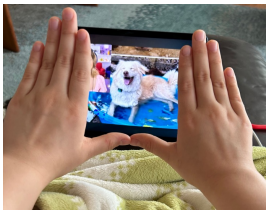
Macula/ Fovea





- Lie opposite the pupil in the central visual field
  - Location ensures the cone cells receive direct light stimulation
- Fovea contains **only** cone cells; macula mostly cone cells
- Fovea provides the detailed vision required for reading and other tasks with small details
- Has a very limited field of view-only about 4 square inches

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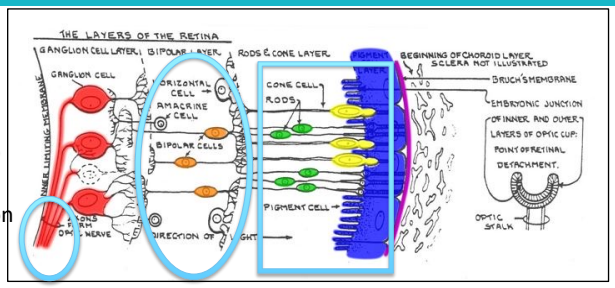
Retinal Processing Pathway

Light pattern coming in thru pupil

ganglion axons



pattern created by rods and cones

- Retina uses an inside out structure to process visual input
  - Light pattern passes through the first layers to contact the rods and cone photoreceptor cells
  - Then makes a return trip through the bipolar layer and other cells hori to the ganglion cell layer
  - Whose axons exit at the blind spot and create the optic nerve

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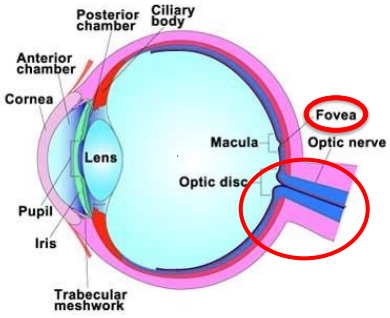
Optic Nerve

- Cranial nerve 2
- Exits eye at the optic disc
  - Located just medial to fovea
  - No receptor cells are here so the retinal field is inactive
  - Creates a 5 degree physiologic blind spot
- Each nerve carries 1 million **organized d**ata points
  - inner core-input from cones
  - outer core- input from rods



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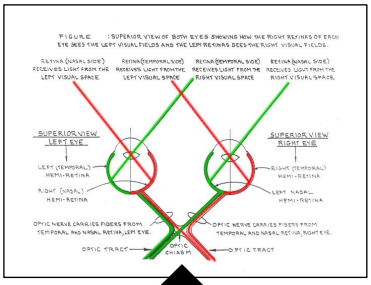
At the Optic Chiasm

- Before the chiasm
  - Two separate, independent sets of information coming from the eyes
- At the chiasm
  - Fibers carrying visual input from the **nasal retinal field** in each eye cross over and enter the **optic tract** on the opposite side
  - **Temporal field fibers don't cross**
    - **They just turn the corner**
- After the chiasm
  - Input from the eyes is merged so that visual processing is integrated between the eyes
- Each hemisphere now processes visual input from the **contralateral** half of the visual field
  - Left hemisphere will process right visual field information (green lines)
  - Right hemisphere will process left visual field information (red lines)



L eye R eye

The Optic Chiasm

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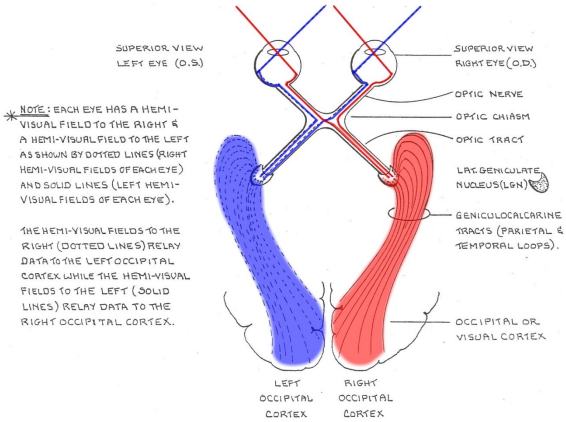

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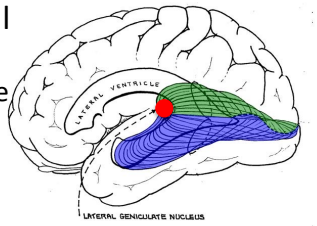
Lateral Geniculate Nucleus (LGN)

- Considered the gateway to the visual cortex
  - 80% of input from optic tract lands here
- Lies in the thalamus and integrates visual input with input from the **cortex** and **brainstem**
  - **Prefrontal** areas of the cortex modulate **attention** based on the goal
  - **Brainstem** plays a key role in **energizing** the cortex
  - **Together** they focus visual attention on key environmental features/objects needed to achieve the person's goal.



Gilbert a-b, 2013

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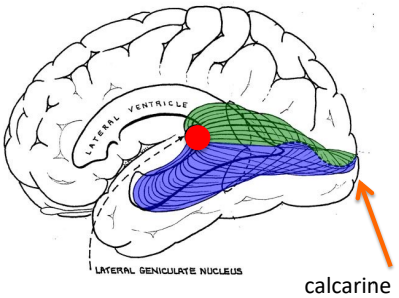
Geniculocalcarine Tracts (GCT)

- Arise from LGN(red dot)
- Terminate in **calcarine fissure** of occipital lobe
- Convey representation of the visual field to the cortex via **two loops**
  - Parietal-inferior visual field
  - Temporal-superior visual field
- Tract runs through each hemisphere
  - Carries information about the **contralateral** field



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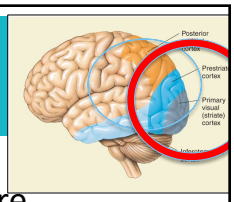
Occipital Lobe



- GCT fibers terminate at the calcarine fissure
  - First stop primary visual cortex–V1 (darker blue)
- V1- serves as a post office
  - Sorts incoming visual input-completes a basic analysis and decides to **keep it or dump it**
  - **Sends the visual input it keeps** to prestriate cortex
- Prestriate cortex (lighter blue)
  - Analyzes more complex aspects of the visual input like motion, color and form and works with the primary cortex to create an image

Gilbert a-b, 2013

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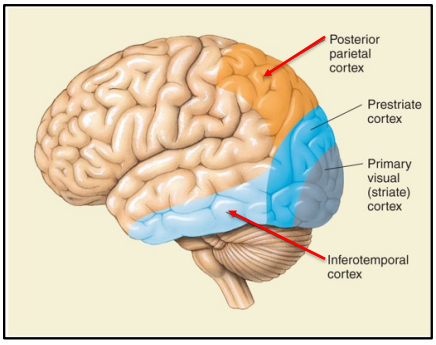
Cerebral Cortex

- **Prestriate cortex** sends the images onto areas in the cortex to use to meet goals
- Precise images are sent to the **inferotemporal cortex** to be combined with language to recognize and classify objects
- Broader global visual input is sent to **posterior parietal cortex** to be combined with body/space maps to prepare the body to move



Gilbert a-b, 2013

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Why did I put you through this lesson?

- As we will learn in the next lesson, hemianopia and other visual field deficits occur following **damage along the visual pathway**
- How the client's visual field changes after the ABI **depends on location** of the lesion along the pathway
- Knowing where the injury occurred **enables you** to observe closely for certain behaviors
- And vice versa-observing for certain behaviors helps you identify where the injury occurred

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Key Lesson Take Aways

- Nasal fibers in the optic nerve cross at the optic chiasm to join the temporal fibers of the opposite optic nerve to create left and right visual fields
- Lesions posterior to the optic chiasm cause a field deficit on the same side in both eyes
- The right visual field is processed through the left hemisphere and the left visual field is processed through the right hemisphere
- The V1 area of the occipital lobe receives the field information from the GCT, keeps what it needs and sends it onto the prestriate area of the occipital lobe first and then onto cerebral cortex for processing to be used to achieve goals

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Lesson 3 Hemianopia

Causes and Characteristics of Hemianopia and other Visual Field Deficits

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What we have learned so far

- Hemianopia is a common vision impairment in adults and children with ABI from stroke and TBI
- The right visual field is processed through the left hemisphere
- The left visual field is processed through the right hemisphere
- Lesions posterior to the optic chiasm cause a field deficit on the same side in **both eyes**
- HH generally creates a permanent vision loss

2

2

This Lesson will Cover

- Types and causes of visual field deficits
- Types of hemianopia
- Prevalence of hemianopia following stroke and head Injury
- Accompanying visual impairment

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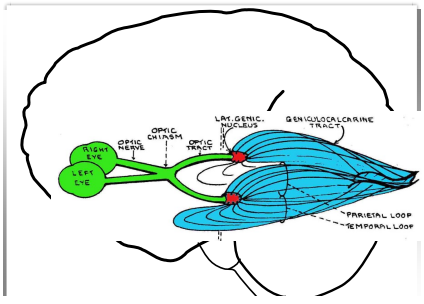
Visual Field Deficits

- The visual pathway transects the brain
  - Covers a lot of territory
  - Lots of opportunity for damage from TBI, stroke, infection, Alzheimer, MS
- Type of visual field deficit (VFD) depends on the structure damaged on the pathway



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Structure	Type of Impairment	Common Causes
Retina	vision loss in central visual field (macular scotoma and/or peripheral visual field (glaucoma) **vision loss occurs in one eye**	central retinal artery or vein occlusion; age-related eye disease-AMD, diabetic retinopathy, glaucoma
Optic nerve	partial or complete loss of vision in **one eye**	TBI, MS, stroke, tumor, anoxia glaucoma/ other disease
Optic chiasm	complete or incomplete **bi-temporal** hemianopia-client loses vision in peripheral field resulting in tunnel vision	pituitary and other tumors, TBI, aneurysm
Optic tract	complete or incomplete homonymous hemianopia – may also have afferent pupillary defect (pupil does not respond normally)	stroke, tumor, TBI
Geniculocalcarine tract	homonymous hemianopia or quadrantanopia from occlusion of middle cerebral artery or posterior cerebral artery	stroke, tumor, TBI
Occipital lobe	homonymous hemianopia, hemianopia with macular sparing, homonymous **scotomatous** defect-vision loss occurs in the central visual field-peripheral field is intact (opposite of macular sparing)	stroke, TBI, anoxia, encephalopathy

Wolberg & Kapoor, 2022; Loftus et al. 2010; Costello, 2016; Maia da Silva et al. 2017; Rowe et al. 2019; Bruce et al. 2006

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Hemianopia is the Most Common VFD

- 2/3rd of persons with VFD from stroke experience HH
- 25% of persons with VFD from TBI experience HH
- Other more common causes of VFD
  - Anoxia
    - Can create bilateral concentric field constriction-e.g. tunnel vision
  - Central retinal artery occlusion
    - Stroke of eye-creates central and peripheral VFD
  - Glaucoma
    - Concentric VFD progressing from peripheral to central
  - Multiple sclerosis
    - Scattered VFD from plaques along the optic nerve

Rowe et al. 2019; Bruce et al. 2006

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Causes of Hemianopia

- Most occur from a lesion along geniculocalcarine tract
- Stroke is the most common cause
  - Middle cerebral artery occlusion (MCA)
    - Feeds the central area of the cortex
    - Hemianopia or quadrantanopia
  - Posterior cerebral artery occlusion (PCA)
    - Feeds occipital cortex
    - 70% result in homonymous hemianopia
    - Account for 5-10% of all stroke
- Damage to the occipital lobe from TBI and tumors also can cause HH

Wolberg & Kapoor, 2022

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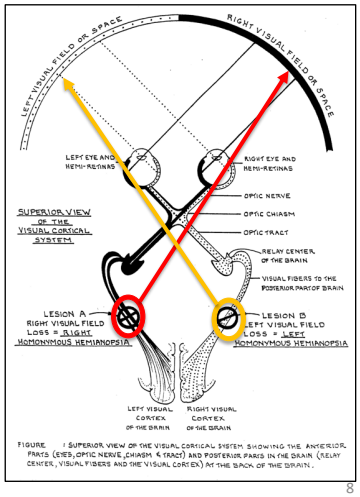
Homonymous Hemianopia

- **Homonymous** means the field deficit is the same in each eye
- Results from damage to
  - Geniculocalcarine tract
  - Occipital lobe
- Affects the visual fields in **both eye**s on the **side opposite the lesion**



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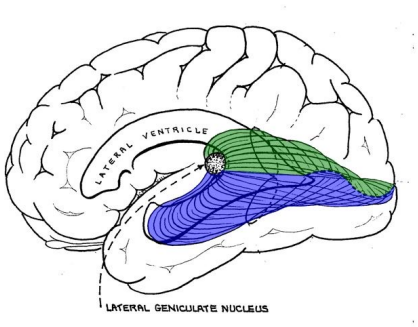
Types of Hemianopic Field Loss

- Parietal loop
  - Deficit in **inferior field**
  - Difficulty seeing support surfaces
- Temporal loop
  - Deficit in the **superior field**
  - Difficulty seeing overhead signage (exits, street signs)
- Quadrantanopia
  - One loop is affected
- Hemianopia
  - Both loops are affected
- Altitudinal deficit
  - Both parietal loops are affected
    - Bilateral inferior field loss
  - Both temporal loops are affected
    - Bilateral superior field loss



Wolberg & Kapoor, 2022; Zihl, 2012

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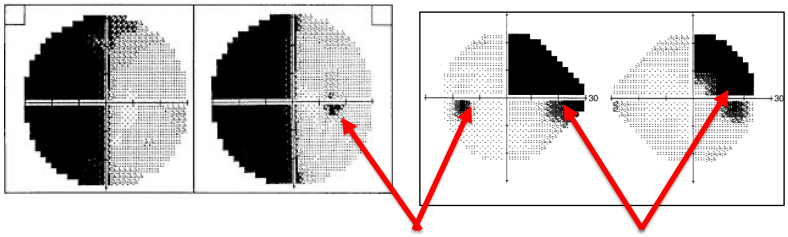
Homonymous Hemianopia/Quadrantanopia



blind spot

- **Key Characteristic**
  - **Marked** vision deficit on **involved** side in **both eyes**
    - Partial vision to blindness

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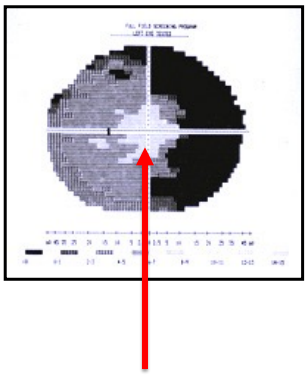
Macular Sparing



- Presents like HH but 5-25 degrees of the fovea/macula is spared
  - Area of spared vision may have reduced contrast sensitivity
- Occurs in approximately 30% of HH caused by a PCA stroke
- Leaves mostly a peripheral field loss on the affected side (black area)
  - Reading is unaffected
  - Affects driving, mobility and navigation
- Person often is unaware of deficit
- Careful testing is required to uncover

Wolberg & Kapoor, 2022; Clatworthy et al. 2013; Zihl, 2012

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Accompanying Impairment

- **Subtle** vision impairment on **sound side**
  - Slowed visual processing speed detecting large objects in intact right visual field of persons with RHH from occipital lesions
- Light sensitivity
  - Challenges in high glare environments
- Reduced contrast sensitivity
  - Difficulty seeing in dim light, colors not as bright
- Difficulty adjusting to changing light
- Phantom vision episodes (Charles Bonnet Syndrome)
  - Formed, unformed photopsias

Chokron et al. 2018; de Haan et al. 2015; Vaphiades et al. 1996

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Key Lesson Take Aways

- Visual field deficits are the most common vision impairment in acquired brain injury because the visual pathway literally traverses the entire brain
- Homonymous hemianopia from stroke is the most common visual field deficit but there are many other types and causes including eye disease
- The homonymous field deficit can present as hemianopia, quadrantanopia, or altitudinal loss depending where the lesion occurred along GCT
- The client may experience other visual changes from the brain injury that also affect ADL performance

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Lesson 4

Changes in Visual Search and Scanning caused by Hemianopia

1

What we have learned so far

- Homonymous hemianopia causes a loss of vision in one half of the visual field on the side opposite of where the brain injury occurred
- Stroke is the primary cause of hemianopia, but it can occur with TBI and tumor
- The homonymous field deficit can present as hemianopia, quadrantanopia, or altitudinal loss depending where the lesion occurred along GCT
- The client may experience other visual changes from the brain injury that also affect ADL performance

2

2

This Lesson will Cover

- 4 visual changes caused by the HH that limit the client's ability to effectively search the affected visual field and complete occupations
- Perceptual completion and how it influences the client's ability to search the affected visual field

3

3

Changes in Ability to use Vision

- Presence of HH causes 4 specific changes in the client's ability to use vision to acquire information and direct movement
- These changes affect the client's ability to
  - Search for key information in the environment needed to complete occupations
  - Accurately identify visual details
  - Visually direct the hand/foot in precision activities

4

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Visual Change 1

- Client adopts a **narrower, incomplete** search pattern towards the blind side **confining search** to the midline and sound side
- This change in the search pattern occurs due the influence of a **normal** visual process called **perceptual completion**

Dowling, 2018; Gilbert-b, 2013; Postuma et al. 2023

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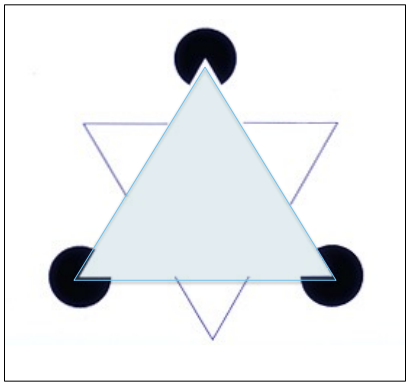
Perceptual Completion

- Normal cognitive process that uses experience and **memory** to **predict** how a visual scene should look
- Enables us to rapidly construct a reasonably accurate scene and locate items within it
- The primary advantage of perceptual completion is that it increases **speed and efficiency** in visual search



If you see the solid white triangle, you have normal perceptual completion

Dowling, 2018; Gilbert, 2013

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Review: Perceptual Completion

- The prefrontal lobes use **perceptual completion** to **quickly** construct a **mental picture of surroundings**
  - Uses this picture to **direct search** towards specific targets based on **anticipation** of where they will be found in this environment
- Supplies a critical performance skill that enables us to
  - Enter familiar and unfamiliar environments and successfully adapt to them quickly and safely
  - Quickly locate item/features needed to complete occupations

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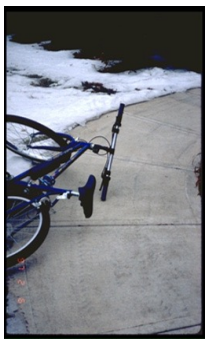
Even with a VFD as large as a hemianopia, the brain will perceptually complete the missing field

Client with Left HH thinks the pathway looks like this....



But in reality the pathway looks like this…

Chokron et al. 2020; Cole, 1999; Hazelton et al. 2019; Schuchard, 1995

8

Because of Perceptual Completion

- Initially client is unaware of missing vision
  - Perceives an **unaltered** and **complete** visual field-no black curtain-no gaps in the field
  - But the perceived field is **not necessarily accurate**
- As client interacts with the environment
  - Experiences collisions, knocks over items on blind side
  - Begins to distrust visual input from that side
  - Responds by focusing attention on vision coming from the sound side/field (creating learned non-use of affected side?)
- Adopts **narrow** search pattern confined to **midline/sound side**
- May appear to **ignore** blind side, but **does not have neglect**

Hazelton et al. 2019; Cole, 1999; Wijesundera, 2020

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Perceptual completion **reduces** self-efficacy and autonomy

- Person instinctively trusts their **newly altered** perception and as a result **experiences mistakes, collisions**
  - Thinks the aisle is clear in a grocery store and collides with another shopper or a pallet, cart…
  - Thinks they have read to the end of a line of text-and realizes the text is not making sense but don't know why
- This disconnect between perception and reality causes **confusion, uncertainty, anxiety, fear**
  - Person loses self-confidence, self-efficacy
    - Becomes **more passive/reliant** on others for decision making and completing activities
    - **Drops out** occupations

Hazelton et al., 2019; Cole, 1999, Wijesundera, 2020

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Visual Change 2

- Significantly disrupted search towards blind visual field
  - Perceptual completion prevents client from knowing **where border** of **blind field begins or ends** because there is **no marker** indicating the **transition** from seeing to non seeing field
- Will observe client
  - **Make irregular** attempts to search the blind field
  - **Abbreviate search** towards blind side
  - **Slowly search** blind field **(**very time consuming)
    - Use **stair step** saccades
    - Use **inefficient** search strategies
    - Mena-Garcia Study: 73% **lower** visual processing speed compared to norm

11

Pambakian et al. 2000; Chokron et al. 2016; Zihl, 2011; Kasneci et al. 2014; de Haan et al. 2015; Tant et al. 2002, Postuma et al. 2023; Mena-Garcia et al. 2021

11

Stair Step Saccades

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Slow and Disrupted Search

- Prevents person from completing activities in a **timely** manner
  - Creating frustration and eventually a dropping out of occupations
- In dynamic tasks like driving, it may prevent safe completion of the task
  - Forcing client to retire from driving

Finestone, et al. 2009

13

Visual Change 3

- Client misses and/or mis-identifies visual detail on the blind side
  - Occurs when field cut extends into the **fovea**
  - Client doesn't see the visual information **lying within** the field cut
  - Significantly impairs **reading performance**
  - Difficulty with tasks that have **small details**

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Visual Change 4

- Occurs **only** when HH is on **same side as the dominant hand/foot**
- Creates difficulty visually monitoring the hand/foot in activities
- Client has difficulty completing
  - Activities that **require precision** and **visual guidance** of the **hand**
  - Activities that **require precision** and **visual guidance** of the **foot**

Warren, 2009; Cole, 1999; de Haan et al. 2015

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Key Lesson Take Aways

- Perceptual completion prevents client from distinguishing the seeing field from the blind field
- Influence of **perceptual completion** causes **4 significant changes** in the client's ability to use vision to complete daily occupations
- Client adopts a **narrow** search pattern confined to the **midline and sound side**
- Client has **difficulty searching** the blind field
- Client **misses/mis-identifies** visual details on the blind side
- Client with HH on same side as dominant hand/foot may have **difficulty completing** activities that **require precision**

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Lesson 5
Changes in Mobility and Navigation

1

1

What we have learned so far

- Perceptual completion prevents the client from distinguishing the seeing field from the blind field
- Client adopts a **narrow** search pattern confined to the **midline and sound side**
- Slow and disrupted search towards the blind field prevents the client from reacting rapidly in dynamic situations
- Client may experience reduced self-confidence and self-efficacy in navigating environments
- Client with HH on same side as dominant hand/foot may have difficulty completing activities that require precision

2

2

This Lesson will Cover

- Influence of hemianopia on ability to safely navigate and interact with environments
- Changes in mobility
- Difficulties in orientation
- Challenges participating in community environments

3

3

Perceptual Completion and Slow and Narrowed Search from HH

- Prevents client from
  - Noticing **obstacles** in environment contributing to
    - Unsafe behaviors in community environments
    - Collisions
    - Disorientation
  - Noticing **objects** in environment
    - Difficulty locating items needed for ADLs
- Mimics neglect*

  (*but person **does not** have neglect)

Pundlik et al. 2023; Hazelton et al. 2019; de Haan et al. 2015

4

Influence of HH on Mobility

- Observe significant but often subtle changes in how the client moves their body through the environment
- Biggest challenges
  - Difficulty monitoring the support surface
  - Difficulty completing dual tasks
  - Disorientation navigating environments
  - Reduced self-efficacy/self-confidence navigating dynamic and/or unfamiliar environments

Zhil, 2011; Krishnan et al. 2017; de Haan et al. 2015; Hazelton et al. 2019; Warren, 2009

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Difficulty Monitoring the Support Surface

- Key Observations
  - **Stiff, uncertain, tentative gait**
  - **Appears uncertain** when encountering changes in support surface (curb cuts, ramps) or making **transitions**
  - **Shoe gazes**-looks at support surface immediately in front of feet

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Difficulty Completing Dual-Tasks

- Dual-Tasks are the most challenging
  - Require simultaneous monitoring of the support surface and the environment
    - Common examples: shopping, walking the dog, attending church, washing clothes, vacuuming, preparing a meal
- Client must prioritize their attentional resources to **staying upright and walking** during **dual-tasks**
- Key Observations
  - **Tendency to** fixate gaze straight ahead; reluctant to search surrounding environment
  - Collides with or comes very close to obstacles
  - Trails surfaces (uses hand to guide self around obstacles) to use tactual feedback to move
  - Stops to search/unable to search while walking
  - **Misses critical information** in surroundings

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Key Observations on Ida

- Observe these key behaviors
  - Looks stressed
  - Stiff, wooden gait
  - Fixates gaze straight ahead; reluctant to look toward the sides of the hallway
  - Misses the door handle
  - Shoe gazes when transitioning through door

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Difficulty Orienting

- **Doesn't obtain enough visual input** to build a complete/accurate map of surrounding space
  - **Focus on staying upright** limits awareness of surroundings
  - Plus, **perceptual completion slows search**
    - Unable to scan **fast enough** to build the scene
- Experiences a **tendency to get lost**
  - **Very uncomfortable** navigating alone
  - **Avoids** independent travel
    - **Relies** on others to lead them
      - **Following** others is a common observation
    - Dependence is difficult for client **and family**

Zihl, 2011; de Haan et al., 2015; Hazelton et al., 2019; Warren, 2009

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Overall Changes in Mobility

- These are key observations that indicate the client is experiencing challenges with mobility
  - Person appears hesitant, uncomfortable, anxious navigating environments
  - Stiff, uncertain gait
  - Coming very close to obstacles
  - Trailing
  - Uncertain during transitions
  - Shoe gazing
  - Stopping to search
  - Following

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How big a problem is this?

- Studies examining functional limitations in persons with HH have found
  - **90%** reported experiencing a collision because they didn't see an obstacle
  - **44%** expressed a fear of falling
  - **70%** felt restricted in their ability to walk unassisted
  - **65%** were dissatisfied with their ability to travel
  - **31%** worried about doing things that would embarrass themselves in front of others
  - **44%** rarely left their home without someone to accompany them (regardless of age)

Zihl, 2011; de Haan et al. 2015; Hazelton et al. 2019; Warren, 2009

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Emotional Response

- Clients with HH are especially challenged by
  - Unfamiliar surroundings
  - Crowded areas
  - Dark areas; areas with poor lighting
  - Inclement weather
- These environments can trigger anxiety that sometimes escalates into a panic attack
  - "Crowditis"

Zihl, 2011; de Haan et al. 2015; Hazelton et al. 2019; Warren, 2009

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Reduced Social Participation

- Anxiety in crowded/dynamic environments
  - Inability to monitor the environment
- Reduced self-efficacy and increased passivity
  - Fear of collisions
  - Fear of making an embarrassing mistake; causing or experiencing an accident etc.
- Social isolation
  - Strong desire to stay in a predictable and static environment

Hazelton et al. 2019; de Haan et al. 2015; Warren, 2009

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Key Lesson Take Aways

- HH can limit the client's ability to accurately monitor the support surface, complete dual tasks and remain oriented during navigation
- The client will display key behaviors that suggest difficulty with mobility and orientation
- The client's difficulties with mobility may cause a loss of self-confidence and increased passivity in participating in activities
- Anxiety may cause the client to withdraw from community activities and become socially isolated

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Lesson 6
Challenges in Reading

Perceptual Span used for Reading

Components of Reading Performance

1

1

What we have learned so far

- Hemianopia results from damage posterior to the chiasm and creates a visual field deficit in both eyes
- The most common type of hemianopia affects the left or right half of the visual field of both eyes
- The field cut caused by the hemianopia generally affects the peripheral and central visual field on one side, but macular sparing is possible
- Impairment of the central visual field affects the cone cells that provide the acuity needed for reading

2

2

This Lesson will Cover

- The perceptual span that we use for reading
- Characteristics of a normal perceptual span
- How we use the perceptual span to read a line of text (the reading process)
- Components of reading

3

3

HH Influence on Reading

- Reading ability is impaired when the border of the field deficit extends **into the fovea**
- Both left and right hemianopia disrupt reading
- Each type of HH impairs reading a little differently by how it affects the **perceptual span** used for reading
- To understand how reading changes in HH we need to understand how we normally read using the perceptual span

4

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The Perceptual Span

- The ability to see individual letters and numbers, punctuation marks, and words is dependent on the **very acute vision provided by the fovea**
- Our most acute vision extends 1 degree on either side of foveal fixation
  - This little area forms a window that we use to view text
  - The window is known as **a perceptual span**

Rayner, 1998; Legge, 2021

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Normal Perceptual Span

- Approximately 8 degrees wide
  - Encompasses 15-19 characters
  - Adapts to the reader
    - Asymmetrical-extending farther to the right for English readers
    - Asymmetrical- extending farther to the left for Hebrew readers
    - Extends 5-6 characters vertically for character readers
    - For bilingual readers, the span changes dependent on whether the person is reading characters or letters
- Comprised of foveal and parafoveal field
  - **Foveal field**: creates a smaller window within the perceptual span that is wide enough to capture 7-9 characters
    - Known as the **word identification** span-enables the person to clearly see the letters and words
  - **Parafoveal field**: captures the remaining 5-9 characters on the edges of the span
    - Provides a general perception of the length and shape of words to help the person to predict the preceding or upcoming word

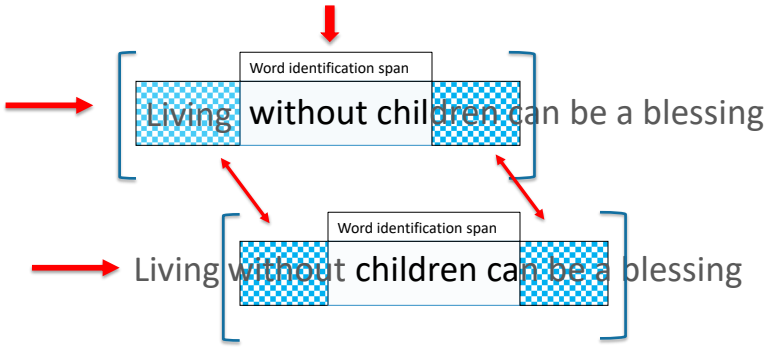
Rayner, 1998

6

6

Normal Perceptual Span

Reading is a series of alternating **fixations** and **saccades** that move the perceptual span (in the brackets) across a line of text moving from the middle of one word to the middle of the next.



Rayner, 1998

7

Right Side of Span is Critical for Fluency

- Provides information about **length of upcoming words** used to **plan and launch the next saccade**
- Provides a few letters of the next word and practiced readers can use this to **predict the upcoming word** and **increase reading speed**
  - Practiced reader may even extract enough information to skip over short words
- Because of right side of the span
  - We can **simultaneously recognize the word** and **plan** the **next saccade** with each fixation
    - Resulting in **fluent** reading

MacKeben et al., 2015; Rayner, 1998

8

Left side of Span is Critical for Accuracy

- Provides information about the letters, numbers, characters to the left of fixation
  - Necessary for accurate word recognition
- Helps the person locate of beginning of the line of text on the left
  - Necessary to accurately navigate through lines of text on a page

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The Reading Process

- Each saccade moves eye 8-9 characters
- Each fixation takes 250ms
  - 50 ms to recognize the word
  - 200 ms to plan next saccade
- Generally, we make only one fixation per word
- Re-fixation may be needed
  - If the word is long and exceeds word identification span
  - If the optimal viewing position was not achieved
    - e.g. the eye did not land where it was supposed to

Rayner, 1998

10

Components of Reading Performance

- Speed
  - Number of words and numbers read **per minute**
- Accuracy
  - Number of words and numbers read **accurately**
- Fluency
  - Ability to read with proper speed, accuracy and expression
- Comprehension
  - Understanding the meaning of text and ability to apply and infer this understanding

MacKeben et al. 2015; Rayner, 1998

11

Reading Speed

- Determined by amount of time spent in fixation and saccades
  - Fixation time increases (reading speed decreases) when we read
    - Unfamiliar words
    - Long words that require re-fixation
    - Poor quality print that makes words difficult to see
  - Fixation time decreases (reading speed increases) when we read
    - Familiar words
    - **Predictable** words

MacKeben, et al. 2015; Rayner, 1998

12

Reading Accuracy (and speed)

- Is strongly influenced by
  - Syntax
    - Sentence structure
      - Subject/verb
      - Adjective/adverb/subject
  - Semantics
    - The meaning of a word, phrase, sentence, or text.
      - Garbage in garbage out

MacKeben et al. 2015; Rayner, 1998

13

Reading Speed

- Acquired through practice
- Practiced (skilled-adult) readers make
  - **Shorter** fixations
  - **Longer** saccades
  - **Fewer** regression and re-fixations
  - Use **contextual** cues and **prediction** to decode words faster

Rayner, 1998

14

Fluency and Comprehension

- Fluency is a product of speed and accuracy
  - **Familiarity** contributes to fluency
    - An English teacher who loves mystery novels will read them more fluently than a neuroanatomy textbook
  - **Practice** increases fluency
    - Avid readers are generally more fluent because they read a lot
- Familiarity and practice also increase **comprehension**
  - We comprehend an article on a familiar topic much more easily than one on an unfamiliar topic
  - Our first pass through an unfamiliar textbook chapter is often slow and tedious and yields little understanding of the subject
    - But re-reading and highlighting increases our comprehension

MacKeben et al. 2015; Rayner, 1998

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Why was this lesson needed?

- Understanding the normal reading process helps us understand
  - Why and how hemianopia affects reading
  - How reading intervention is provided
  - The best type of reading intervention to provide
- These topics will be covered in Lessons 7 and 17, 24 and 25

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Key Lesson Take Aways

- The perceptual span is a window created by foveal cone cells to provide the acute vision needed to read
- A normal perceptual span enables us to accurately decode words and fluently read text
- The right side of the span is critical to reading fluently
- The left side of span in critical to reading accurately
- Reading performance is comprised of intertwined components of speed, accuracy, fluency, comprehension
- Reading performance is strongly influenced by the client's understanding of word and sentence construction; word predictability and amount of daily reading

17

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Lesson 7
Changes in Reading

Reading with a Hemianopia

1

1

What we have learned so far

- The perceptual span is a “window” of foveal cone cells that provide our most acute vision
- When reading we move the perceptual span across the page of text to decode words
- The right side of the span is critical to reading fluently
- The left side of the span is critical to accurate word identification and navigation through lines of text
- Reading speed is developed through practice and strongly influenced by both vision and language

2

2

This Lesson will Cover

- The effect of hemianopia on reading performance
- Temporal and spatial changes in the perceptual span that impair reading performance
- Other conditions that affect reading performance

3

3

HH Influence on Reading

- Reading ability is impaired when field cut extends into the fovea
- HH alters the **perceptual span** used for reading
- Right and left hemianopia each exert a different effect on the perceptual span and reading performance
- The field cut disrupts both **spatial** and **temporal** features of the perceptual span

Rodriguez et al. 2015; Schuett, 2009; Zihl, 2011

4

HH Disrupts Spatial Processing

- Hemianopia reduces the **size** of the perceptual span
  - Chops off the window on the **involved HH side**
- Cuts off letters at the beginning/ending of words
  - Word becomes unrecognizable (***top* becomes *op***) or
  - Transformed into another word (***cat* becomes *at***)
- Left HH causes more disruption/impairment of spatial processing
  - Persons with L HH make almost twice as many mis-identifications as persons with R HH

Zihl, 2011

5

Perceptual Span in HH

Left HH

g without children is more relaxing for the parents of toddlers.

Right HH

Eating without ch is more relaxing for the parents of toddlers.

6

6

Influence on Reading Speed and Accuracy

- HH Limits ability to see a whole word in one fixation
  - Reading word-by-word is faster than letter-by-letter because it helps person **predict** the upcoming word
    - Seeing a **few letters reduces the pool** of upcoming potential words
      - "He is very good at re…(is it reading, reaping, remembering)?
    - **Seeing the whole word** enables the person to understand the **relationship between words** and provides the **best prediction** of the upcoming word (known as linguistic inference)
      - He is very good at **reaping** the benefits of his labors
      - He is very good at **reading** hard words
- HH reduces reading speed by shortening the perceptual span reducing the ability to use **prediction** to increase reading speed and accuracy

MacKeben, et al. 2015

7

Disrupts Temporal Processing

- Smaller perceptual span window means person must make **more** saccades
  - **Less** information is gathered with each saccade
  - Additional saccades throws off the smooth **timing** of the fixation and saccade pattern used to move the eye across text-disrupting fluency
- Both left and right hemianopia cause increased saccades, but the disruption is **much more significant** in **right** hemianopia

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Disrupted Temporal Processing in Right HH

- Persons with R hemianopia make **3x more saccades**
- Saccades have smaller amplitude (e.g. shorter distance) and are characterized as "hit or miss"
- The absence of visual input from the right side of perceptual span prevents saccades from being accurately aimed toward the upcoming word
  - Perceptual span more often lands **near beginning of words** which causes more re-fixations to identify the word
- Person applies adaptive strategy of making short saccades through text at a **predetermined** rate

Leff et al., 2000; Zihl, 2011; Schuett, 2009

9

9

Disrupted Temporal Processing in Left HH

- Left hemianopia
  - Decreases the amplitude (distance) of the long leftward saccade
    - Client falls short of the border of the text
  - Causes client to omit words on the left side
    - Make 10x more omissions than right HH
  - Client may also skip lines of text
- May lead the client to
  - Use a finger to guide reading across the lines of text
  - Report that text is making little sense

Zihl, 2011; Schuett, 2009

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Both Left and Right Hemianopia

- Increase the number of reading regressions where the client re-reads a word to try to figure it out
- These changes eat up time and slow reading speed
  - Persons with Left HH take 2x as long as normally sighted persons to read
  - Persons with Right HH take 3x as long

Zihl, 2011

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Summary

Left Hemianopia	Right Hemianopia
• 10x more omissions – Unable to accurately make long saccade towards left margin – Tendency to skip lines • More regressions • 2x slower reading speed	• 3x more saccades – Unable to accurately saccade towards right to fixate on next word – Hit and miss strategy • More regressions • 3x slower reading speed

12

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Influence of Field Sparing

- The farther the border of the HH is from the fovea the…
  - Fewer the mis-identifications
  - Greater the reading speed
- Most errors are made by persons with 1-2 degrees of field sparing within the fovea

Zihl, 2011

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HH Creates Several Reading Deficits

- Omissions
- Misidentification of word and numbers
- Reduced reading speed
- Reduced reading accuracy
- Line skipping
- Poor page navigation
- Significant increase in effort, with dropping out of reading dependent occupations

Schuett, 2009; Leff et al. 2000; Leff et al. 2001; Leff et al. 2008; Zihl, 2011

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Other Factors Influencing Reading

- Difficulty using/adapting to a bifocal
- Hemi-inattention/neglect
  - Increases errors especially omissions to the left
- Aphasia or another language deficit
- Short term memory impairment
- Focusing deficiency
- Reduced acuity
- Impaired concentration
- Reduced literacy

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Key Lesson Take Aways

- Reading is a key performance skill for many I-ADLS
- HH alters the spatial and temporal aspects of the perceptual span
- Clients with Left HH misread the beginnings of words and omit words on the left side of text
- Clients with Right HH have difficulty smoothly and rapidly moving through text
- Multiple conditions can affect reading performance
- Its important to collaborate with eye doctors, speech language pathologists and other reading experts to achieve the best client outcome

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Lesson 8

ADL Limitations from Hemianopia

1

1

What we have learned so far

- Hemianopia can significantly affect mobility and navigation
- Hemianopia can significantly affect reading performance
- Hemianopia can impact the client's self-efficacy, self-confidence and autonomy
- These are important components of many ADLS

2

2

This Lesson will Cover

- Effect of HH on eye-hand and eye-foot coordination
- The predominant types of ADL limitations experienced by the client
- Emotional/adjustment challenges related to difficulty completing ADLs and fulfilling expected roles

3

3

Effect of Hemianopia on Eye-Hand Eye-Foot Coordination

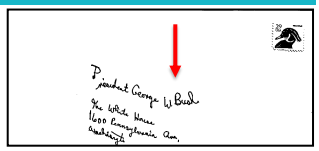
- When HH is on the **same side** as the dominant hand/foot **and** the field cut affects the **foveal area**
  - The client will often have difficulty seeing and **visually monitoring** the hand/foot
    - Experience difficulty completing activities that **require precision** and **visual guidance** of the **hand/foot**

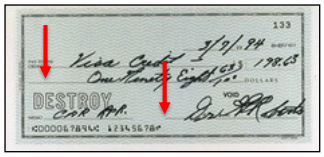
4

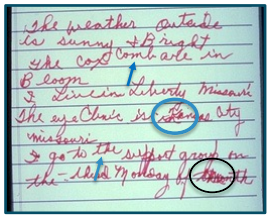
4

Reduced Eye-Hand Coordination

- May reduce handwriting legibility
  - Drift up /down on the line
  - Position incorrectly on the line
  - Write over other words
- Reduce accuracy in
  - Pouring, cutting, keyboarding, threading, measuring
  - Other tasks that require visual monitoring of hand







Warren, 2009; Mennem et al. 2012; de Haan et al. 2015

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Eye-Foot Coordination

- Difficulty completing activities that **require precision** and **visual guidance** of the **foot**
  - Sports activities
  - Walking on cluttered, uneven terrain
  - Climbing a ladder
  - Walking down the stairs
  - Negotiating curbs
- Increases **falls risk especially in unfamiliar and community environments**
  - Creates fear of falling
  - Dropping out community activities

6

6

ADL Challenges

- Reading based activities
  - Bill paying, meal prep, laundry, shopping, home maintenance
  - Medication management and other health management tasks
  - Using smartphones and computers
  - Viewing TV, movies, photography, other hobbies
- Require monitoring of a wide visual field
  - Meal prep, cleaning, yardwork, viewing sports, movies, driving
- Occur in a dynamic visual environment
  - Driving, cycling, shopping, dining out, recreational activities
- Require monitoring of hand in activities
  - Cooking and laundry-pouring, measuring, chopping
  - Paying bills, communication-handwriting, keyboarding
  - Maintenance, home repairs-using screwdriver, pliers and other tools

Warren, 2009; Costela et al. 2017 & 2018; Bowers, 2016; Hazelton et al. 2019; de Haan et al. 2015 7

7

ADL Challenges (in descending order)

- Driving
- Shopping and community events
- Yard work
- Meal preparation
- Financial management
- Functional communication
  - Calendars, telephones, clocks, TV viewing, computers
- Housekeeping
- Self-care
  - Limited problems with grooming, clothing selection

Warren, 2009

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8

Emotional/Adjustment Challenges

- Trying to remember that they cannot trust how they perceive their surroundings and that they must alter their search pattern contributed to feelings of
  - Fear
  - Worry
  - Embarrassment (when they failed)
- Constant difficulty in trying to compensate also led to
  - Desire to pass as fully sighted
  - Dissatisfaction with current abilities
  - Irritability
  - Loss of self-efficacy

de Haan et al. 2015; Hazelton et al. 2019

9

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More Effort

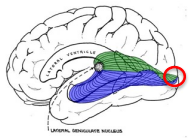
- The client must put more effort into completing activities
  - That extra effort causes **significant fatigue**
  - Accomplishes less during a day and needs more rest breaks
    - Increased frustration and worry
    - Irritability
- Puts pressure on family relationships
  - Family members must pick up the slack
  - Must alter the timing and how they do outings
    - Like having an infant

de Haan et al. 2015; Hazelton et al. 2019

10

Client Interview with Mr. L

78 year old client 6 weeks post onset of Right HH from PCA stroke



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Audio Clip

- Brief interview with Mr. L's wife describing some of the challenges she observed her husband face in living with his HH

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Dropping out Occupations

- Anxiety, reduced self-efficacy and confidence, increased passivity cause the client to withdraw from many activities especially those that
  - Occur in dynamic environments
  - Occur in unfamiliar environments-especially areas with low lighting and contrast
  - Occur at night
  - Involve lots of people/unpredictable encounters
  - Involve risk of self-harm
    - Areas with lots of steps, cooking, medication management
- Person deliberately socially isolates
  - Triggering significant conflict as family is forced to also stay in
- Person also relinquishes family responsibilities
  - Again, forcing family members to pick up the slack

13

13

Key Lesson Take Aways

- Clients often experience significant challenges completing I-ADLs especially those dependent on reading, writing and mobility and occur in community environments
- Clients often drop out community activities leading to social isolation
- Clients lose self-confidence/self-efficacy and show increased passivity in participating in activities and begin to rely on family to complete many home activities
- Family dynamics are severely disrupted
- Without OT, clients experience more disability than is necessary due to their vision loss

14

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Lesson 9

Perimetry tests eye doctors complete to diagnose visual field deficit

1

1

What we have learned so far

- Any type of visual field deficit is possible, but hemianopia is the most common deficit associated with stroke and TBI
- A complete homonymous hemianopia involves the central and peripheral visual field on the left or right side
- Hemianopia can occur with macular sparing leaving part or all of the central visual field intact

2

2

This Lesson will Cover

- Common types of diagnostic field tests the eye doctor may complete
- Common types of screening field tests doctors may complete

3

3

Key Members of the Rehab Team

- Ophthalmologist or optometrist
  - Needed to **diagnose** the field deficit
- Use carefully controlled, diagnostic **perimetry testing** to determine location, extent and depth of the visual field deficit
  - Testing must be completed in doctor's office using specialized equipment
  - Client must be able to follow directions, sustain attention for several minutes and provide reliable answers
    - Can require up to 45 minutes of sitting/concentrating to get a clean test
- Average of 5 months is required to complete diagnostic test

Zhang et al. 2006

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4

Diagnostic Perimetry Testing

- **All** perimetry testing (screening or diagnostic) has three components
  - **Sustained fixation** on a **central target**
  - Presentation of a **second target** of a specified size/luminosity in a designated area of the field
  - Acknowledgment of the second target **without breaking fixation** on the central target
- Clients in early stages of recovery from ABI often have physical and attention deficits that make it difficult to get reliable test results
- Because of these challenges-eye doctors may **push back** on testing client before 6 months into recovery

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Perimetry Tests

- Types
  - Central, peripheral or full field
  - Screening and diagnostic
  - Computerized and manual
- Test Strategies
  - Static
  - Dynamic
  - Threshold
  - Screening

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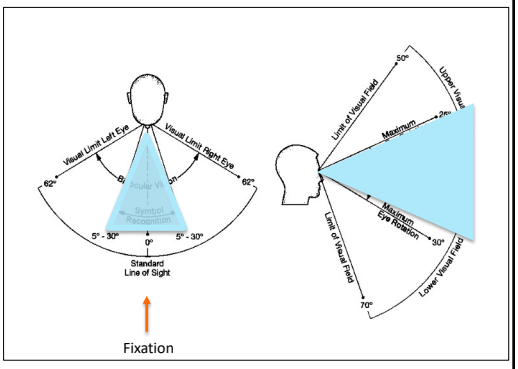
6

Central vs. Peripheral Field Testing

- Foveal field
  - Most detailed vision
  - Narrowest field-closest to eyes
  - Mapped only with **microperimetry**
- Central field
  - **Detailed vision**
  - Straight ahead
  - Mapped using a **flat chart**
- Peripheral field
  - Widest field-farthest from nose
  - **Least detailed** vision
    - Captures light, form, movement
  - Mapped only with **bowl** perimetry



https://pt.slideshare.net/KelvinLo5/unity-vr-jamkelvin1127?smtNoRedir=1

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Static vs. Kinetic Test Strategy

- Static
  - Target **appears** in a specified location without moving to that location
- Kinetic
  - Target **is moved** into a specified area of the field until it is detected and acknowledged

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Threshold vs. Screening Strategy

- Threshold
  - Target is **repeatedly presented** in a specific location in the field and **increased in intensity** until it becomes visible
  - Very accurate, precise measurement
- Screening
  - Target is **presented one time** at supra-threshold level
  - Still accurate, but less precise

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Types of Perimetry Tests

Screening	Diagnostic
• Central field – Confrontation test • Central field – Tangent screen – Damato campimeter • Peripheral field – Two-person kinetic confrontation test	• Full field – Automated Humphrey Visual Field Analyzer – Manual Goldmann perimeter • Central field – Fundus microperimetry

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Screening Confrontation Tests

- Quick bedside screening
- Provides gross indication of deficit
- Estimate how much central field is missing based on comparison to examiner's field
- Questionable reliability
- **Should be followed up by a better controlled or diagnostic test**

Trobe et al. 1981

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Ophthalmologist completing a confrontation test

- Tom-client with left HH from a PCA stroke
- Tom quickly detects a target entering from the right side but can't detect a target entering from the left until it is within the boundaries of the right CENTRAL visual field

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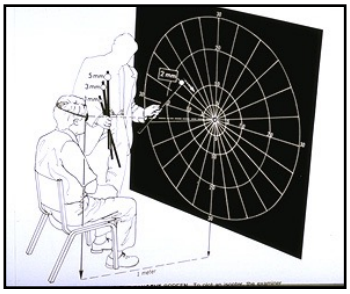
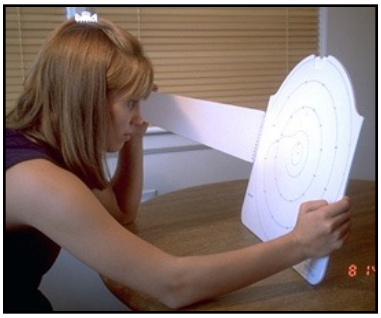
Manual Central Field Screening Perimeters

Tangent Screen



- Quick and inexpensive
- Requires skilled examiner
- Flat -measures only central field

Damato Campimeter



- Quick and inexpensive
- Portable
- Flat-measures only central field

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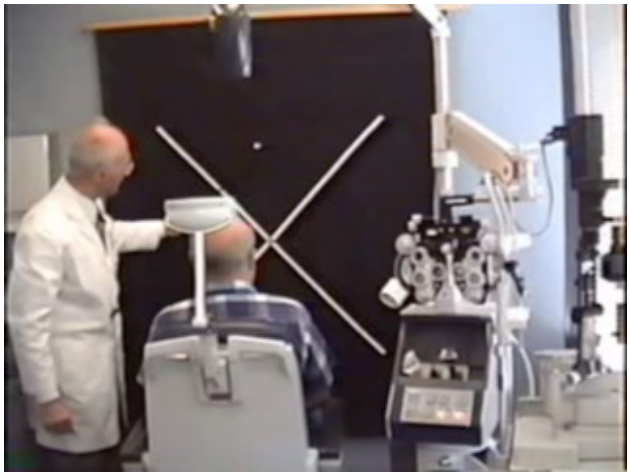
Ophthalmologist completing the tangent screen test

Observe how Tom quickly detects a target entering from the right side but is unable to detect a target entering from the left until it is within the boundaries of the right visual field



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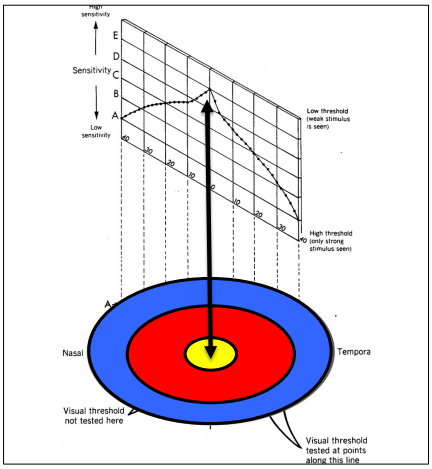
Diagnostic Testing

- Assesses the visual sensitivity of the field
- Every point within the retinal visual field has a specific visual **threshold**
  - Weakest test stimulus just visible in that location under the specific test conditions
  - Indicates sensitivity of photoreceptors to stimuli



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Diagnostic: Bowl Perimeter

- Measures central and peripheral field
- Computer driven
  - Accurate and comprehensive
- Able to detect subtle deficits
- Expensive-not every OD or MD practice will have one

Humphrey Visual Field Analyzer

16

16

Person completing perimetry test using the Humphrey Visual Field Analyzer

Client fixates on a central target inside the bowl and depresses the button each time she sees the second target silently appear

17

17

Microperimetry

- Identifies how field deficit affects foveal field and **perceptual span**
- Able to measure very small blind spots (scotomas) in the central field
- Most reliable, accurate form of perimetry
  - But only measures central 20 degrees of field
  - And not readily available outside a big low vision clinic

Schuchard, 1995; Williams, 1995

18

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Key Lesson Take Aways

- **All** perimetry tests have 3 components that require the client to be able to direct and sustain attention
- Takes an average of 5 months into recovery to obtain a reliable diagnostic test
- Screening tests strategies show fewer targets and targets are bigger and brighter
- Threshold test strategies show more targets at graduated levels of size and brightness
- There are all kinds of perimetry tests; computerized diagnostic tests are the most accurate
- Central field tests are required to identify issues in reading

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Lesson 10
Perimetry Test Interpretation

How to read the reports the eye doctors send you

1

1

What we have learned so far

- Doctors use perimetry tests to identify and describe visual field loss
- Two types of tests
  - **Screening** suggests the presence of a field deficit
  - **Diagnostic** identifies the size, location and density of the deficit
- Diagnostic testing takes approximately 5 months

2

2

This Lesson will Cover

- Different types of perimetry reports that you may see in the client's chart and how to interpret them

3

3

Interpretation of Perimetry Tests

- Different pathologies are **characterized** by
  - **Losses** in different areas of the field
    - Central scotoma
    - Paracentral scotoma
    - Peripheral field loss
    - Hemianopia, quadrantanopia
  - **Density** of the field deficit
    - Absolute
      - Complete loss of function-no detection of targets
    - Relative or threshold
      - Incomplete loss-still able to detect some targets if they are bright enough

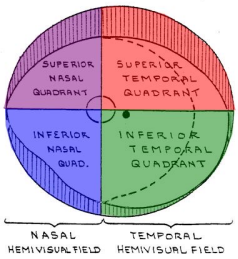
4

4

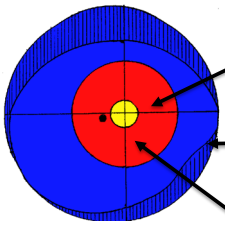
Visual Field Diagram

- Geographic Divisions
  - Depict the location of the deficit within the field
    - Superior/inferior and nasal/ temporal
- Acuity Divisions
  - Depict the acuity of the area affected by the visual field deficit
  - Central (cones-detail vision) or peripheral (rods background/motion)

LEFT FIELD
Nose/nasal



RIGHT FIELD
Ear/Temporal



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Interpretation of Perimetry Tests

- Visual field diagrams come in different formats
  - Isopters
  - Absolute scales
  - Gray scales
- Field diagrams are always displayed as you are looking at it
  - Right side of the diagram is on your right side etc.
    - Only exception is microperimetry print out

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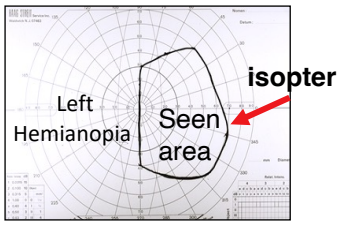
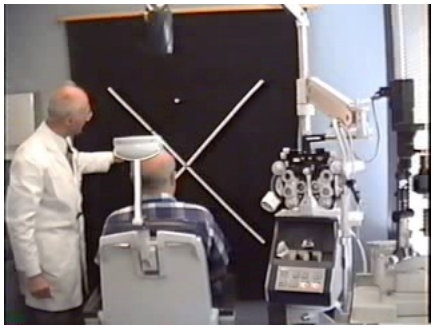
Isopter Diagram





- **Isopter:** boundary between an area where a target is **visible** and **not visible**
  - Seeing field lies **inside** isopter
- May use different sized targets to map out the sensitivity of the field

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Threshold vs. Screening Tests

- Threshold tests
  - Will have several isopters or symbols
    - Depicting the varying sensitivity of the field
- Screening tests
  - Will have one isopter or one set of symbols
    - Depict only areas of intact and impaired retinal function

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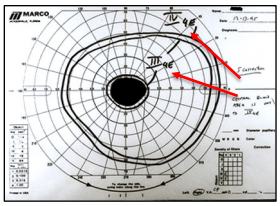
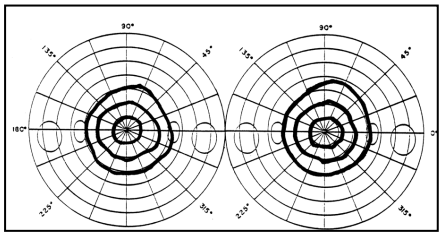
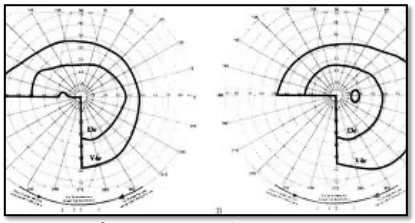
Isopter Diagrams

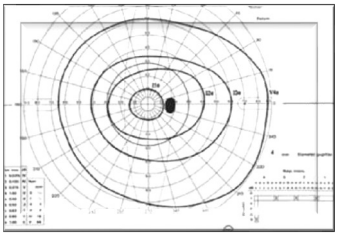




Tunnel Vision



Left Lower Quadrantanopia



Normal Central Visual Field

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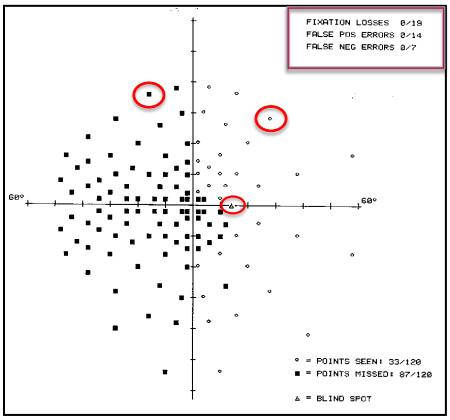
9

Absolute Scale Diagram

- Uses symbols to describe sensitivity of field
- One symbol indicates loss
  - In this example-a black square
- A different symbol indicates intact field
  - In this example-an open circle
- Each perimeter will have its own legend (bottom right)



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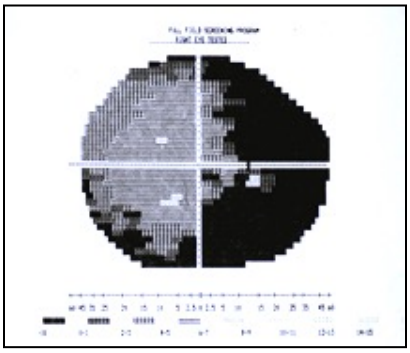
Gray Scale Diagram

- Sensitivity of field is described using different shades of gray
- Light shading-high threshold, can detect small target
- Black shading-no response to target



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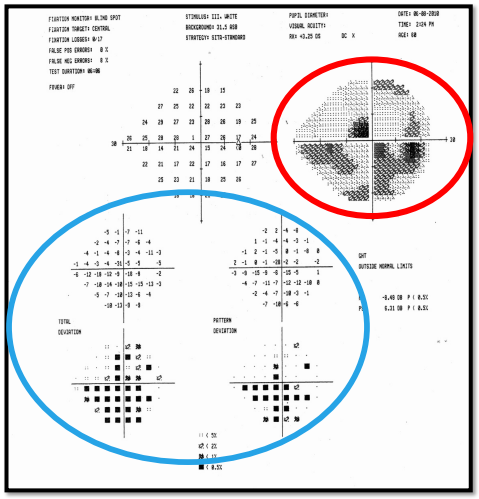
Humphrey Print Out



- **Absolute scales** are useful to OD or MD
- **Gray scale is** most useful to OT
- Shows a “swiss cheese” type of field loss associated with damage to calcarine fissure/occipital pole area from TBI

12

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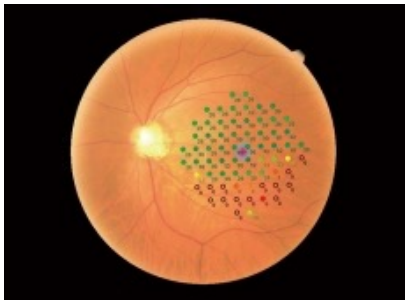
Microperimetry

- If you don't work in a low vision clinic with a microperimeter its unlikely you will ever need to interpret this kind of print out
- **Just remember that** clients can develop macular scotomas from their brain injury
  - Williams, T.A.(1995). Case report-low vision rehabilitation for a patient with a traumatic brain injury, *American Journal of Occupational Therapy 49*(9), 923-926



Nidek MP-3 Microperimeter

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Key Lesson Take Aways

- The visual diagram is interpreted as it is viewed, the right half of the field is on your right, the left half is on your left
- On a isopter diagram-the seeing area lies INSIDE the isopter
- Absolute scales will use symbols or numbers to describe the deficit
- Gray scales are a useful tool to use to educate the client and family about the field deficit

14

14

Lesson 11
The OT Approach to Evaluation and Intervention

1

1

What we have learned so far

- HH is a **low vision** condition with very limited chance for full recovery
- HH limits the client's ability to complete daily occupations
- HH causes the client to drop out occupations due to added effort, anxiety and loss of self-efficacy

2

2

This Lesson will Cover

- The focus and purpose of evaluation
- Key questions to ask and answer
- Areas to evaluate
- Alignment between evaluation and intervention
- The purpose of documentation

3

3

Recovery

- **Some improvement** possible in first 1-3 months
  - 40-60% experience some recovery of field
    - Recovery more likely in lower visual field
- **Recovery slows down** with time
  - Additional recovery diminishes after 8 weeks
  - Generally little recovery beyond 4-6 months
- Considered a **permanent deficit**
  - Medicare classifies it as a **low vision** condition
  - Therefore, compensation is the primary intervention approach
  - To teach compensatory strategies, must know location and extent of the field deficit

Zhang et al. 2006; Celebisoy et al. 2011; Agarwal & Kedar, 2015

4

VFD is a Hidden Impairment

- Generally, only observe the **consequences** of field loss
  - Mimics deficits in the performance skills it supports
    - Motor (mobility, eye-hand, eye-foot coordination)
    - Reading
    - Orientation
  - May not be **apparent** until other skills improve
    - Critical to know the **key** behaviors that define the condition and the assessments that describe vision impairment
  - May be overlooked if client has other more obvious impairment
- We need eye doctors to diagnose/prognose the field loss and advise intervention
  - But it is difficult to establish working relationships

5

5

Evaluation

- "Evaluation process is focused on finding out
  - What the client wants and needs to do;
  - Determining what the client can do and has done;
  - Identifying supports and barriers to health, well-being, and participation"
- The client's ability to participate in occupation underlies and ties together evaluation and intervention

AOTA Practice Framework, 2020 - s21

6

6

Purpose of the OT Evaluation

- To develop an **intervention plan**
  - Evaluation is the **first component** of intervention
    - The **sole** reason to evaluate the client is to select the most appropriate intervention
  - OT evaluates **FUNCTIONAL** vision
    - To understand how it hinders and facilitates occupational performance
  - Combines findings with other evaluations
    - To **identify strengths, weaknesses, rehab potential**
  - To set the most appropriate goals for the plan of care

7

7

Key Evaluation Questions

- Is the client's vision limiting occupational performance?
- What are the client's strengths and weaknesses in using vision to complete activities?
- How does the environment help or hinder the client's ability to use their vision?
- Who should be on the rehab team?
- What information needs to be communicated to the team ?

8

8

Evaluation Areas

- Suspected location and size of the VFD
  - Few clients will receive diagnostic testing early on in recovery
- Changes in client's search performance
  - Central field
  - Peripheral field
- Changes in client's functional performance
  - Reading
  - Mobility and navigation
  - ADLs
- Other visual changes
  - Older clients may have other age-related vision issues that affect acuity and field
  - Clients with TBI may have other vision impairment such as oculomotor impairment, changes in acuity and visual attention

9

9

Purpose of Evaluation Documentation

- To connect the client's vision impairment to their ability to complete specific ADLS
  - Provides the rationale for the goals
- State achievable goals that describe what must be addressed to remove the ADL limitation
- Describe the intervention plan to address the goals
- Provide justification for skilled occupational therapy intervention

10

10

Optimal Client Outcome

- The client can **participate** in all **needed** and **desired occupations**
- To achieve this
  - The client must be able to **use their current vision** as **efficiently** as possible to **complete occupations**
  - The client's environment must **support** their occupational performance

11

11

Alignment Between Evaluation and Intervention

- Improve the client's efficiency using their intact visual field to complete occupations
  - To **accomplish this**, we must identify the factors that could limit their ability to use their remaining vision
    - Other vision impairment
    - Cognitive, motor, language impairments
    - Neglect
- Create a **visible** environment that supports participation **despite** vision impairment
  - To **accomplish this**, we must understand the types of environments the client must/wants to participate in
    - Home, work, play
  - And understand the client's roles in these environments
    - Driver vs. commuter; spectator vs. coach; primary cook vs. helper

12

12

Key Lesson Take Aways

- HH creates a permanent vision impairment
- It is easy to overlook vision impairment because it looks like a deficiency in the performance skills it supports
- Evaluation is the first component of intervention; its' purpose is to identify effective interventions that will enable the client to participate in desired occupations despite vision impairment
- The purpose of evaluation documentation is to connect the client's vision impairment to their ability to complete specific occupations

13

Lesson 12
Identifying Occupational Limitations

Clinical Observations

Catherine Bergego Scale

1

1

What we have learned so far

- HH is a **low vision** condition with very limited chance for full recovery
- Ophthalmologists and optometrists are the most qualified doctors to diagnose a visual field deficit
- It takes approximately 5 months obtain a diagnosis of HH because the client's physical and cognitive limitations affect test reliability

2

2

This Lesson will Cover

- Clinical observations that suggest the presence, side and extent of the hemianopia and how the HH may influence performance
- Examples of how to document and interpret clinical observations
- The Catherine Bergego Scale to differentiate HH from Neglect

3

3

Clinical Observations

- Our best approach in the **early stages of recovery**
  - Very difficult to get a diagnostic test completed
    - Client can't attend long enough, sit long enough, follow direction well enough to obtain a valid test
    - Must refer out of the clinic
- Look for changes in behavior/performance that suggest the presence of a HH
  - Mobility/navigation, reading, writing
- Work as a team
  - Compare observations to look for consistencies in behaviors that suggest presence and location of the deficit
- Family member's observations also contribute a lot to understanding the client's limitations
  - See case study and interview handout
- Follow up with a diagnostic test when feasible

4

4

Brain Injury Assessment Battery for Adults (biVABA)

- The new 2023 updated manual is available as a free download on our website
- It includes updated assessment forms to evaluate acuity, oculomotor, visual field and visual attention
- The clinical observations in the next slides are found on the visual field assessment form in **Appendix C** of the biVABA manual
  - Also included as a handout for this lesson

5

5

biVABA **Key** Clinical Observations- **Mobility**

Observe client move (walking or propelling wheelchair) through busy and quiet areas with moving or stationary obstacles

- Collides with or comes very close to obstacles consistently on one side
- Fixates a straight ahead target (chair, bed …) and moves towards it without looking to either side
- Fixates the floor immediately in front of feet (e.g. shoe gazing)
- Turns head and consistently fixates to one side
- Stays close to one side of the wall when moving down a hallway
- Uses fingers to "trail" object (wall, furniture) to guide self when moving down a hallway or around an obstacle

6

6

biVABA **Key** Clinical Observations-**Mobility**

- Stays half step behind companion when walking-unwilling to take the lead **(following)**
- Stops moving when approaching or passing by another moving object or person
- Complains of feeling **off balance to one side**
- **Slows down**, appears **hesitant** when transitioning support surfaces
  - Carpet to vinyl, over a curb, or onto a curb cut
- Expresses a **fear of falling**
- Appears **anxious**, uncertain, uncomfortable moving in crowded or community environments
- **Refuses/resists** going into crowded or community environments, drops out occupations

7

7

biVABA **Key** Clinical Observations-**Navigation/Orientation**

- Observe client move towards a designated location
  - Difficulty/unable to locate a destination
  - Avoids obstacles in familiar environments but collides with obstacles in unfamiliar settings
  - Reads only half of a wide sign or misses signage on one side when moving
  - Complains of disorientation moving through environment
  - Complains of disorientation riding in a car or pushed in a wheelchair
  - Has **dropped out** community activities due to fear of getting lost
  - Depends on family/others to guide them through an environment
  - **Avoids** crowds and crowded environments such as shopping centers

8

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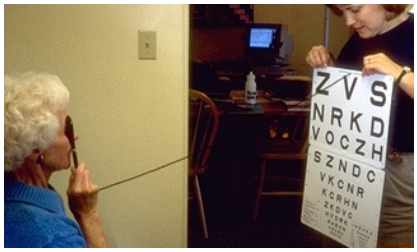
biVABA **Key** Clinical Observations-**Reading**

- Observe client read aloud a paragraph-12 pt font
  - Abbreviates search on one side of page-omitting words
  - Transforms numbers: example-reads an “8” as a “6”
  - Uses finger to guide reading across line of print/maintain place on the line
  - Consistently loses place on the line on one side of the page
  - Hesitates when reading a word; misreads word initially then corrects self; reads slowly
- Refer to biVABA Appendix G on how to determine the reading grade level of a document

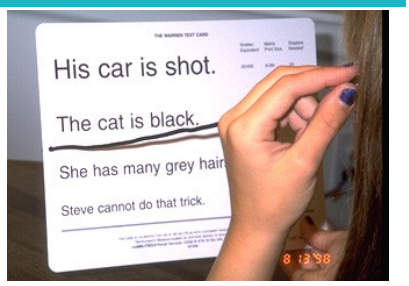
9

9

Performance on Visual Acuity Chart



Example: client with left HH may miss the Z in the top row, the N,R in the next row of an intermediate acuity test



Example: client with left HH may read the top line as “His car is hot” and the second line as “The hat is black.”

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biVABA **Key** Clinical Observations- **Eye/Hand Coordination**

- Observe the client complete a task that requires monitoring of the hand
  - Fill out a check, form, envelope, handwriting sample
    - Positions handwriting towards 1 side completing a form
    - Handwriting drifts up and down on line
- Other tasks
  - Difficulty accurately pouring
  - Difficulty accurately using keypad on phone, microwave, keyboard on computer

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Other Observations….

- Unable to follow what is happening on TV or movie
  - Especially viewing sporting events/shows with a lot of action
- Scans shelves or counters very slowly to find items and often is unable to locate an item
- Changes in mood, temper
  - Very particular that items are returned to a specific location following use; upset when others leave items out or return them to a different location
  - Family reports increased **irritability** or **passivity** completing daily activities
  - Anxious in crowded clinic areas, family reports anxiety in community environments

12

12

Documenting Clinical Observations

The client was observed walking down a hallway without assistance. She walked slowly and focused straight ahead without looking toward either side of the hallway. She had trouble finding the handle located on the right side of the clinic door. She looked at her feet as she walked through the doorway. She reports being bothered by people moving by her and worries she will hit them. She also worries she will get lost. She feels uncomfortable walking in areas other than her home. She relies on her neighbor to take her to appointments and help her shop.

^{6th} grade reading level

13

13

Interpreting Clinical Observations
(biVABA section 4.3.3.1)

- The client demonstrates or reports several behaviors that suggest navigation and orientation issues stemming from hemianopia or other visual field deficit (VFD). Carefully screen the client for a VFD in the peripheral field in one or both eyes. Consult with the rehab team especially PT and Nursing to determine if they have observed similar behaviors in the client.
- The client demonstrates or reports several behaviors that suggest mobility issues stemming from hemianopia or other VFD. Carefully screen the client for a VFD in the peripheral field in one or both eyes. Consult with the rehab team especially PT and Nursing to determine if they have observed similar behaviors in the client.
- The client demonstrates or reports several behaviors that suggest reading issues stemming from hemianopia or other VFD. Use the Damato campimeter to carefully screen the client for the presence of a VFD in the central field in one or both eyes. Recheck the client's high contrast visual acuity and reading acuity. Gather more information about the client's reading limitations using the Telephone Number Copy Test (see section 4.5.2), and the Pepper Visual Skills for Reading test (see section 4.5.5.3) if you have this assessment. You should also consult with the Speech Language Pathologist about your findings to discuss vision vs. language deficits.
- The client demonstrates or reports behaviors that suggest eye/hand coordination issues stemming from hemianopia or other VFD. Deficits in eye/hand coordination are most likely to occur when the VFD is on the same side as the dominant hand (see sections 2.4.3.2 and 5.8.8).

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Catherine Bergego Scale (CBS)

- Neglect assessment
  - Functional measure based on direct observation of client in daily activities
  - Good correlation with conventional paper and pencil tests
- 10 item scale
  - ADLs and mobility items
  - Score 0-30
    - **no** neglect-(score 0), **mild** neglect (score 1-10), **moderate** neglect (score 11-20) 3 **severe** neglect (score 21-30)
- Example of recording form in handouts and biVABA Appendix D

Azouvi et al. 2003; Luukkainen-Markkula et al. 2011; Marques et al. 2019

15

Key Clinical Observations- **Awareness and Insight**

- Person with only HH
  - Misses objects/features located on blind side **but attends and searches** that side when cued
  - Collides with/knocks over objects on 1 side **but learns from mistakes and does not continuously repeat them**
  - Has difficulty reading-but **realizes** that reading is difficult and text is not making sense
  - Anxious/stressed in crowded dynamic environments due to **awareness** that these environments are potentially dangerous
  - Can **describe** difficulties completing occupations and activities and **link them** to vision impairment

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Key Lesson Take Aways

- Clinical observations are a good starting place for evaluating the client because they help link the field loss to occupational performance
- Include family observations
- The Bergego scale and client's personal observations/ insight can help distinguish HH from neglect

17

Lesson 13
Describing the Visual Field Deficit

Two Person Kinetic Confrontation Test

1

1

What we have learned so far

- Eye doctors are the most qualified to diagnose a visual field deficit, but it takes approximately 5 months complete the diagnostic test due to the client's physical and cognitive limitations and need for an outside referral
- Occupational therapists can screen for field loss by observing for specific behaviors and challenges as the client completes mobility, reading and activities that require fine-motor coordination

2

2

This Lesson will Cover

- Strengths/weaknesses of the 2 Person Kinetic Confrontation Test
- Instructions for administering the test
- How to record test performance on the recording form
- Test interpretation

3

3

Two Person Kinetic Confrontation Test

- Comprehensive written test instructions are located in section 4.3 of the biVABA manual
- Value of this test
  - Requires a few easy to obtain test items
  - Uses second examiner to help ensure that the client **does not cheat**
  - **Assesses both peripheral** and **central** visual field using a kinetic test strategy
  - **Quick screening**-only assesses 4 points in the field
    - **Only** provides a **gross indication** of hemianopia
    - But also is a **quick assessment** that can be used early in recovery

4

4

Set Up

- Test items
  - Visual fields recording form
  - Penlight target (no other target is acceptable)
  - **Patch** occluder
  - 2nd Examiner and target
    - Can be a family member, visitor, FW student
    - Interesting target, large enough to be seen at 1 meter distance **without eyeglasses**
- Environment
  - Sufficient non glaring lighting for client to see second examiner's target
  - Room free from visual, auditory, physical distractions

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Test Set Up

- Client seated without eyeglasses, 1 eye patched
- **Front EX** sits directly across-approximately 1 meter from client-holds target at midline at eye level
- **Rear EX** stands behind client with penlight target

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6

Test Instructions

1. Seat client comfortably with eyeglasses off, if worn
2. Test each eye separately
3. Use the patch occluder to cover the untested eye
4. Rear examiner shows the lighted penlight to client and explains how the penlight will start behind client's ear and move forward towards client's nose
5. Rear examiner holds the penlight and stands behind the client
6. Rear examiner instructs client to fixate on front target and say "now" or raise hand to indicate they see the light when it appears
7. As client fixates front examiner's target, rear examiner brings lighted penlight forward moving in an arc-keeping the penlight close to the client's head. (Note: if the target is moved too fast, client will not be able to respond quickly enough to obtain an accurate field measurement)
8. Front examiner observes client's eye during test to ensure client maintains fixation on the target and does not look for the penlight
9. When client indicates seeing the penlight target, rear examiner notes the location and records it on the recording form (slides 11 and 12)

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10. Rear examiner moves penlight forward using the positions of the clock as a guide: 3 o'clock, 9 o'clock, 12 o'clock and 6 o'clock. The 3 o'clock position is located on client's right side and the 9 o'clock position is located on client's left side
11. To help client attend throughout the test, "reset" client's attention for each test location by reminding client to focus on the front target (see section 4.3.1.4)
12. When presenting the penlight from the 6 o'clock location, stand on the client's occluded side and position the unlit penlight at stomach level far enough away from the client's body to ensure the light isn't directed up under the client's chin or up their nostril. Turn on the penlight when the light is in position
13. If the client breaks fixation and looks for the penlight during the test, do not record the response and present penlight in that location again at end of the test
14. To test the right eye: occlude the client's left eye with the eye patch
15. To test the left eye: occlude the client's right eye with the eye patch
16. To test the right and left half of the visual field: move the penlight from the 3 o'clock and 9 o'clock positions
17. To test the superior and inferior half of the visual field: move the penlight from the 12 o'clock and 6'clock positions

8

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Instructions to the Client

- "We are going to use two people to give you this test. [*Name*]will sit in front of you and hold this target for you to look at [*indicate flower design card*]. While you look at the target, I am going to stand behind you and move this penlight from behind your ear towards the front of your face. As soon as you see the light from the penlight, please raise your hand or say "now". It is VERY IMPORTANT that you keep your eye focused on the target that [*Name*] is holding at all times during the test and that you do not try to look for the light. If you move your eye to look for the light the test is not accurate. [*Name*] will be watching your eye to make sure that you do not move your eye to look."

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Two Person Kinetic Confrontation Test

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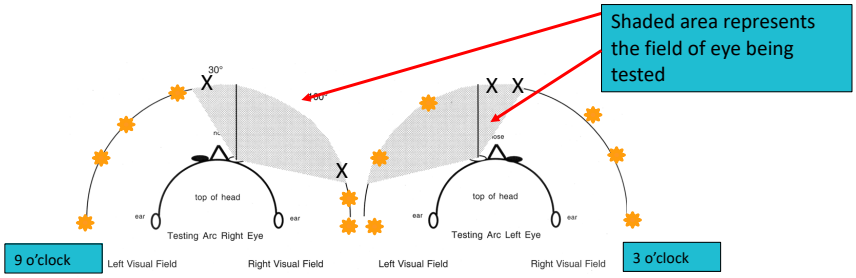
Example: Recording Performance of Client with L HH on biVABA form



Horizontal Plane: 9 and 3 o'clock position

Place an **X** to mark the **approximate** location along the arc where client first notices penlight

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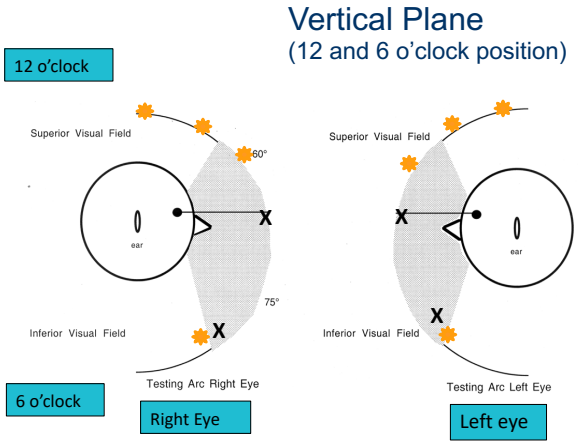
Recording Performance of Client with a Superior Altitudinal Deficit



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Test Interpretation

- **The client DOES NOT SEE** the penlight in **all locations on the LEFT SIDE** (9 o'clock, 6 o'clock, 12 o'clock). This **suggests** the presence of a **left hemianopia**.
- The client **DOES NOT SEE** the penlight in all locations on the **RIGHT SIDE** (3 o'clock, 6 o'clock, 12 o'clock). This **suggests** the presence of a **right hemianopia**.
- The client DOES NOT SEE the penlight with either eye in the **lower area of the visual field** (6 o'clock position). This suggests a **visual field deficit in the inferior field.** When it affects **both the left and right halves of the inferior field**, it is characterized as an **altitudinal defect**. A complete loss of visual field in the lower visual field affects the client's ability to accurately monitor changes in the support surface and obstacles in the affected field, increasing falls risk and difficulty safely navigating environments.
- The client **DOES NOT SEE** the penlight with either eye in the **upper area of the visual field** (12 o'clock position). This suggests a **VFD in the superior field**. When it affects **both the left and right halves of the superior field**, it is characterized as an **altitudinal defect**. A complete visual field deficit in the superior field affects the client's ability to orient to the environment and may cause difficulty navigating environments without getting lost.

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- The client **DOES NOT SEE** the penlight in **the upper area of the visual field** (12 o'clock position) but **does see it in lower area of the visual field** (6 o'clock position) on the **RIGHT SIDE**. This suggests a **right quadrantanopia affecting the superior visual field**. Quadrantanopia causes less field loss, and it is easier for the client to compensate for it. It may cause functional limitations only in specific conditions-as when a sign or object is located in the RIGHT upper field.
- The **client DOES NOT SEE** the penlight in the upper area of the visual field (12 o'clock position) but **DOES SEE IT in the lower area of the visual field** (6 o'clock position) on the **LEFT SIDE**. This suggests a **left quadrantanopia affecting the superior visual field.** Quadrantanopia causes less field loss, and it is easier for the client to compensate for it. It may cause functional limitations only in specific conditions-as when a sign or object is located in the LEFT upper field.
- The client **DOES NOT SEE** the penlight in **the lower area of the visual field** (6 o'clock position) but **DOES SEE IT** in the **upper area of the visual field** (12 o'clock position) on the **RIGHT SIDE**. This suggests a **right quadrantanopia affecting the inferior visual field.** Quadrantanopia causes less field loss, and it is easier for the client to compensate for it. It may cause functional limitations only in specific conditions-as when an object or barrier is located in the RIGHT lower field and may increase risk of collisions and falls.

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- The client **DOES NOT SEE** the penlight in the **lower area of the visual field** (6 o'clock position) but **DOES SEE IT** in the upper area of the visual field (12 o'clock position) on the LEFT SIDE. This suggests a **left quadrantanopia affecting the inferior visual field**. Quadrantanopia causes less field loss, and it is easier for the client to compensate for it. It may cause functional limitations only in specific conditions- as when an object or barrier is located in the LEFT lower field and may increase risk of collisions and falls.
- The client **DOES NOT SEE** the penlight until it is **almost directly in front of the shoulder on the left side.** This suggests that the peripheral visual field is impaired on the left side, but the client may have no deficit in the central visual field (see section 4.2.1.8). Testing with the Damato Campimeter may help confirm that there is no central field deficit. Deficits confined to the peripheral visual field usually do not affect reading and other near vision tasks but can create significant problems in mobility and navigation.
- The client **DOES NOT SEE** the penlight until it is **almost directly in front of the shoulder on the right side.** This suggests that the peripheral visual field is impaired on the right side, but the client may have no deficit in the central visual field (see section 4.2.1.8). Testing with the Damato Campimeter may help confirm that there is no central field deficit. Deficits confined to the peripheral visual field usually do not affect reading and other near vision tasks but can create significant problems in mobility and navigation
- The client **DOES NOT SEE** the penlight until it is **directly in front of the face on BOTH SIDES.** This suggests that the client may have tunnel vision. It is not a common visual field deficit, but it can occur with anoxic brain injuries, tumors, and other neurological and retinal conditions. Depending on the size of the intact central visual field, the client may have minimal problems reading and seeing visual details but significant problems with mobility and navigation.
- The client repeatedly breaks fixation and must be continually redirected back to the test. This indicates that the client has poor attention, and the results of the test may not be accurate. The OT may need to rely on clinical observations to determine if a VFD may be present.

biVABA Section 4.3

15

Documentation Examples

- Simple Summary Statement
  - The client was screened for visual field loss on one side. He detected targets shown on the right side but not on the left side of his visual field. This suggests a loss of the vision on the left side. The client often misses objects on his left side such as grooming items or food on his tray. He often runs into furniture and door frames on his left side when using his wheelchair.
- Description
  - The client was screened for a visual field loss on one side using a 2 person kinetic confrontation test. The untested eye was covered with a patch. The client focused on a central target held in front by a second examiner who ensured that the client stayed fixated on the central target. A penlight target was moved inward from behind the client's head on the right then left side. The client saw the penlight as soon as it entered the right side of his vision. The client did not see the penlight on the left side until it was in front of his nose and entered into the right side of his vision. The test was repeated with the left eye covered. Again, the client did not see the penlight until it entered into the right side of his vision. This suggests a loss of vision on the left side. The client often misses objects on his left side such as grooming items or food on his tray. He often runs into furniture and door frames on his left side when using his wheelchair.

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Key Lesson Take Aways

- Its important to use screening assessments that can control for inattention to obtain reliable results
- The 2 Person Kinetic Confrontation Test provides quick screening of the visual field using easily obtained test items and provides a gross indication of the location of the field deficit
- The test screens the central and peripheral fields
- Adding the front examiner is important to ensuring that the client does not cheat and stays fixated on the central target

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Lesson 14
OT Assessment

Damato Campimeter

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What we have learned so far

- Its important to use visual field screening assessments that can control for inattention to obtain accurate results
- The 2 person kinetic confrontation test can control for attention but provides only a gross indication of field deficit
- When reporting evaluation results, link the field deficit to the limitations in occupational performance

2

2

This Lesson Will Cover

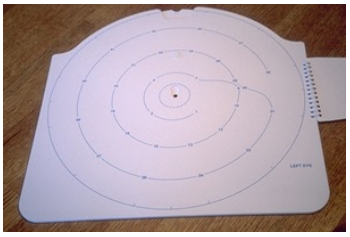
- Strengths/weaknesses of the Damato campimeter as clinical assessment
- Instructions for administering the test
- How to record test performance on the recording form
- Test interpretation

3

3

Damato Campimeter

- Portable central field test
- Precise, accurate and reliable test with better examiner control
  - Compared against gold standard Humphrey 30-2
  - Sensitivity of 81% (ability to correctly ID persons **with** VFD)
  - Specificity of 72% (ability to correctly ID persons **without** VFD)

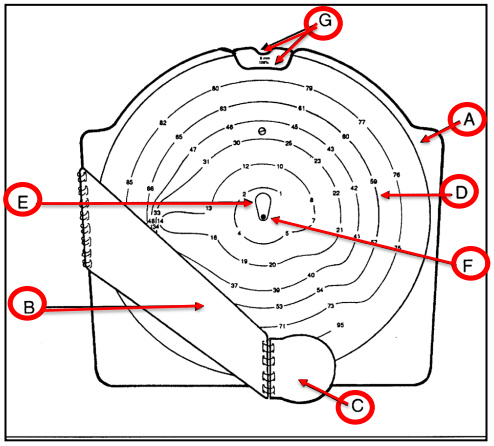


Rowe et al., 2010

4

4

Component Parts of the Campimeter



A: Test card
B: Side arm
C: Eye cover
D: Test Grid
E: Target window
F: Target
G: Target arm and finger notches on the arm and card

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Test Instructions

- Test items
  - Damato Campimeter
  - **Paper copy** of the recording form plastic template
  - Book stand (optional)
  - Eye patch or clip on occluder (if needed)
- Environment
  - Well lighted room; light behind the client and evenly illuminating the board
  - Room free from visual, auditory, physical distractions

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6

Instructions to the Client

- "This test will carefully measure whether you have lost vision in the very center part of your field, the area you use to read and identify objects. I will test this by having you focus on a number on this chart [*show a number*] and then tell me when you see this black dot appear [*show the black dot in the target window*]. I will test each eye separately so you will need to cover one eye during the test. To cover your eye, you will hold this [*show side arm with eye cover*] against your eye. It is very important that you follow these instructions, so we will practice several times before you take the test."

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Test Instructions

- Seat client comfortably at a table wearing eyeglasses **IF** needed to identify the numbers on the chart.
  - Eyeglasses make it more difficult to observe whether the client cheats by moving the eyes toward the target window in anticipation of the dot appearing-so use eyeglasses only if needed
- Instruct client to hold the campimeter upright on the tabletop or use a book stand
- Stand behind the chart and face the client so you can observe the client's eyes to ensure the client fixates on the number and doesn't look over to the window
- **The tip of the client's nose should be pointing at the stimulus window on the chart**
- Instruct the client to occlude the eye using the eye cover **folded inward**

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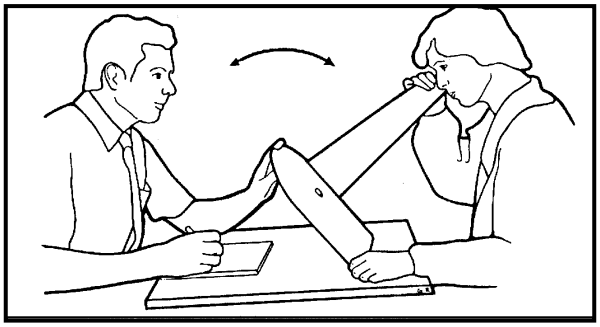
Test Instructions



- Adjust the card so it faces the client squarely,
- Tilt the card backward and forward until client feels comfortable
- Make sure the client understands to use the side arm to maintain this position through-out the test

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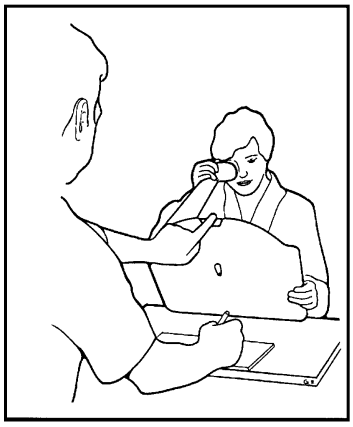
Make sure there are no shadows on board and client's head is centered on the chart with nose aligned with stimulus window



Correct position

Don't allow the client to tilt the head or the card during the test

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Test Instructions

- Provide a **practice session** to ensure client can see the numbers and target dot on the board
- Practice session steps
  - Make sure the window is blank
  - Instruct client to focus on the window and to say "now" when the black dot appears
  - Show the dot in the window; repeat several times until client responds **every time** the dot is shown
  - Point to random numbers on the board and ask the client to identify them
- Repeat the practice session until the client is consistent

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Test Instructions

- Begin the test
- Show the client the number 1 on the grid
- Instruct the client to keep looking at the number 1 and to say "now" when the black dot appears
- Watching the client's eye closely, move the dot into the window to ensure the client remains fixated on the number
- If client doesn't see the dot, place a black mark over that number on the form **or write down the number**

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Test Instructions

- Remove the black dot from the window
- Instruct client read aloud the next number
- Remind the client to keep focusing on the number
- Move the black dot into the target window
- Repeat this process until client has viewed all numbers
- If you are unsure whether the client was attending, immediately retest the number before moving onto the next number

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Damato Campimeter

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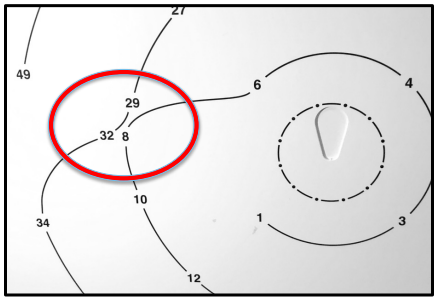
To help the client focus

- **Prime** the client to attend **each time**
  - "Are you still looking at the number? What number is it? Be sure to keep your eye on the number"
- Watch client's eye**, when client is focused on the number,** move your finger in the notch to make the dot appear
- Use testing at blindspot numbers to **check head position**



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The Blind Spot

- The blind spot
  - The numbers 8, 29, 31 indicate areas where the natural blind spot will occur
  - The blind spot is used **to assure that the client's head is properly positioned and aligned with the board**
  - The client should **not see** the black dot at one of these locations if the head is **properly centered on the board**
  - Test number 8 first; if the client sees the black dot at this location, test numbers 29 and 31
  - If the client sees the black dot at all three locations, **check the client's head to make sure it is properly positioned**
  - If the client continues to **see** the black dot at all locations but you are sure that the head is aligned properly-continue with the test

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Modifications for Difficult-to-Test Clients

- Highlight the number with a laser pointer or tap on it with your finger to help maintain the client's attention/fixation
- Reduce the number of test items from 30 to 15 for clients with limited attention and endurance
- Allow the client raise a finger when seeing the black dot instead of providing a verbal response
- Break the test down into short segments and give it over several days

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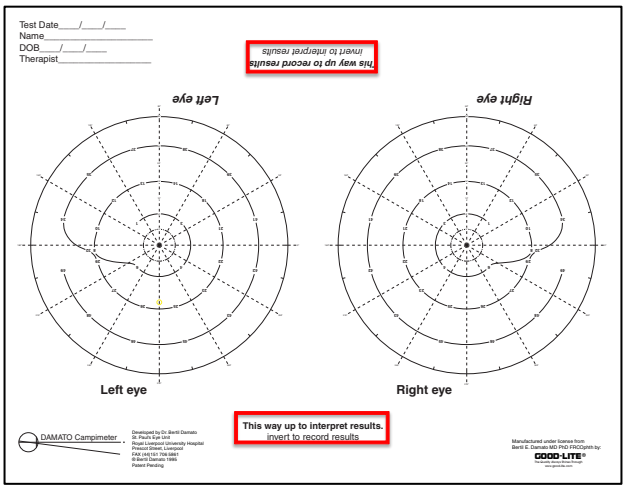
Damato Recording Form



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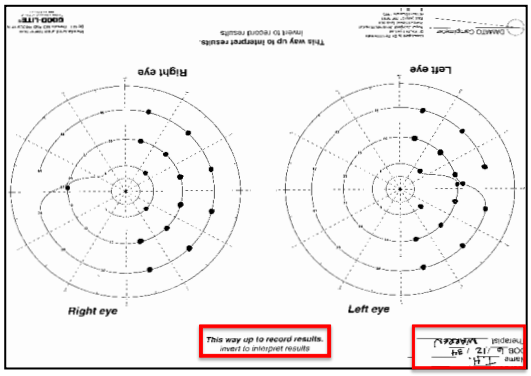
Recording Results on the Test Form

- Position form correctly
  - Client info in lower right corner for recording
- If client doesn't see dot at the test location, place black dot on corresponding # on form
  - OR write down number



REMEMBER: form is held one direction to record and the opposite direction to interpret

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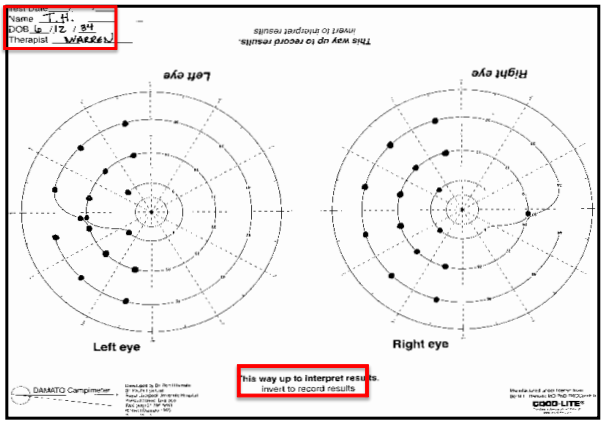
To Display/Interpret Results

- Rotate form so that client info is in upper left corner



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Test Interpretation

The recording form shows that the dots fill the entire RIGHT half of the visual field on both field diagrams. This suggests a RIGHT hemianopia affecting the central area of the visual field. Because the border of the field deficit is right next to fovea (the area used to see small details and color) it is likely the client will have difficulty reading. If the hemianopia is on the same side as the dominant hand, the client may also have trouble monitoring the hand during writing and other fine motor activities.

The recording form shows that the dots fill the entire LEFT half of the visual field on both field diagrams. This suggests a LEFT hemianopia affecting the central area of the visual field. Because the border of the field deficit is right next to fovea (the area used to see small details and color) it is likely the client will have difficulty reading. If the hemianopia is on the same side as the dominant hand, the client may also have trouble monitoring the hand during writing and other fine motor activities.

The field diagram shows the dots confined to a superior quadrant (quadrantanopia). This type of deficit usually causes fewer occupational limitations. If the deficit extends into the foveal area (inner ring of numbers on the field diagram) the client may experience reading difficulty. The client may also have difficulty locating objects/signage in that area of the upper field which may affect navigation and driving.

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The field diagram shows the dots confined to an inferior quadrant (quadrantanopia). The client may be unable to accurately monitor changes in the support surface and obstacles in the affected field, increasing falls risk and difficulty safely navigating environments. The client may also have difficulty reading if the deficit extends into the macular area.

The field diagram shows a half moon pattern of dots along the outer edge of the diagram on one side (target numbers in the 30s and 40s). If the Two Person Kinetic Confrontation Test suggests a peripheral deficit on this side, the client may have macular sparing, which occurs in about 30% of all hemianopias. The client should experience few if any problems with reading and seeing visual details but may have difficulty with mobility and navigations.

The recording form shows black dots filing the superior quadrants on both field diagrams. An altitudinal defect affecting the superior quadrants of both eyes is a frequent corollary of traumatic brain injury. Depending on how close the field deficit comes to the foveal area (inner ring of numbers), the client may have difficulty seeing overhead signage and objects. This could create challenges with orientation and safe navigation. Driving performance should be very carefully evaluated. Depending on how close the field deficit comes to the foveal field (inner ring of numbers) it could also affect reading and page navigation.

The deficit is on the side of the client's dominant hand. The client may experience reduced eye hand coordination and have difficulty writing legibly, pouring, cutting and other tasks that require monitoring of the hand to complete.

22

22

The recording form shows black dots filling the inferior quadrants on both field diagrams. Depending on how close the field deficit comes to the foveal area (inner ring of numbers), the client may have difficulty seeing objects on the floor and could contribute to falls. A complete loss of visual field in the lower visual field affects the client's ability to monitor the support surface during ambulation and may cause significant limitations in mobility and significantly elevate the client's falls risk. Driving performance should be very carefully evaluated. Depending on how close the field deficit comes to the foveal field (inner ring of numbers) it could affect reading and page navigation.

The deficit is observed only in one eye. This indicates that the injury is anterior to (e.g., in front of) the optic chiasm and affecting the optic nerve or retina. Common causes of this type of deficit include optic nerve trauma, retinal damage and central retinal artery occlusion (a stroke of the eye). If the entire central visual field has been affected and the Two Person Kinetic Confrontation Test shows vision loss on both sides in the same eye, the client has monocular vision. Persons with monocular vision often have difficulty with mobility due to reduced peripheral vision and depth perception. If the involved eye is also the dominant eye, the client may experience fatigue and stress when completing reading and other near vision tasks.

The deficit appears in all four quadrants. Some brain injuries can involve the entire central field producing a "Swiss cheese" type field where the client retains "spotty islands" of vision scattered throughout the blind field. This client may have been diagnosed with cortical blindness. The client with this kind of deficit will have significant functional limitations in all daily activities from reading to mobility. Sophisticated testing using an automated perimeter like the Humphrey, or a microperimeter is needed to diagnose this visual field deficit.

23

23

Documentation

A Damato Campimeter was used to screen the client's central visual field for vision loss. The client saw all targets on the right side of the chart but saw no targets on the left side of the chart. The client reports difficulty accurately reading words. He must look at the word more than once to identify it. This causes him to read very slowly. He has difficulty accurately paying bills and reading his glucose monitor.

.

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24

Key Lesson Take Aways

- The Damato campimeter can provide a comprehensive measurement of the **central visual field** in clients who are further along in recovery
- It is important to keep the client focused on the central target to obtain an accurate test
- The test can be modified to accommodate clients with reduced attentional capability and limited verbal communication

25

Lesson 15
Assessment of Visual Performance

Introduction to assessing visual search performance

1

1

What we have learned so far

- Presence of HH can impairs client's ability to
  - Quickly and completely search for visual information on HH side
  - Accurately guide hand/foot to complete activities when HH is on same side as dominant hand/foot
  - Accurately and fluently read when border of HH extends into the fovea

2

2

Lesson 16
OT Assessment

Assessment of Limitations in Visual Search of Central Visual Field

Cancellation Tests

1

1

What we have learned so far

- Central visual field deficit can significantly disrupt the client's ability to read and complete other tasks like handwriting
- The client's level of insight into the extent of their visual field deficit and how it affects their performance is a key part of assessment
- Its important to identify all other conditions that may contribute to difficulty searching the central visual field
- Assessment should help the OT determine how the client's vision is limiting performance and the client's strength and weaknesses in using their current vision

2

2

Lesson 17
OT Assessment

Assessment of Reading Performance

Pepper VSRT

S-K Read

1

1

What we have learned so far

- Reading is fundamental to many important activities of daily living and difficulty reading creates a significant limitation for the client
- Reading ability is impaired when the border of the field deficit extends **into the fovea**
- Both left and right hemianopia disrupt reading, but right HH creates greater challenges in reading
- Each type of HH impairs reading a little differently by how it affects the perceptual span used for reading

2

2

Lesson 18
OT Assessment

Telephone Number Copy Test

1

1

What we have learned so far

- Persons with HH can have difficulty accurately identifying numbers
- Numeracy is important to home management, cooking, financial management, and medication management
- Clients whose hemianopia affects the fovea and is on the same side as their dominant hand can have difficulty monitoring their hand in activities like handwriting

2

2

Lesson 19
OT Assessment

Search Performance
Needed for Safe Navigation and
Compensatory Visual Scanning

1

1

What we have learned so far

- HH can limit the client's ability to accurately monitor the support surface, complete dual tasks and remain oriented during navigation
- The client will display certain key behaviors that suggest difficulty with mobility and orientation
- The client may experience significant anxiety in crowded and dynamic environments and a loss of self-confidence and increased passivity in participating in activities
- Anxiety may cause the client to withdraw from community activities and become socially isolated

2

2

Lesson 20
OT Assessment

Dual Search

The ScanCourse Test

1

1

What we have learned so far

- Dual-tasks are the most challenging mobility tasks
  - Require simultaneous monitoring of the support surface and the environment
    - Shopping, walking the dog, attending church…
- Client must prioritize their attentional resources to **staying upright and walking** during **dual-tasks**
- Key Observations
  - **Tendency to** fixate gaze straight ahead; reluctant to search surrounding environment
  - Collides with or comes very close to obstacles
  - Trails surfaces-uses hand to guide self around obstacles-to get tactual feedback
  - Stops to search-unable to search while walking
- The client's search performance can be affected by hemianopia AND hemi-inattention/neglect

2

2

Lesson 21
Assessing ADL Performance

SRAFVP

Home/Environment Assessment

Lighting Assessment

1

1

What we have learned so far

- HH is a **primary sensory** loss and **does not** directly change how brain completes visual processing
- HH **does not** alter structures that direct visual attention, sort out information, identify and classify information or combine it with other sensory input
- HH **limits** incoming visual information, so brain has less information to use in processing
- HH tends to be a **permanent** impairment and compensation is the client's only option
- Client must learn to **use remaining vision more effectively to compensate** for missing vision
- Environment must **support participation**

2

2

Lesson 22
The OT Approach to Intervention

1

1

What we have learned so far

- HH may clear up slightly, but usually **permanent** impairment remains
- Person must learn to **use remaining vision more effectively to compensate** for missing vision
- Environment must **support participation**

2

2

Lesson 22
The OT Approach to Intervention

1

1

What we have learned so far

- HH may clear up slightly, but usually **permanent** impairment remains
- Person must learn to **use remaining vision more effectively to compensate** for missing vision
- Environment must **support participation**

2

2

Lesson 23
Environmental and Task Modification
Part 1

Interventions to Achieve Optimal
Person **Environment** Fit

1

What we have learned so far

- Persons with HH are strongly influenced by the visual properties of their tasks and the environment
- HH can reduce the accuracy and completeness of visual input into the brain causing the person to miss critical environment/task features needed to complete ADLS in the home and community

2

Lesson 24
Environmental Modification
Part 2

Interventions to Achieve Optimal
Person **Task** Fit

1

This Lesson will Cover

- Modifications to the **tasks** that will decrease visual stressors and provide an optimal person task fit

2

Lesson 25
OT Intervention

The Client Who Wants to Resume Reading

Part 1

1

1

What we have learned so far

- Both left and right hemianopia disrupt reading; right HH creates greater reading challenges
- Reading is an important component of many ADLs and difficulty reading can significantly limit the client's ability to participate in daily occupations
- Many clients stop reading because the effort required for word recognition is so great, they have difficulty sustaining the activity or deriving any pleasure from it

2

2

Lesson 25
OT Intervention

The Client who wants to Resume Reading

Part 2

1

1

OT Intervention Protocol

- Practice strategies to help the client establish a new saccade strategy
  - Evidence based interventions
  - Pre-reading exercises
- Practice using the strategy to read continuous text
  - Daily reading of familiar books and subjects
- Read desired print materials
  - Modify print materials to enable the client to accurately read needed/desired materials

2

2

Lesson 26
OT Intervention

Reading Intervention for ALL Clients

Handwriting Interventions

1

1

What we have learned so far

- The client who wants to improve their reading performance and resume reading will need to put in significant practice over several months to increase their reading speed and accuracy
- Few clients are able to undertake this challenge
- ALL clients must be able to obtain the information supplied by print materials to be independent in their daily activities
- Handwriting legibility often declines in the client whose HH is on the same side as the dominant hand

2

2

Lesson 27
OT Intervention

Compensatory Visual Scanning Training (C-VST)

1

1

What we have learned so far

- Hemianopia prevents client from accurately assessing dynamic environments in a timely manner
- Puts the client at risk for experiencing collisions, disorientation and dangerous maneuvers in dynamic and community environments
- This may cause the client to feel vulnerable and anxious and to respond by avoiding activities that take place in dynamic environments or rely on others to lead him/her through an environment

Hazelton et al. 2019; Chokron et al. 2016

2

2

Lesson 28
OT Intervention

Community-Based Intervention

Critical Habits

1

1

What we have learned so far

- Persons with HH often avoid participating in community activities due to anxiety and fear of injury or embarrassment
- C-VST can help the client develop performance skills needed for safe navigation
- Light boards are an effective tool to use to increase the speed and efficiency required to compensate for HH in dynamic environments

2

2

Lesson 29
OT Intervention

Return to Driving

1

1

What we have learned so far

- Hemianopia is a low vision condition; improvement of visual field is unlikely
- Persons with HH may also experience slowed processing speed on the unaffected side
- The client must practice in community environments to build confidence in navigating alone
- Compensatory visual scanning training is an evidence-based intervention that teaches the client to use remaining vision more efficiently to locate objects on the blind side by using a wide head turn
- Light boards are an effective way to increase the speed of compensatory visual scanning by increasing the client's attention and search efficiency

2

2

Lesson 30
Evaluation and Intervention

Summary of

Ida's Case

1

1

What we have learned so far

- The client's ability to use vision is influenced by the size and extent of the HH, perceptual completion, co-impairments (cognitive, motor, etc.) and the environment
- Optimal person-environment-task fit maximizes independence and participation
- Clients with HH primarily have difficulty with vision dependent I-ADLs and dynamic community environments
- Client's with HH and their families must learn to live with this permanent condition
- Many clients "adjust" to vision loss by avoiding and dropping out occupations
- Some clients can safely return to driving

2

2

This Lesson will Cover

A review of the components of assessment and intervention recommended in this course using Ida as a case example

3

3

Ida's History

- Medical
  - 74 years old, no significant health issues until stroke
  - Sustained a PCA stroke in the left occipital lobe 4 weeks prior to admission to our outpatient LV program
- Social
  - Extremely independent, private, self-sufficient woman used to helping others but not receiving help
  - Lives in rural neighborhood of widely spaced homes on large lots outside town with population of 3,500 people
  - Widowed, no living children, no family in area
  - Close 50-year friendship with neighbor; neighbor cares for 4 year-old great granddaughter during the week

4

4

Ida's Limitations in Performance Skills

- Reading
  - Reads very slowly and makes mistakes
    - Re-reads documents several times using finger strategy to maintain place
- Writing
  - Loses her place when writing
    - Uses finger strategy to maintain place
- Mobility
  - Walks slowly and tentatively especially in new environments
    - Expresses a fear of falling
  - Feels disoriented in community environments and relies on neighbor to guide her through

5

5

Ida's Limitations using her Vision

- **Slow visual search** towards the right side (central and peripheral)
  - **Sources:** clinical observation, Dynavision, reading and writing assessments, visual search subtests, ScanCourse
- Mobility
  - Difficulty **monitoring the support surface** and **completing dual activities**
    - **Sources**: clinical observation, ScanCourse
  - Slow to locate objects on right side
    - **Sources:** clinical observation, Dynavision, ScanCourse
- Reading
  - Reduced reading accuracy for words
    - **Source:** 80% reading accuracy on Pepper test
  - Very slow reading speed
    - **Source:** client report, Pepper test, Telephone number copy
    - 12.3 wpm corrected reading rate/19 wpm on Pepper test
- Writing
  - Slow performance due to use of compensatory finger strategy

6

6

Ida's Strengths using her Vision

- Aware of her field loss on the right side
  - Verbalized that she couldn't trust her R side vision and that it could "trip her up"
  - Stated that she had to "slow down" when using her hands and moving to avoid "getting into trouble"
- Aware of reduced accuracy and slowness reading
  - But able to accurately read words and numbers
- Aware of her visual vulnerabilities-understood
  - She was at increased risk for falling and must be careful
  - She should not drive under any circumstances

7

7

How does Ida's home environment help or hinder her ability to use vision?

Help	Hinder

• Familiar environment
• Large number of windows
• Everything but bedroom and bathroom on first floor
• Good lighting in bedroom and bath, step-in shower with handrail
• Attached garage with handrail and 3 steps down to floor
• Single step with handrail onto sidewalk in front of house
  – Sidewalk in good repair
  – Bright porch light
	• Lots of clutter
	• Lack of organization
	• Lots of pattern
	• Poor task lighting
	• Areas with poor lighting
	  – Dark paneling in dining area
	  – Poor overhead lighting in kitchen, hallways, garage, no overhead lighting in living room
	• Wall-to-wall single color carpeting on stairs
	• Low contrast stair railing
	• Clutter in walkways between areas inside house and on stairs

8

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9

9

ADL Limitations

- Independent in basic ADLS
- Neighbor very concerned about Ida's
  - Safety on the stairs and outdoors
  - Accuracy managing her medications
  - Safe use of the stove, leaving food out, knocking over items
- Ida was concerned about
  - Requiring assistance to accurately pay bills, read mail, post mail and get groceries
  - Managing her medications (she had some new ones)
  - Difficulty getting around
  - Inability to drive

10

10

Other Considerations

- At risk for
  - Falls?
  - Social isolation?
  - Depression?
- Who should be on the rehab team?
  - CDRS
  - Eye doctor?

11

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Goals List

- The client will identify home and task modifications that support her ability to compensate for the hemianopia to safely complete ADLs
- The client will compensate for the hemianopia to accurately complete daily medication management
- The client will compensate for the hemianopia to accurately complete financial management
- The client will compensate for the hemianopia to accurately read printed information
- The client will compensate for the hemianopia to maintain orientation and safely navigate familiar community environments independently
- Determine whether the client compensates for the hemianopia well enough to qualify for an onroad driving assessment

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Client Family Education

- During first session with Ida and neighbor
  - Ann asked Ida to describe
    - What she sees and doesn't see
    - What the doctor told her about her vision loss and recovery
  - Ann asked her neighbor to
    - Describe what she has observed about Ida's vision
    - Wear HH simulator and move around and pick up items
  - Ann provided basic education on HH
    - Provided handout

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13

The client will identify home and task modifications that support her ability to compensate for the hemianopia to safely complete ADLs

- Completed home visit to identify areas that could increase falls risk/reduce independence
- Educated Ida/neighbor on how to modify environment to increase visibility and add structure. Ann showed examples of modifications; session ended with teach-back and homework assignment
  - Homework: identify challenging areas and possible solutions; identify items to purchase and where to find items
- Ida purchased
  - Task lamps for dining room table, desk and kitchen desk, torchiere lamp for living room; neighbor's son installed larger fluorescent light fixture in kitchen, striped edges of stairs with orange duct tape (inside, in garage, outside) striped handrails with bright plastic tape; added brighter bulb in garage
  - Ida and neighbor area cleared out and organized "command central' using baskets as workstations and added a clip-on task lamp
  - Ida and neighbor cleared/relocated items from walkways; organized kitchen and bathroom cupboards, closets and other areas

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The client will compensate for the hemianopia to accurately complete daily medication management	• Ida/neighbor made tray workstation for medication management and brought it in; Ann checked Ida's ability to complete medication management accurately
The client will compensate for the hemianopia to accurately complete financial management	• Ida completed handwriting tracing exercises to learn to monitor pen tip to improve handwriting accuracy. Ann demonstrated modifications to increase visibility of writing surface for completing financial management • Ida/neighbor cleared off her desk, purchased a small portable file holder for bills, added in and out baskets to organize mail, organized her drawers, replaced the long fluorescent tube desk lamp with an LED task lamp

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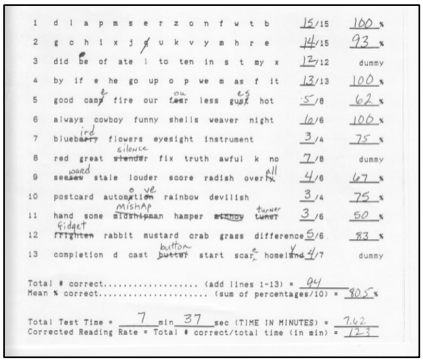
15

The client will compensate for the hemianopia to accurately read printed information

Ida completed pre-reading exercises from Warren and LUV reading series, word searches, and crossword puzzles 20 minutes a day

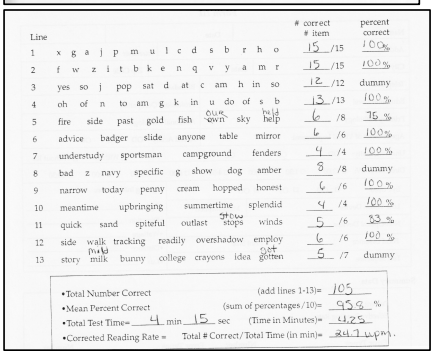
Initial Pepper:
80% accuracy 12.3 wpm
Discharge Pepper
95.8% accuracy 24.5 wpm



1	d l a p m s e r z o n f w t b	15/15	100 %
2	g c h l x j f u k v y m h r e	14/15	93 %
3	did be of ate i to ten in s t my x	12/12	dummy
4	by if e he go up o p we m as f it	13/13	100 %
5	good cany fire our tear less gust hot	5/8	62 %
6	always cowboy funny shells weaver night	6/6	100 %
7	blueberry flowers eyesight instrument	3/4	75 %
8	red great strenuer fix truth awful k no	7/8	dummy
9	seales stale louder score radish over	4/6	67 %
10	postcard automotive rainbow devilish	3/4	75 %
11	hand sone mishapaan hamper mummy tunet	3/6	50 %
12	frighten rabbit mustard crab grass difference	5/6	83 %
13	completion d cast butter start scar homeless	4/7	dummy

Total # correct..... (add lines 1-13) = 94
Mean % correct..... (sum of percentages/10) = 80.5 %

Total Test Time = 7 min 37 sec (TIME IN MINUTES) = 7.62
Corrected Reading Rate = Total # correct/total time (in min) = 12.3



Line		# correct # item	percent correct
1	x g a j p m u l c d s b r h o	15/15	100%
2	f w z i t b k e n q v y a m r	15/15	100%
3	yes so j pop sat d at c am h in so	12/12	dummy
4	oh of n to am g k in u do of s b	13/13	100%
5	fire side past gold fish own sky help	6/8	75%
6	advice badger slide anyone table mirror	6/6	100%
7	understudy sportsman campground fenders	4/4	100%
8	bad z navy specific g show dog amber	8/8	dummy
9	narrow today penny cream hopped honest	6/6	100%
10	meantime upbringing summertime splendid	4/4	100%
11	quick sand spiteful outlast stops winds	5/6	83%
12	side walk tracking readily overshadow employ	6/6	100%
13	story milk bunny college crayons idea gotten	5/7	dummy

•Total Number Correct (add lines 1-13)= 105
•Mean Percent Correct (sum of percentages/10)= 95.9 %
•Total Test Time= 4 min 15 sec (Time in Minutes)= 4.25
•Corrected Reading Rate = Total # Correct/Total Time (in min)= 24.7 wpm

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The client will compensate for the hemianopia to maintain orientation and safely navigate familiar community environments independently

Ida completed

- Dynavision exercises 20 minutes of every tx session graded to challenge her as she improved
- Dual-task walking exercises including
  - Extended scan courses
  - Find red
  - Narrated walking
  - Treasure hunts
- She accompanied her neighbor on shopping trips and to church and other functions

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Determine whether the client compensates for the hemianopia well enough to qualify for an on-road driving assessment

On last day-Ida was able to touch 60 lights in 60 seconds on the Dynavision

Ann contacted Ida's physician about resuming driving. The physician wanted Ida to wait 6 months until spring (April)

In April, Ida's physician referred her to a driving program for an on-road assessment. She passed with restrictions to drive in familiar areas, daytime only and to restrict driving to her small town (no KC metro area traffic)

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Key Lesson Take Aways

- Always aim for participation not independence, it helps you be creative, and client-centered
- Use client's visual strengths to compensate for visual weakness
- Intervention should always include a goal to maximize person/task/environment fit
- Educate the client and family; education increases client's insight into how HH affects occupational performance. This helps client use "intellectual over-ride" to compensate
- Build the client's self-efficacy so they can problem solve difficulties instead of avoiding and dropping out occupations

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19

This Lesson will Cover

- Issues, factors, and barriers to resuming driving
- Search characteristics of well-compensated drivers
- Critical visual skills training
- On the road training
- Family involvement in return to driving
- Driving retirement

3

3

Likelihood of Returning to Driving

- Biggest barrier "Is it safe?"
  - McGwin et al. compared MVC (motor vehicle collision)rate per mile driven of HH drivers with matched group of normally sighted controls over 9 yr. driving period
    - HH drivers had higher over all MVC and at fault MVC
      - 2.44x higher over all; 2.64x higher for at fault crashes
    - MVC rate is comparable to persons with cataract
      - And affects a much smaller population of drivers
      - **Key Question**: Does the elevated crash risk outweigh the mobility/psychological burden (depression) caused by losing driving privileges?
- The conclusion of most driving research is that
  - Some persons can resume driving and others cannot
  - Return to driving should be determined **case-by-case**

Elgin et al. 2010; McGwin et al. 2016; Wood 2015; Bowers, 2016

4

Licensure Regulations

- Regulations vary between states and countries
  - You need to check your state, country
  - **VERY IMPORTANT** your client knows the requirements
- Some persons are **automatically denied** licensure because they **don't meet the field requirement** for the minimum peripheral or central visual field
  - Other states have no requirement (New Hampshire in US)
- Some countries offer a **restricted license** to a person with a stable HH who has been deemed to be safe to resume driving
  - Examples: UK, Canada, Belgium, Netherlands

Pelli 2002; Howard et al. 2023; Bowers 2016; Kasneci, 2014; Harper et al. 2022

5

Challenges caused by HH

- Vision is the main source of sensory input during driving
- HH **slows visual processing speed** putting pressure on **attentional resources** during driving
- Leaves **less attention** for **operational** and **tactical** aspects of driving
  - Operational
    - **Maintaining** the lane
    - **Maintaining a consistent speed** and **distance** from other vehicles
  - Tactical
    - **Anticipating changes** in driving environment

Wood 2015; de Haan et al. 2014; Bowers 2016

6

Factors Influencing Return to Driving

- Deficits person has in addition to HH
  - Deficits in movement, cognition, language
    - Dangerous combinations include HH and inattention, HH and hemiplegia and R-HH and aphasia
  - Person who **can't** successfully navigate/engage environment will likely drive **very little** even when cleared for driving
- Person's driving history
  - Number of accidents and citations
  - Years of driving experience
  - **Length of time** since stopped driving
- Driving environment
  - Rural vs. city
  - Hilly vs. flat terrain

de Haan et al. 2014; Parker et al. 2011

7

Factors Influencing Return to Driving

- Extent of the HH
  - Often can successfully compensate for quadrantanopia
  - HH with macular sparing has better outcome than complete HH
  - Relative field losses have better outcome than absolute losses
  - **BUT** HH size/type **does not predict** whether person can resume driving
- Current vs. non-current driver
  - Most studies show **current drivers do better** than those who have stopped driving
- Driving needs
  - **Short distances in familiar environments**
  - Rush hour traffic
  - Long distances
  - Long distance in unfamiliar areas
  - Rental cars in unfamiliar areas

Vaphiades et al. 2014; Bowers 2016

8

Areas of Difficulty Behind the Wheel

- **Number 1**: Maintaining lane position
  - Tendency to hug the lane on the seeing side
    - May be a deliberate compensatory strategy
  - Drifting within the lane
- **Number 2**: Accurately judging the gap
  - Staying appropriate distance from other cars
    - Following cars and cars parked along the street
- **Self-reported** problems (Parker study)
  - Situations that rely heavily on peripheral vision
    - Lane changes towards blind side
    - Merges towards blind side
    - Multi-lane traffic in commercial areas
    - Parking lots
  - Situations that cause poor visibility
    - Night driving, rain, fog

Bowers et al. 2005; Bowers 2016; Wood et al. 2009; 2011; Parker et al. 2011; de Haan et al. 2014; Elgin et al. 2010; Kasneci et al. 2014

9

Critical Search Behaviors

- Research shows these behaviors are associated with **safe driving**
  - **Frequently** searching the blind field
  - **Wider scanning towards HH side***
  - Scanning **all areas** of the HH side
  - Searching **both sides** of the visual field
  - **Faster** initiation and **completion** of search (e.g. visual processing speed)

* Most important performance skill

Bowers, 2016; Wood, 2019

10

Visual Skills Training is Critical

- This training must be completed first to address client's
  - Low visual processing speed
  - Restricted visual search into blind field
- Lightboards are the key intervention tool
  - Incrementally challenge the client to improve performance
  - Provide objective data on client's progress and readiness
    - Klavora found Dynavision 4 min mode A test predicted pass/fail BTW
- Dual task training in dynamic and community environments is also important
  - Chau et al. found ScanCourse performance predictive of pass/fail on driving assessment for persons with ABI
    - 76.7% sensitivity (18/20 cut off score for passing)
  - Howard et al. found Mobility Assessment Course (MAC) scores could predict HH persons who were well adapted for their HH and should pass a driving evaluation

Klavora et al. 2000; Howard et al. 2023; Nelemans et al. 2022; Chau et al. 2021

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BTW Assessment

- An on-the-road assessment is the only way to fairly assess the client
  - The context allows the client to tap into past experience driving and driving expertise
- Should assess all areas the client plans to drive
  - Assessment of the client's performance BTW should be tailored to the driver's needs
    - Rural drivers face different challenges than urban drivers

Kasneci et al. 2014; Elgin et al. 2010; Vaphiades et al. 2014

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On the Road Training

- If person has potential to resume driving, **on road training** should emphasize **minimizing risk**
  - Select routes with minimum merges and lane changes
  - Position car so that evasive maneuvers, if needed, are made towards seeing side
  - Avoid multi-lane traffic
  - Drive during the least busy time of day
  - Restrict night and dusk/dawn driving
  - Restrict driving to just what is needed
  - Use wide rearview mirrors and select a vehicle with good rear visibility

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Family Client Education

- Return to driving is a family decision
  - Include family members on every discussion
- Families want to support the client but are nervous about safety implications
  - Don't want to say "no," but also don't want to say "yes"
- Its important to have a frank discussion about
  - Client's need to drive, where and when they will be driving
  - The steps involved in return to driving
    - Assessment, physician sign-off, training
    - And the cost

14

14

Driving Retirement

- Not all clients can return to driving
  - Too much disability or government statutes prevent it
- When handled poorly, may cause depression and decreased social participation
  - When handled carefully, person can adjust and move on
- **DON'T DUCK THE ISSUE**
  - **OT owns** this important I-ADL
    - Not someone's else's problem
  - If you think you have handled it by providing the client a list of alternative transportation-you haven't
- Be direct
  - Vague statements let client/family dodge the issue and it **must be addressed**

Mathisen & Eilertsen 2016

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My Advice

- Include the family
- Frame the discussion as **transportation**
  - What activities require transportation?
    - Make a **detailed list** that includes, time, distance, etc.
  - Identify available transportation sources for each activity
    - Encourage **brainstorming**
      - Is it possible to change location, time so someone is available?
      - Think outside the box-grandchildren? friends? neighbors?
  - List all sources that might be viable
    - Consider the plus side when listing these
  - Choose **one to consider** and **one to try**

Mathisen & Eilertsen 2016; Johnson et al. 1995; Dreer & Broadfoot 2010

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Key Lesson Take Aways

- In some cases the client may be prevented from driving by state, country regulations
- HH does cause limitations in driving but it does not predict ability to resume driving, return to driving must be made on a case-by-case basis
- Family must be involved in all driving decisions
- Visual performance skills must be established first
- Lightboards are a key intervention
- An on-the-road driving assessment and training must be completed
- OT must address driving retirement with the client and family when the client cannot resume driving and help the client transition into being a non driver

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This Lesson will Cover

- Dual task compensatory visual scanning interventions to increase awareness of the environment during ambulation
- The **most important** habit to establish to ensure safe navigation in dynamic community settings
- Using community settings to improve navigation skills
- Field expansion prisms for navigation
- Promising interventions

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Community Environments

- Intervention should include working with the client in community environments
- Person feels **least comfortable** in dynamic and/or unfamiliar environments
  - Can trigger anxiety and panic attack
  - Client responds by avoiding community environments
  - Will not navigate a community environment alone
- Important to **develop/apply skills within context**
  - Persons with HH use working visual memory to guide search in naturalistic environments
- Must carefully prepare the client to handle the challenges of dynamic environments
  - Grading tasks is important to ensure success and build self-efficacy

Martin et al. 2007; de Haan et al. 2015; Hazelton et al. 2019

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Preparatory Clinical Interventions

- Use dual task C-VST to teach client to **consciously observe** their surroundings during ambulation
  - Reduces tendency to shoe gaze or fixate straight ahead when walking
  - Reinforces use of a wide search strategy for safe navigation
- Begin in the building and grounds and progress to community environments
  - Gradually add in more complex and dynamic environments to build attentional skills

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Dual Task Interventions

- Extended scan courses
  - Use various types of targets and extend the course along longer hallways
- Find red
  - Client points out anything with red in it while walking to gift shop or other destination
- Narrated walk
  - Describe landmarks and surroundings while walking to a destination, then recall landmarks on return trip to clinic
- Treasure hunts
  - Navigate independently to find an item (" treasure") in the environment
    - Example: find a vending machine located on another floor
    - Example: locate a specific office, room in the hospital complex
    - Example: find a large wall hanging or picture on another floor

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Pre-Requisite to Community Activities

- **THE CRITICAL HABIT** that must be established for safe navigation of environments
- When entering a dynamic and or unfamiliar environment, **stop** at the entrance and **consciously and thoroughly scan** the surroundings to locate potential hazards
  - Enables client to build a map of the space before entering which
    - Reduces likelihood of collisions and dangerous maneuvers
    - Reduces anxiety
    - Builds self-confidence

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Examples of potential hazards in a grocery store environment

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Examples of using a grocery store to train navigation skills

Grocery Store Activity One: client walks past aisles on HH side (right side for this client) and states how many persons are in the aisle

Grocery Store Activity Two: client looks down aisle and indicates where an item such as mustard is located based on concentration of color

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Locating Specific Items on Shelves

Challenge: Client becomes overwhelmed when searching for item-loses place easily and takes too long to read labels

Solutions:

- Teach client to set search parameters For example, by using color differences to define borders of search
- Encourage client to run finger along each item to ensure the item is seen
- Save time in searching by only looking for first letters of item's name instead of trying to read the entire label

Begin search at border between yellow and white labels

Kascneci et al. 2014; Mena-Garcia et al. 2021

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Start Slow and Build Skill

- Self-efficacy is key to enabling the client to independently navigate environments
  - Carefully grade your challenges to ensure the client successfully completes the task
- Assign "homework" to complete at least one task independently between sessions
  - Increase task demands each week
- Example
  - **Week 1** family member walks with client into church sanctuary, client locates pew and sits down
  - **Week 2** family member walks client to church door, client goes in, locates pew and sits down
  - **Week 3** family member drops client off in front of church-client goes in, locates pew and sits down

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Other Important Habits/Routines

- Supportive habits
  - Identify key landmarks when entering a new environment
  - Turn on room lights when navigating
  - Place LED task lamps where tabletop top activities will be completed and **turn them on**
  - Keep keys in a bowl next to the door
  - Put the lid back on items (so if you knock it over it won't spill)
- Supportive routines
  - Shop at times of day when there are less crowds
  - Choose well-lighted walkways with minimal obstacles
  - Arrive early to events to settle in before others begin to arrive
  - Remain seated and leave event after the crowd has thinned out

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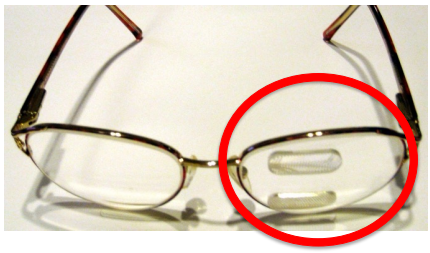
Field Expansion Prism

- Optometric intervention
  - Rationale: prism expands space on the HH side by shifting images towards the center
- Place partial Fresnel prisms on 1 lens on HH side
- Train client to look into the prism to shift images toward central field
- Provides up to 40% expanded field on HH side



Houston et al. 2016

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Field Expansion Prisms

- Participants trained to use prism in Rowe 2017 study report specific difficulties
  - Adapting to lenses
    - 67% experienced **headache**, difficulty navigating, visual confusion, double vision
    - More difficult if the eye without the prism is the one with strong ocular dominance
  - Device abandonment
    - 50% wearing prisms at 12 weeks compared to 20% wearing them at 26 weeks
- Must be carefully prescribed
  - Optometrists are conducting research to refine their prescribing protocol and develop training tools

Giorgi et al. 2009; Bowers et al. 2014; **Rowe et al. 2017**; Apfelbaum et al. 2013; Shen et al. 2015; Jung & Peli 2018; Houston et al. 2016

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Promising Interventions

- Virtual reality
  - Not much literature on use with hemianopia
  - One intervention study using a VR supermarket found increased visual scanning speed (Dehn et al.)

Dehn et al. 2020

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Key Lesson Take Aways

- The client will avoid dynamic environments that cause discomfort and begin to rely on others to lead them through these environments
- Dual-task interventions in the clinic and community help the client search more consistently and efficiently towards the blind side
- Client must be taught how to engage the community environment to build the self-efficacy needed to travel independently
- Supportive habits and routines are important to reduce demands on the client's vision and attention

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This Lesson will Cover

- Compensatory visual scanning training (C-VST) to increase the speed and efficiency of the client's search strategies

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Key Intervention Questions

- What does the client want and need to do?
- How can I **modify the task/environment** to help the client use their **current** vision more effectively to complete occupations that require mobility and navigation
- Can I improve the client's ability to **compensate** for the HH and safely navigate and engage environments by **improving their awareness of the blind visual field and the speed and accuracy of their visual search?**

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Compensatory Visual Scanning Training (C-VST)

- Training focuses on
  - Establishing a faster more efficient search of the blind side
- Specifically, we want to increase
  - Width, efficiency, accuracy of the client's **head turn**/search
  - The client's visual anticipation/attention towards blind side
    - Grounded in development of insight/intent
- Goal is for the client to automatically employ search strategies without explicitly thinking about them
  - Requires **over practicing** visual skills using various training activities
    - Computers, light boards, manual boards
    - Dual task training strategies in various environments

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Desired Search Components

- Training focuses on developing these visual search components
  - Initiation of a wide head turn towards the blind field
  - Increased head and eye movement towards the blind field
  - Initiation of fast head and eye movement towards the blind field
  - Execution of an organized and efficient search pattern that begins on the blind side
  - Attention to/detection of visual detail on the blind side
  - Ability to quickly shift attention and search between the central and peripheral visual fields on the blind side
  - Ability to quickly shift attention and search between both fields

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Compensatory Visual Scanning Training (C-VST)

- Has the most evidence of effectiveness
  - Pollock et al. 2019 (Cochrane review of interventions for VFD in persons with stroke)
  - Aimola et al. 2014 (RTC)
  - de Haan et al. 2016 (RTC)
  - Rowe et al. 2017 (RTC)
- RTCs suggest the training effect is specific to the task
  - Tasks that emphasize detection of peripheral objects **won't improve** search of central field and vice versa
  - Training devices must be task specific as well

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Key Component of C-VST

- Incorporate **selective attention** into training activities
  - Use tasks that require identification and categorization of objects and targets
    - On **both sides** of the visual field
  - Focus on response speed and target accuracy
- Best activities
  - Light boards
  - **Timed** search and find activities

Chokron et al. 2018

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Light Boards

- Training tasks to build performance skills
  - Game format
    - Increases motivation
    - Can grade the challenge to keep the client progressing
  - Requires client to engage the entire board
    - Builds search/processing skills on **both sides** of field
  - Provides dynamic **dual task** activities
    - Facilitates automaticity in searching blind field
    - Challenges visual processing speed and accuracy

Blackwell et al. 2020; Brooks et al. 2017; Stephenson et al. 2019; Olgiati et al. 2016

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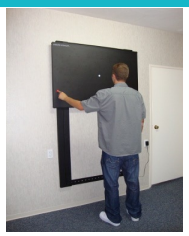
Light Boards Help Improve…

- Use of compensatory head turning
  - Width and speed
  - Automatic initiation of head turn
- Attention
  - Anticipation of targets
  - Identification of targets
- Efficiency of visual search
  - Thru timed search tasks
- Search between both sides of the visual field

Dynavision- D2
Blackwell et al. 2020



Vision Coach
Brooks et al. 2019

Bioness Integrated Therapy System
Stephenson et al. 2019

NVT vision rehabilitation system
Hayes et al. 2012

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Comparison Performance on D2

Ida's First Attempts

Ida at Discharge

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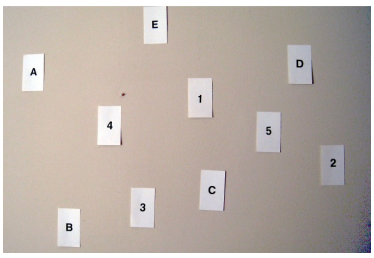
When you don't have a Lightboard

Example A

Example B

Example C



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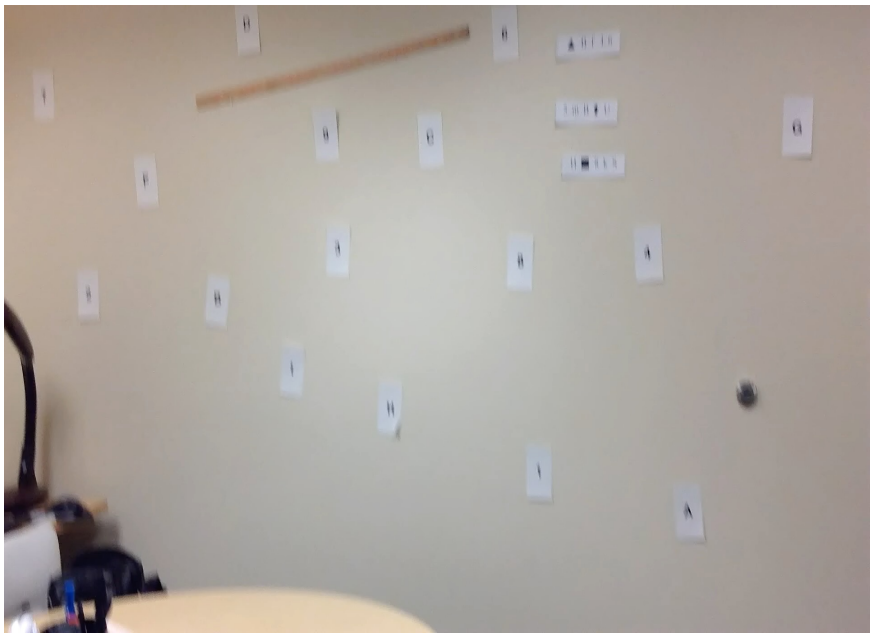

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Clients with Less Capability

- Lower functioning clients require activities that are
  - Slower paced
  - Place less demand on search and attention
- Activities should emphasize
  - Initiating and completing a **consistently wide search strategy** to locate items on the blind side
  - Searching **both sides** of the visual field
- Select table-top activities wide enough that client must use a head turn to search the HH side
  - Scanning boards
  - Games
  - Puzzles

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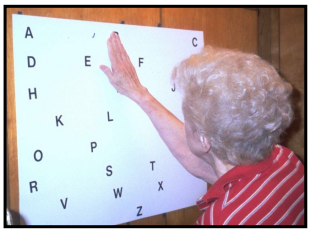
Examples



A

B

C

D

E

F

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Key Lesson Take Aways

- Compensatory visual scanning training is an evidence-based intervention that teaches the client to use remaining vision more efficiently to locate objects on the blind side by using a wide head turn
- Light boards are an effective way to increase the speed of compensatory visual scanning by increasing the client's attention and search efficiency but aren't appropriate for every client
- Inexpensive portable scanning boards and activities can be easily constructed to challenge the client
- Low functioning clients require slower paced activities that demand less attention and cognition

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This Lesson Will Cover

- Interventions that enable the client to obtain information normally supplied by reading text using technology and services
- Interventions to improve handwriting legibility

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The State of the World

- We have become very dependent on reading print
  - Texting has replaced the telephone as our preferred method of communication
- The smartphone has become a primary tool for communication and information
- We increasingly rely on digital sources for information
  - Daily news, social media, entertainment

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Enable Client to Acquire Information from Print

- **THE** goal for every client regardless of whether they want to work to resume reading or not
  - Using digital devices is an important aspect of every intervention plan
- Suggest you state a broad reading goal
  - The client will be able to compensate for their vision impairment to independently obtain and understand printed information
    - Provides the flexibility to improve the client's ability to read printed text and be able to obtain print information via other technology and sources

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Modify Devices

- Focus on the devices the client is already using
  - Smartphone, i-pad, kindle, computer, TV, apple watch etc.
- Set up the accessibility features
  - Adjust the brightness and background color of the screen
  - Enhance size, color, and boldness of text, icons, cursors
  - Set up auditory features-chimes, vibration etc.
- Train the client to use built-in features, such as zoom, voice-over, and speech to text
- Set up Siri!

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Apps and Software

- Locate apps and software that will enable client to complete a specific task using voice commands
- **GREAT** RESOURCE:
  - American Foundation for the Blind
  - Technology Resources for People with Vision Loss
    - https://www.afb.org/blindness-and-low-vision/using-technology
    - Incredible website, comprehensive resources

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Internet Connected Virtual Assistants

- Alexa, Siri, google home as examples
- Can be set up to complete a variety of tasks
  - Tell time, outside temperature, weather forecast, set a timer, order items, turn on lights, etc.
- Easy to use but you must
  - Help set it up and customize it to meet their needs
  - Or provide family with the resources to do it
    - There are LOTS of youtube tutorials!

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Seeing AI

- Free software
- Describes nearby people, objects, and text
- Developed for first for the iphone; an android version is (now or soon will be) available
- Several youtube tutorials on how to use it

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Old School

- Large print
  - Libraries
  - Word searches, crossword puzzles, devices
- Talking devices
  - Watches, clocks, blood pressure cuffs, glucose monitors, scales….
- Available through re-sellers
  - MaxiAids: maxiaids.com
  - LS&S: lss.products.com
  - Amazon

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Old School

- Talking Books
  - The US National Library Service for the Blind and Physically Handicapped offers free recorded books, magazines, and music through its Talking Books lending library program (http://www.loc.gov/nls/)
    - Each state has at least one talking book library
    - OT's can qualify the client for services
    - Libraries often carry forms and information for your state
- Radio Reading Services
  - Many states offer free radio-reading services in conjunction with a university-sponsored public radio station.
  - Radio-reader services provide a variety of special programming for persons with disabilities, which often includes reading local newspapers
- Pharmacies
  - Not mandated yet in U.S., but most pharmacies will provide large print medication labels; some will provide talking labels
- Other Businesses
  - Some restaurants will provide large-print menus, many businesses will provide statements and bills in large print

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Handwriting Interventions

- Focus on teaching the client to use two compensatory strategies
  - Slow down and monitor pen tip to ensure accuracy
  - Position paper so that pen tip can be seen

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Intervention Components

- Modify the writing surface
- Practice tracing
  - This is how we learned to monitor and guide the pen tip when we were learning to write
- Practice occupations that require handwriting
  - Checks and check registers, envelops
  - Grocery lists, write a letter, pay bills

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Increase Visibility of Writing Surface

- Even, high quality non-glaring illumination
  - Goose neck/flexible arm lamp with LED bulb
  - Placed opposite of writing hand to eliminate shadow
- Maximal contrast
  - Use black marker/gel pen
  - Bold line paper and checks if needed

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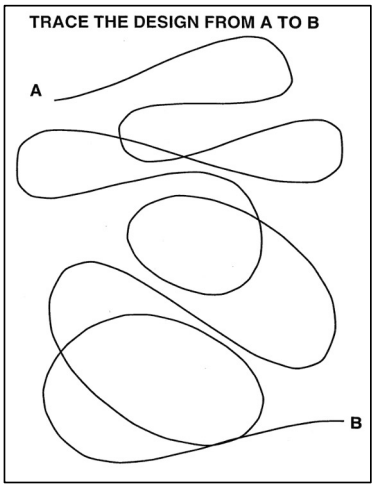
Tracing Exercises

- From Warren Pre-reading and Writing Exercises
- Encourage client to reposition paper, head, hand so they can **see the pentip at all times**



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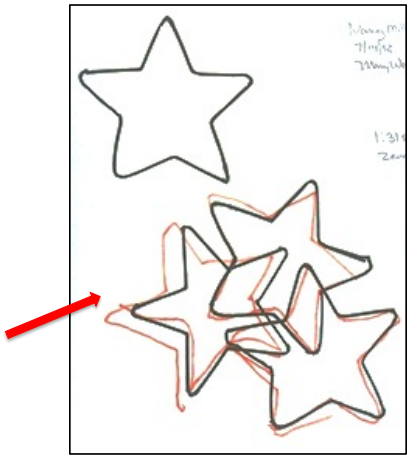
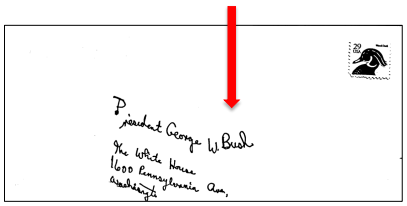
Tracing Example-Before





First attempts at tracing by client with R HH. Tracing exercise and envelope were completed on the same day

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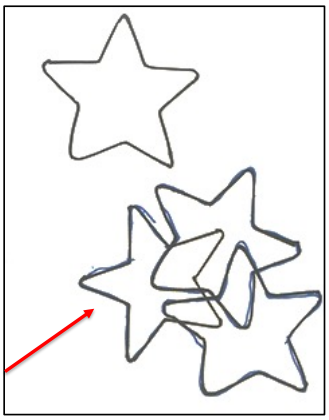
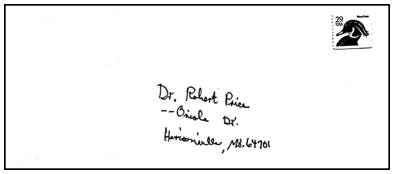
Tracing Example-After





Same client's performance one week later after practice tracing and handwriting as a home exercise program

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Incorporate into Daily Occupations

- As handwriting improves, have client practice daily occupations that require legible handwriting
  - Signature
  - Lists
  - Checks
  - Addressing envelopes

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Key Lesson Take Aways

- **All clients** must be able to acquire information from printed materials and this should always be on the goals list
- Add accessibility features to client's devices as first step in intervention
- Explore other alternatives to obtain information from print
- Improve handwriting legibility by teaching the client to slow down and monitor the pen tip

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Pre-Reading Exercises

- Improve the client's ability to use the new perceptual span in reading
- The exercises require client to complete activities that require precise eye movement/foveation
  - Assists client to learn the saccade strategy needed to accurately place letters etc. within the new smaller perceptual span to clearly see words/navigate text
- Requires a **significant** amount of practice
  - Must structure intervention in a way that keeps the client motivated to practice

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Pre-Reading Exercises

- Require execution of reading saccades without the emotional burden of trying to read text
  - Use letters, numbers and words
    - Removes client's ability to compare current reading performance with pre-ABI performance in terms of speed and fluency
  - Challenging and fun
    - Increases motivation to practice
  - Saccade proficiency improves with practice
  - Start with larger font sizes which take less saccade proficiency and progress to smaller font sizes as the client improves

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Examples of Pre-reading Exercises

- *Pre-reading and Writing Exercises for Persons with Macular Scotomas*
  - Free download
  - Link located in the Free Resources Section of the courses website
- Format
  - Series of letter and number searches printed in font sizes ranging from
    - 1M (standard print) to 4M (very large print)

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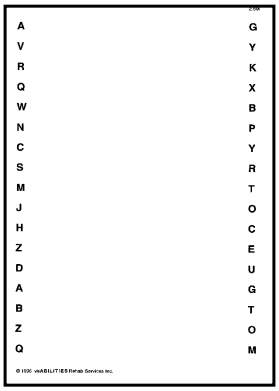
Warren Pre-Reading Exercises

Simple exercises are completed as timed drills during therapy sessions to increase saccade control



Letter Jump: client reads out letters back and forth down the page while being timed

Single Letter Underline: client reads out only the underlined letters while being timed

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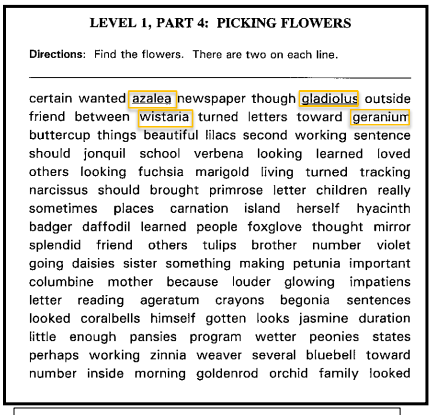
Assign more detailed/complex exercises as homework

Warren Pre-reading and Writing Exercises

Pre-Reading Exercises

- *Learn to Use Your Vision (LUV) Reading Series*
  - Valjean Wright and Gale Watson
  - Available through www.lowvisionsimulators.com
- Format
  - Series of word searches and reading passages that emphasize visual search and comprehension
  - Includes cloz exercises

LUV Reading Series

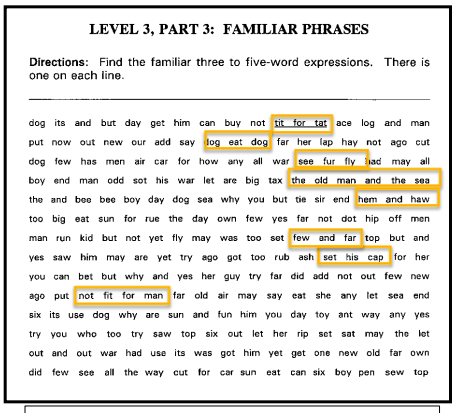


LEVEL 1, PART 4: PICKING FLOWERS

Directions: Find the flowers. There are two on each line.

certain wanted azalea newspaper though gladiolus outside friend between wistaria turned letters toward geranium buttercup things beautiful lilacs second working sentence should jonquil school verbena looking learned loved others looking fuchsia marigold living turned tracking narcissus should brought primrose letter children really sometimes places carnation island herself hyacinth badger daffodil learned people foxglove thought mirror splendid friend others tulips brother number violet going daisies sister something making petunia important columbine mother because louder glowing impatiens letter reading ageratum crayons begonia sentences looked coralbells himself gotten looks jasmine duration little enough pansies program wetter peonies states perhaps working zinnia weaver several bluebell toward number inside morning goldenrod orchid family looked

Underline the flowers-there are two in each line



LEVEL 3, PART 3: FAMILIAR PHRASES

Directions: Find the familiar three to five-word expressions. There is one on each line.

dog its and but day get him can buy not tit for tat ace log and man
put now out new our add say log eat dog far her lap hay not ago cut
dog few has men air car for how any all war see fur fly had may all
boy end man odd sot his war let are big tax the old man and the sea
the and bee bee boy day dog sea why you but tie sir end hem and haw
too big eat sun for rue the day own few yes far not dot hip off men
man run kid but not yet fly may was too set few and far top but and
yes saw him may are yet try ago got too rub ash set his cap for her
you can bet but why and yes her guy try far did add not out few new
ago put not fit for man far old air may say eat she any let sea end
six its use dog why are sun and fun him you day toy ant way any yes
try you who too try saw top six out let her rip set sat may the let
out and out war had use its was got him yet get one new old far own
did few see all the way cut for car sun eat can six boy pen sew top

Underline the familiar phrase-there is one for each line

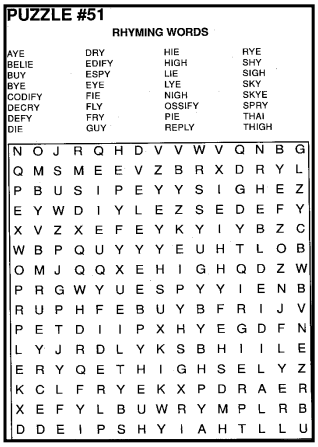
Comprehension Exercises

- Cloz technique
  - LUV Reading Exercises
- Works well for avid readers with large vocabularies
- Instruct client to read the sentence and predict the missing word
- Builds confidence that client can skip over troublesome words and still read accurately

F:	Fingernails grow fa_____ than toenails.	faster
P:	The past tense of mar_____ is divorce.	marriage
F:	The world's la_____ baby whale weighed four tons.	largest
P:	God n_____ measures a man in inches.	never
F:	A watermelon is 92 pe_____ water.	percent
F:	"Amen" means "so b_____ it."	be
F:	Daniel Webster's brain weighed 53.5 ou_____.	ounces
P:	When fate sh_____, it hits the bullseye.	shoots

Other Pre-Reading Exercises

Commercially available word searches and cross word puzzles



PUZZLE #51

RHYMING WORDS

AYE	DRY	HIE	RYE
BELIE	EDIFY	HIGH	SHY
BUY	ESPY	LIE	SIGH
BYE	EYE	LYE	SKY
CODIFY	FIE	NIGH	SKYE
DECRY	FLY	OSSIFY	SPRY
DEFY	FRY	PIE	THAI
DIE	GUY	REPLY	THIGH

N	O	J	R	Q	H	D	V	V	W	V	Q	N	B	G
Q	M	S	M	E	E	V	Z	B	R	X	D	R	Y	L
P	B	U	S	I	P	E	Y	Y	S	I	G	H	E	Z
E	Y	W	D	I	Y	L	E	Z	S	E	D	E	F	Y
X	V	Z	X	E	F	E	Y	K	Y	I	Y	B	Z	C
W	B	P	Q	U	Y	Y	Y	E	U	H	T	L	O	B
O	M	J	Q	Q	X	E	H	I	G	H	Q	D	Z	W
P	R	G	W	Y	U	E	S	P	Y	Y	I	E	N	B
R	U	P	H	F	E	B	U	Y	B	F	R	I	J	V
P	E	T	D	I	I	P	X	H	Y	E	G	D	F	N
L	Y	J	R	D	L	Y	K	S	B	H	I	I	L	E
E	R	Y	Q	E	T	H	I	G	H	S	E	L	Y	Z
K	C	L	F	R	Y	E	K	X	P	D	R	A	E	R
X	E	F	Y	L	B	U	W	R	Y	M	P	L	R	B
D	D	E	I	P	S	H	Y	I	A	H	T	L	L	U

11

Pre-Reading Training Procedures

- Begin with identifying single letters/numbers in largest font size
- Progress to identifying words in smallest font sizes
- Assign enough homework for the client to practice at least 20-30 minutes a day
- Correct/review the client's homework efforts each session
  - Positive feedback keeps them motivated

12

Occupational Activities

- Read familiar materials in large print
  - Begin 2-3 weeks after the client has been working on pre-reading exercises
    - Client should have improved in ability to adapt to the new perceptual span
- Obtain a previously read book or a book on a familiar subject in large print
  - Purchase or check it out from library
  - Familiar subject will reduce cognitive load
- Instruct client to read a chapter a day

13

13

Occupational Activities

- Resume reading desired materials
- Modify and adapt reading materials
  - Optimal illumination
  - Materials with
    - Good contrast
    - Appropriate font, leading, size of text
  - Consider using e-readers
  - Provide an anchoring lines to help the person orient
- Assess difficulties using bifocal
  - Change in saccade pattern may cause client to move onto edge of bifocal and experience blur
  - May need to discuss single lens reading glasses with eye doctor


LIFESTYLE
Birmingham man concedes best woman won 'Big Brother 4'
More families remodel kitchens

14

14

Reading Intervention Effectiveness
(documented on Pepper Test)

Form III

Line		# correct # item	percent correct
1	x g a j p m u l c d s b r h o	11 /15	73 %
2	f w 2 i t b k e n q v y a m r	9 /15	60 %
3	yes so j pop sat d at c am h in so	9 /12	dummy
4	oh of n to am g k in u do of s b	12 /13	92 %
5	fire side past gold fish own sky help	7 /8	88 %
6	advice badger slide anyone table mirror	4 /6	67 %
7	understudy sportsman campground fenders	3 /4	75 %
8	bad z navy specific g show dog amber	6 /8	dummy
9	narrow today penny cream hopped honest	4 /6	66 %
10	meantime upbringing summertime splendid	2 /4	50 %
11	quick sand spiteful outlast stops winds	2 /6	33 %
12	side walk tracking readily overshadow employ	4 /6	66 %
13	story milk bunny college crayons idea gotten	7 /7	dummy

•Total Number Correct (add lines 1-13)= 80
•Mean Percent Correct (sum of percentages/10)= 67 %
•Total Test Time= 2 min 00 sec (Time in Minutes)= 2
•Corrected Reading Rate = Total # Correct/Total Time (in min)= 40 wpm

Form I

Line		# correct # item	percent correct
1	d l a p m s e r z o n f w t b	15 /15	100 %
2	g c h i x j q u k v y m h r e	15 /15	100 %
3	did be of ate l to ten in s t my x	11 /12	dummy
4	by if e he go up o p we m as f it	12 /13	92 %
5	good camp fire our fear less gust hot	8 /8	100 %
6	always cowboy funny shells weaver night	6 /6	100 %
7	blueberry flowers eyesight instrument	4 /4	100 %
8	red great slender fix truth awful k no	8 /8	dummy
9	seesaw stale louder score radish overly	5 /6	83 %
10	postcard automation rainbow devilish	4 /4	100 %
11	and some midshipman hamper minnow tuner	5 /6	83 %
12	frighten rabbit mustard crab grass difference	6 /6	100 %
13	completion d cast butter start scar homeland	7 /7	dummy

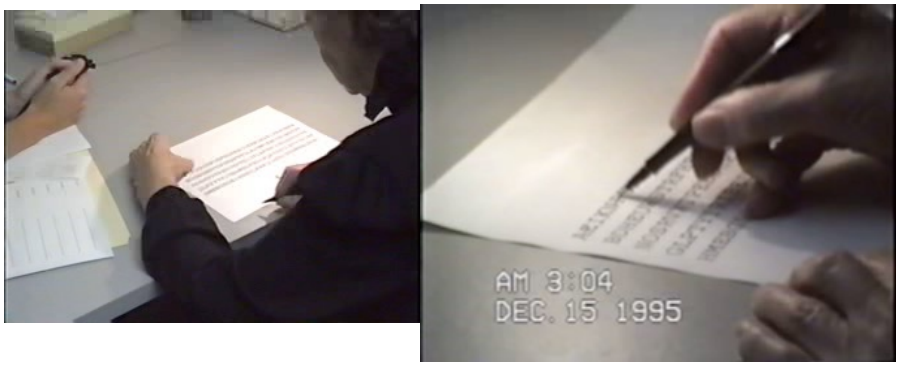
•Total Number Correct (add lines 1-13)= 106
•Mean Percent Correct (sum of percentages/10)= 96 %
•Total Test Time= ____ min ____ sec (Time in Minutes)= ____
•Corrected Reading Rate = Total # Correct/Total Time (in min)= 30 wpm

83 year old client with HH from severe stroke. Initial Pepper test on left; discharge Pepper test on right. Client followed the progression described.

15

15

Video of Client at DC



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16

Key Lesson Take Aways

- The client who wishes to improve reading performance must commit to putting in significant practice
- Interventions to improve performance focus on enabling client to adapt their reading saccade strategy to the new size of the perceptual span
- OT must structure the intervention to motivate the client to put in the required practice time

17

17

This Lesson will Cover

- Evidence-based compensatory interventions to improve reading speed and accuracy
- An intervention protocol to use with the client who wants to improve their reading performance

3

3

Improving Reading Performance is **NOT** a Goal for Every Client

- Some clients are **unable** to resume reading due to language and cognitive impairments
- Other clients are **not motivated** to put in the practice required to improve reading performance
- **But every client must be able** to access the important information provided by text

4

4

Best Candidate for Reading Intervention

- An avid reader
  - Reads daily, often reads a book or more a week
- Has a good understanding of syntax and semantics and a wide vocabulary
  - This ability enables the client to predict words when only seeing a few letters
- Has time to devote to practice
- Is realistic about the outcome

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5

Basis for Intervention Approach

- Reading research shows that the neocortex learns to how adapt to perceptual span to read
  - We learn to use our neocortex to identify words within the perceptual span by intensively practicing reading
  - Beginning in preschool and continuing through the primary grades to acquire the basic skills and then perfecting it through the upper grades and college
- Because reading is a learned process driven by our most flexible and adaptable area of the brain, if the person learned to adapt the PS once they could do it again
  - You can teach an old brain a new trick, **but it will take significant practice**

Rayner, 1998

6

OT Intervention Protocol

- Practice strategies to help the client establish a new saccade strategy
  - Evidence based interventions
  - Pre-reading exercises
- Practice using the strategy to read continuous text
  - Daily reading of familiar books and subjects
- Read desired print materials
  - Modify print materials to enable the client to accurately read needed/desired materials

7

7

Research-Based Reading Interventions

- Active area of research
  - Focused primarily on adapting eye movements to the reduced visual span
  - Read-Right program, DREX, Schuett intervention
- Current interventions have been able to increase **reading speed and accuracy**
  - Require significant practice sessions
  - Can reduce effort
  - Comprehension hasn't been addressed

Maeyama et al. 2023; Ong et al., 2007, Spitzyna et al., 2007; Aimola, et al. 2014' Schuett, 2009; Zihl, 2021

8

Optokinetic Stimulation

- Uses laterally scrolling text (RT to LT)
- Moving text induces optokinetic nystagmus (OKN) that moves eye towards right field
- Practice improves rightward eye movements
  - Minimum 20 minutes a day (20 hrs)
- Reading speed increases when person resumes reading static text

Ong et al., 2012; Spitzyna et al., 2007

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9

Read-Right Program

http://www.readright.ucl.ac.uk/index.php

Type into search engine: https://readright.ucl.ac.uk/

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10

Focus on end or beginning of word

- Present single words of varying lengths on computer screen
- Encourage client to view the whole word
  - L HH
    - Shift eyes leftward to see beginning of word
  - R HH
    - Shift eyes rightward to see ending of word

Schuett, 2009

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Other Free Web-based Intervention Programs

- DREX: Developed by Durham University UK
  - Website:https://www.durham.ac.uk/departments/academic/psychology/research/services/drex/
    - To access: type Durham Reading & Exploration Training into search engine
- Eye-Search developed by University College London
  - Website: https://www.eyesearch.ucl.ac.uk/
    - To access: type Eye-Search into search engage
  - Supporting Research: Ong et al., 2016- open access journal (see reference list)

12

12

Vertical Reading

- Flipping the page orientation that the client reads vertically moving **down** the line of text instead of horizontally across it
- The advantage for the client with R HH is that it restores the normal perceptual span on the right
- Current research has established that adults (without HH and with HH) can adapt and learn to read vertically
  - Mixed results as to whether it increases reading speed

Kuester-Gruber et al. 2021; DeJong et al. 2016; Hepworth et al. 2019; Maeyama et al. 2023; Porter et al. 2020

13

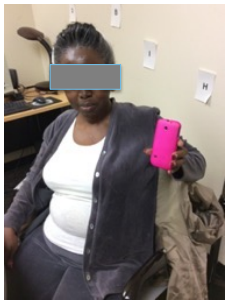
Modify Tasks to Reduce Visual Stressors

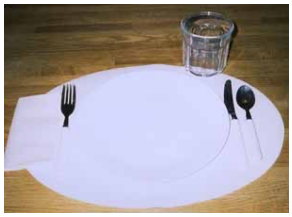
- Add **contrast** to **key** task items to
  - Make a critical feature **more visible**
  - **Draw attention** to a critical feature or item
  - **Reduce** search time and frustration
- Use lighting to **spotlight** tasks
- Reduce pattern and clutter
- **Reduce** number of **visual steps** in the task
- **Structure** the task environment to make it **explicit** and **predictable**
  - Places less demand on visual search and attention

3

Add Contrast to Key Features/Items

- Increased discriminability of targets elicited more efficient and faster search in persons with neglect
  - Husain & Kennard, 1997





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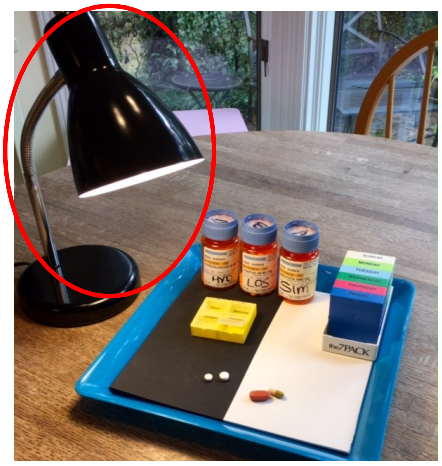
Strategically Use Lighting

- To **spotlight** tasks to direct and focus the client's attention
- Adding task lamp to grooming task enabled clients with hemi-inattention to perform task more quickly with improved FIM score



5

Reduce Pattern/Clutter

6

Reduce Pattern/Clutter

7

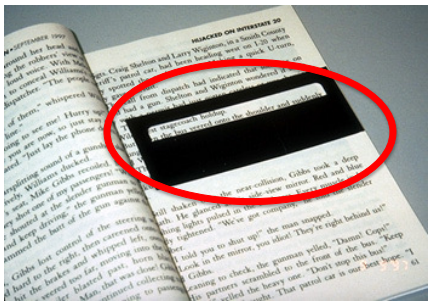
Simplify, Eliminate, Structure

- **Simplify design**
- **Reduce** number of **visual steps** in a task
  - Internet connected home assistants/other technologies
  - Talking devices-clocks, calculators, BP, blood glucose
  - Pre-chopped ingredients, prefilled products like detergent pods, pre-filled insulin pens
- **Structure** task environment to make it explicit and predictable
  - Create workstations

8

Combine Modifications

- Example reading
  - Use non glare high quality task light
  - With a typoscope
    - Uses contrast to highlight reading area
    - Helps client locate and maintain place on text



9

Key Lesson Take-Aways

- Environmental and task modification is the most important tool in the OT intervention toolbox
- Optimum client task/environment fit increases the likelihood the client will participate in occupations
- Remove visual stressors to create environments that support occupational performance
- Create a more visible environment by adding high quality, strategically placed lighting and contrast, and eliminating/minimizing pattern
- Adding structure to environments enables the client to predict the location of key items and landmarks

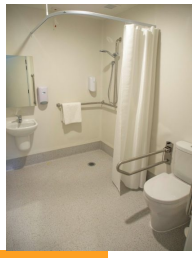
10

This Lesson will Cover

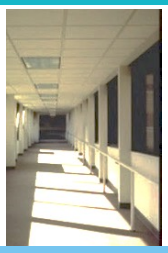
- Modifications to the **environment** that will decrease visual stressors and provide an optimal person environment fit

3

Visual Stressors

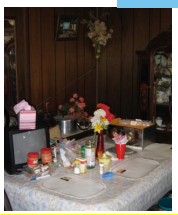
Low contrast



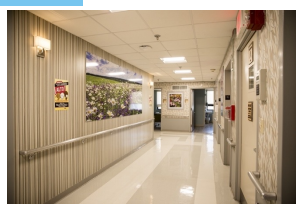
Deceptive pattern, low contrast

Clutter, no structure

Inconsistent lighting, low contrast



Insufficient light, clutter, no structure



Glare, pattern, low contrast

4

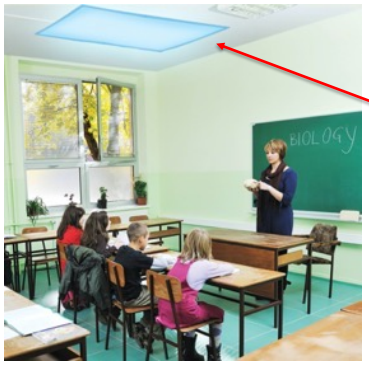
Modify Environment to Reduce Visual Stressors

- Add sufficient and **well-tolerated lighting**
  - Brighter lighting increases visibility of small and low contrast features
  - BUT not when lighting hurts
- Increase contrast of **key features** in the environment
  - Makes these features more visible and easily identifiable
- **Reduce pattern** within the environment
  - Pattern camouflages objects, hiding them from the client
  - Can be **inlaid** or **overlaid** pattern or clutter

5

Add **Well-Tolerated** Lighting

- Fluorescent is the **least tolerated** and **effective** lighting
  - Pulsing/short wave-length can be **irritating** to clients with ABI
  - More **diffuse**, less intense light that does not highlight details



Available from:
Amazon
Educational Insights

6

Filters and Visors

- Filters available from Noir https://www.noirinsight.com and other re-sellers
  - Fit-over frame/ UV shield
    - Gray 20 63%
    - Plum 88 57%
    - Plum 41 no data
    - Amber 48 64%
    - Clear 17 91%
  - Resellers
    - MaxiAids
    - LS&S
- Visors

7

Other Suggestions to Modulate Light

- Change the background on computer screens and smartphones from white to a darker color to absorb reflective light
- Use blinds on windows to deflect the incoming light upward and filter the light
- Cover glossy, reflective surfaces such as countertops and floors with rugs or mats to reduce reflected light

8

Well-Tolerated Lighting

- Halogen
  - Intense, high-quality light with minimum glare
    - But emits heat which limits placement
    - Best used in task light and bulbs
- LED
  - Instant on and high intensity
    - Readily available as room and task lighting
    - Bulbs are more expensive but also last longer

9

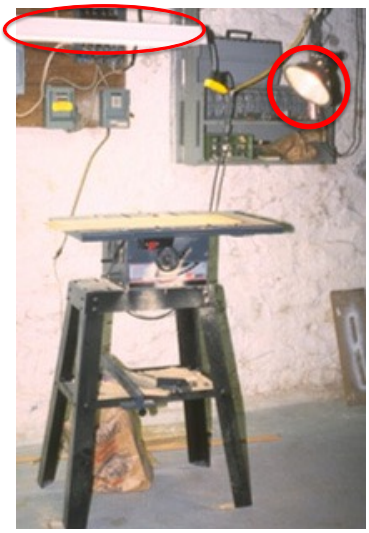
Maximize Room and Task Lighting

- Direct Sources of Light
  - Overhead light fixtures
  - Lamps
  - Light from other rooms and windows
- Indirect sources of light
  - Color of walls, flooring, countertops and other surfaces
  - Mirrors

10

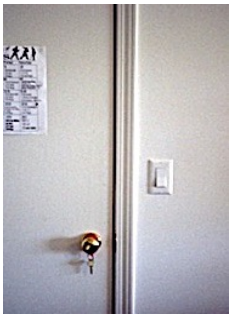
The Best Lighting

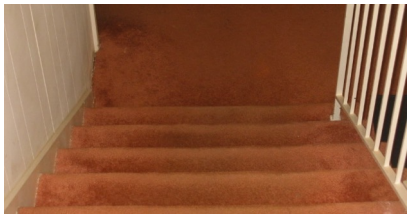
- Is the one that works for the client
  - Aim for optimal placement to achieve even illumination and brightness
  - Never reject a lighting type without trying it

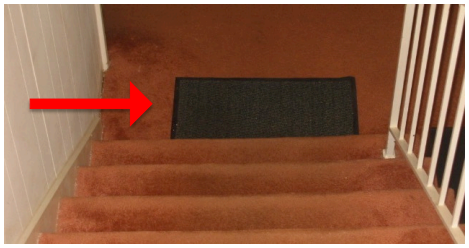


11

Increase **Contrast** of Key Environmental Features







12

Outdoor Environmental Features



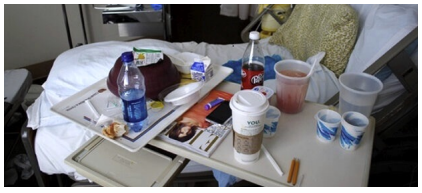


13

Pattern and Clutter

- Client must use **more attentional resources** to locate items in environments with lots of pattern and clutter
  - The increased search effort can **fatigue the client**
    - Diminish attention
    - Decrease motivation
    - Reduce participation





14

Reduce Pattern/Clutter

- **Reduce physical clutter/pattern**
  - **Cover** patterned furniture with plain colored throws, towels
  - **Remove** all but needed items from counters, shelves, remove pictures from walls
  - Organize remaining items
- **Noise** also creates distracting pattern for some clients
  - Adds stress and **reduces concentration** in noisy environments leading to avoidance of these environments
  - Work with clients in **quiet environments** to prevent fatigue and facilitate ability to attend and concentrate
  - Educate client and family on how to reduce noise in home and community environments by
    - Covering surfaces to absorb sound
    - Altering the time of day to participate in community environments

15

Modifications to Improve Ida's Person/Environment Fit

- Replace crocheted afghan with plain colored blanket or sheet
- Remove striped floor rug
- Cover floral foot stool (right side)
- Add more lighting-a tall torchiere LED or halogen lamp to provide lighting at night

- Remove the cannisters and other clutter from the landing and stairs
- Stripe stair handrail with white or fluorescent tape
- Stripe the end of each step

16

This Lesson will Cover

- Key intervention goals for persons with HH
- Linking the client's ADL limitations to their vision impairment
- Key interventions that should be included in the plan of care
- Stating an achievable occupational goal

3

3

Restoring Vision

- Vision restoration is not a reality yet
- Has been under active research investigation for 40 years
  - Looking at various forms of stimulation that may activate visual pathways

4

4

The Goal of OT Intervention

- Intervention should focus on **adaptation** and **empowerment**
  - **Adaptation** enables the client to **use their current vision** as effectively as possible to complete daily occupations
  - **Empowerment** gives the client control over their vision loss by promoting an **active problem-solving approach**
    - Evolves from understanding how environmental conditions limit ability to complete occupations
    - This knowledge helps client figure out how to **adapt** to instead of **avoiding** difficult activities

5

5

Identify the Client's Needs/Goals

- You cannot skip this step
- Clients with vision loss will go to great lengths to complete valued occupations
- The SRAFVP (lesson 21) interview format provides an opportunity to determine the occupations the client values and doesn't value

6

6

Link ADL Limitations to Vision Impairment

- Review the information you have gathered about the client's ADL limitations, needs and goals
- Compare it to the information you have gathered about performance limitations
- Decide the best approach to intervention and the best goal

7

7

The Key Question to Ask Yourself

- Can I improve my client's ability to compensate for the HH?
  - **YES:** focus on improving performance skills
    - Compensatory visual scanning C-VST
  - **NO:** focus on obtaining an optimal person-environment, person-task fit
    - **Enhance** environmental components that **support** vision and **eliminate** visual stressors that **impede** vision
    - **Train** client to use **adaptive devices** and **technology** to complete visual tasks

8

8

Intervention Focus: Compensation

- Enable client to use **remaining vision** more efficiently to **compensate** for the blind field when completing these key components of occupations
  - Reading
  - Writing
  - Mobility and navigation
- Success depends on
  - Increasing awareness/monitoring of the blind field (**insight and attention**)
  - Increasing **efficiency and speed** of search towards and within the blind field (**mastering performance skills**)

9

9

Key Intervention Questions

- What does the client want and need to do?
- What does the client know about their vision loss and how it affects their ability to complete occupations?
- How can I **modify the task/environment** to help the client use their **current** vision more effectively to complete occupations?
- Can I improve the client's ability to **compensate** for their vision loss?

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10

Education is a **Key** Intervention

- Compensation requires use of a conscious **cognitive strategy**
- To succeed client must believe that vision can't be trusted on the deficit side
- Education helps client become aware of
  - The location and extent of deficit and
  - How it has affected occupational performance
- Awareness allows client to develop "intellectual over-ride"

11

11

Components of Educational Intervention

- Goal is to improve client/family understanding what living with HH entails
  - Family involvement is critical
- Experiential
  - Ask client to explain how vision has changed and limits performance
  - Use hemianopia simulators to help family understand vision loss
    - Source: www.lowvisionsimulators.com
- Provide educational handouts

12

12

Obtaining an Optimal Person Environment Fit is a **Key** Intervention

- Twin goals
  - Enable client to understand how environment facilitates/impedes performance
  - Teach the client and family how to achieve an optimum person-environment fit
- Key component
  - Education of client and family
  - Environmental modification (lessons 23 and 24)

13

13

Enhancing Performance Skills is a **Key** Intervention

- Goal is to enable the client to optimize their ability to use remaining vision to complete daily occupations
- Key component
  - Compensatory visual scanning training (C-VST)
    - Lessons 27 and 28

14

14

Setting the Best Goal

- Make **participation** the goal instead of independence
  - Frees you up to be creative
- Make **co-occupation** a goal
  - Co-occupations require each member to contribute to an occupation
    - Meal preparation, shopping, cleaning, putting a child to bed
    - Enables client to actively contribute to family life
      - Helps reduce partner's stress in having to *do it all*
      - Helps both client and family adjust to living with vision impairment

15

15

Examples of Goals

- The client will consistently use strategies to compensate for the hemianopia to locate and select items to assist her husband to complete grocery shopping (co-occupation)
- The client will identify home and task modifications that support his ability to compensate for the hemianopia to complete meal preparation
- The client will compensate for the hemianopia to accurately fill her weekly medication pillbox
- The client will compensate for the hemianopia to resume attending (religious services….etc)
- The client will compensate for the hemianopia to resume reading printed information
- The client will use assistive technology to acquire printed information needed to complete daily occupations
- Determine whether the client compensates for the hemianopia well enough to resume driving

16

16

Key Lesson Take Aways

- Intervention focuses on what the client wants and needs to achieve to successfully live with hemianopia
- Education is a key component of intervention
- Intervention focuses on enabling the client to compensate for the HH to complete occupations
- Intervention focuses on participation rather than independence in occupations
- Goals should be stated as occupational outcomes

17

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  - **YES:** focus on improving performance skills
    - Compensatory visual scanning C-VST
  - **NO:** focus on obtaining an optimal person-environment, person-task fit
    - **Enhance** environmental components that **support** vision and **eliminate** visual stressors that **impede** vision
    - **Train** client to use **adaptive devices** and **technology** to complete visual tasks

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Intervention Focus: Compensation

- Enable client to use **remaining vision** more efficiently to **compensate** for the blind field when completing these key components of occupations
  - Reading
  - Writing
  - Mobility and navigation
- Success depends on
  - Increasing awareness/monitoring of the blind field (**insight and attention**)
  - Increasing **efficiency and speed** of search towards and within the blind field (**mastering performance skills**)

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Key Intervention Questions

- What does the client want and need to do?
- What does the client know about their vision loss and how it affects their ability to complete occupations?
- How can I **modify the task/environment** to help the client use their **current** vision more effectively to complete occupations?
- Can I improve the client's ability to **compensate** for their vision loss?

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Education is a **Key** Intervention

- Compensation requires use of a conscious **cognitive strategy**
- To succeed client must believe that vision can't be trusted on the deficit side
- Education helps client become aware of
  - The location and extent of deficit and
  - How it has affected occupational performance
- Awareness allows client to develop "intellectual over-ride"

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Components of Educational Intervention

- Goal is to improve client/family understanding what living with HH entails
  - Family involvement is critical
- Experiential
  - Ask client to explain how vision has changed and limits performance
  - Use hemianopia simulators to help family understand vision loss
    - Source: www.lowvisionsimulators.com
- Provide educational handouts

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Obtaining an Optimal Person Environment Fit is a **Key** Intervention

- Twin goals
  - Enable client to understand how environment facilitates/impedes performance
  - Teach the client and family how to achieve an optimum person-environment fit
- Key component
  - Education of client and family
  - Environmental modification (lessons 23 and 24)

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13

Enhancing Performance Skills is a **Key** Intervention

- Goal is to enable the client to optimize their ability to use remaining vision to complete daily occupations
- Key component
  - Compensatory visual scanning training (C-VST)
    - Lessons 27 and 28

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Setting the Best Goal

- Make **participation** the goal instead of independence
  - Frees you up to be creative
- Make **co-occupation** a goal
  - Co-occupations require each member to contribute to an occupation
    - Meal preparation, shopping, cleaning, putting a child to bed
    - Enables client to actively contribute to family life
      - Helps reduce partner's stress in having to *do it all*
      - Helps both client and family adjust to living with vision impairment

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Examples of Goals

- The client will consistently use strategies to compensate for the hemianopia to locate and select items to assist her husband to complete grocery shopping (co-occupation)
- The client will identify home and task modifications that support his ability to compensate for the hemianopia to complete meal preparation
- The client will compensate for the hemianopia to accurately fill her weekly medication pillbox
- The client will compensate for the hemianopia to resume attending (religious services….etc)
- The client will compensate for the hemianopia to resume reading printed information
- The client will use assistive technology to acquire printed information needed to complete daily occupations
- Determine whether the client compensates for the hemianopia well enough to resume driving

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Key Lesson Take Aways

- Intervention focuses on what the client wants and needs to achieve to successfully live with hemianopia
- Education is a key component of intervention
- Intervention focuses on enabling the client to compensate for the HH to complete occupations
- Intervention focuses on participation rather than independence in occupations
- Goals should be stated as occupational outcomes

17

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This Lesson will Cover

- Assessments to use to identify the client's specific ADL limitations
- Key components of a home assessment
- Linking ADL limitations to specific changes in visual performance in order to set the ADL goal

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Occupational Limitations Result from Deficient Performance Skills in 3 Areas

- **Reading**
  - Current/habitual saccade strategy doesn't match the new size of the perceptual span
  - Client must learn a new saccade strategy that will
    - Adapt to the new size of the perceptual span
    - Move new perceptual span efficiently across the line of print
- **Eye-hand coordination**
  - Unable to visually monitor the hand in tasks
  - Client must learn how to monitor the hand to
    - Re-establish visual guidance in fine motor activities to improve accuracy, precision and speed

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Deficient Performance Skills

- **Mobility**
  - Perceptual completion prevents client from turning head far or fast enough towards blind side to acquire needed visual information in time allowed
  - Client must learn to use current vision to monitor and guide movement within the blind side
    - Increase speed and efficiency of visual search
    - Turn head far enough to completely search blind field
    - Increase attention to the blind field and balance attention between the fields

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Deficient Performance Skills

- These performance skills underpin many I-ADLs
  - Reading is needed for
    - Financial management, medication management, communication
  - Fine motor coordination is needed for
    - Handwriting legibility, using tools, pouring, cutting, keyboarding
  - Mobility/Navigation is needed for
    - Driving, shopping, community activities

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6

Assessment

- Identify deficient performance skills
  - Addressed in lessons 15-20
- Identify limitations in specific ADLs
  - Self-Report Assessment of Functional Visual Performance (SRAFVP)
  - Handwriting assessment
  - Home Assessment
    - Home lighting assessment

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SRAFVP

- Self-Report Assessment of Functional Visual Performance
  - 38 item assessment of **vision-dependent** ADLS
    - Uses an interview format that allows the client to identify the ADLS that are most important to them
- Validated on persons with HH in 2012
  - Good internal consistency: Cronbach alphas: .73-.99
  - Identified 3 subscales
    - Reading
    - Eye hand coordination
    - Mobility
  - Participants rated reading and eye-hand coordination as more difficult than mobility
- **Free**: download toolkit from:
  - https://www.uab.edu/shp/ot/low-vision-rehabilitation/free-resources
  - **Be sure** to download the **original SRAFVP**
    - **Not** the **R**-SRAFVP

Mennem et al. 2012

8

Handwriting Assessment

- No standardized assessments (yet) to measure HH influence on handwriting performance
- Complete a task analysis instead
  - Fill out a check, write a brief note to dictation
- Key observations
  - Unable to stay on the line
  - Writes over other words/letters
  - Positions writing off to one side

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Home Assessments

- Persons with HH are significantly influenced by their environment
  - Optimal person environment fit = independence and participation
  - Suboptimal person environment fit = frustration, dependence and avoidance
- A few standardized home assessments have been developed for persons with vision loss
  - Generally, very comprehensive focusing on falls prevention
  - HEAVI- Home Environment Assessment for the Visually Impaired
    - OPEN ACCESS article: Swenor, B.K., Yonge, A.V., Goldhammer, V. *et al.* Evaluation of the Home Environment Assessment for the Visually Impaired (HEAVI): an instrument designed to quantify fall-related hazards in the visually impaired. *BMC Geriatr* **16**, 214 (2016).
    - https://doi.org/10.1186/s12877-016-0391-2
- If you cannot complete a home assessment in person-ask the family to take pictures or video of key assessment areas

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Home/Environment Assessment

- Persons with low vision are strongly influenced by **three visual components in their environment**
  - **Amount/quality** of ambient and task **lighting**
  - **Amount of contrast** between objects and environmental features
  - **Amount of clutter/pattern** in the environment
  - **Amount of structure** within the environment

Blaylock et al. 2015

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Areas to Assess

- All pathways used to move from one part of the environment to another
  - Hallways, stairwells, pathway through furniture in a room, through doors, outdoor pathways to deck, car etc.
- All areas where tasks are completed
  - Kitchen/bathroom/workshop counters, dining table, bedside table,desk

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Lighting Assessment

- Brightness Level
  - From direct and indirect sources
  - Consistency of lighting throughout the day
- Quality
  - Clear vs. diffuse
  - Glare vs. non-glare
- Evenness
  - Covers entire surface, no shadow

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Light Meter

- Can be a useful tool to
  - Measure brightness or illumination level
    - Compare readings to standards
  - Assist with client education
  - Provide an objective measure of pre/post lighting modification

- Remove cover from light sensor (arrow)
- Position client for task-typical position
- Place light sensor on task surface (watch for shadows)
- Record reading

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General Light Level Recommendations

Task	Lux
Working areas where tasks with visual requirement are only occasionally performed	100-150
Office or computer work, studying	500-1000
Detailed drawing or mechanical work	1500-2000
Prolonged and precise visual tasks	5000-10000
Very specialized visual tasks requiring use of low contrast, small size materials	10000-20000

Source: Illuminating Engineering Society of North America

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HELA

- Home Environment Lighting Assessment
  - Developed at Washington University in St. Louis
  - Widely used in low vision rehab programs
- It is a comprehensive assessment but very straightforward and easy to use
- Available as a free download from
  - http://www.ot.wustl.edu/about/resources/assessments-388
  - Perlmutter, M, Bhorade, A, Gordon, M, Hollingsworth, H, Engsberg, JE & Baum, CM. (2013). Home lighting assessment for clients with low vision. American Journal of Occupational Therapy, 67, 674-681.

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Ida's Living Room

- Too much pattern on furniture and floors
- Inconsistent room lighting
- Insufficent task lighting

Ida's stairs

- Clutter on landing and steps
- Low contrast stairs
- Low contrast stair rail

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Key Lesson Take Aways

- ADL limitations result from deficient performance skills combined with challenging environments
- The original SRAFVP was validated to measure vision dependent ADL limitations in persons with HH
- A handwriting assessment identifies deficiencies in eye hand coordination using a functional activity
- Persons with HH are strongly influenced by their environment making an in-person or virtual home assessment a critical component of your evaluation

18

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This Lesson will Cover

- How to use the biVABA ScanCourse to evaluate the client's ability to complete activities that require simultaneous monitoring of the floor and surroundings (dual tasks)
- How to interpret the client's performance on the assessment and link it to occupational limitations

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ScanCourse (biVABA)

- Observational dual-task assessment
  - Ability to integrate visual scanning/search with ambulation (wheeled or walking)
  - Observe whether client can
    - Search the environment while navigating a course **or**
    - Uses a maladaptive strategy such as fixating on the floor or staring straight ahead
- Validated on clients with ABI (Lund et al.)
  - Inter-rater reliability: ICC .998; Retest reliability: ICC: .927
  - Validated-significantly correlated with Trails A and B
- Inexpensive and flexible
  - Can be set up anywhere-home or clinic

Lund et al. 2020; Chau et al. 2021

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4

Set Up

- Test Items (items with asterisk are not included in the biVABA)
  - Visual Attention Assessment form
  - 3” by 5” plain index cards (21)*
  - 21 1-inch black vinyl stick-on letters/numbers or a black marker to create target cards*
  - Tape or mounting putty to attach the target cards to the wall *
- Environment
  - Well-lighted hallway with even illumination (no wall shadows)
  - Avoid florescent lighting if possible. Hallway should be lightly traveled and long enough to place 10 test targets in various locations about 2-3 feet apart on each side of the hallway
    - If needed use an adjoining hallway to extend the course
  - Test requires the client’s full concentration-ensure the hallway is free from visual, auditory, and physical distractions

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Test Instructions

- Create 21 targets
  - 3x5 inch note cards with black 1-inch stick-on letters/numbers or post-it notes with letters written on them in magic marker
- Construct the course
  - **Don’t allow client to watch this step**
  - Attach 10 targets along each side of a hallway
    - Randomly place the cards at: floor level, eye level, waist level, above eye level
    - Vary the spacing of the cards-place some close together and others farther apart

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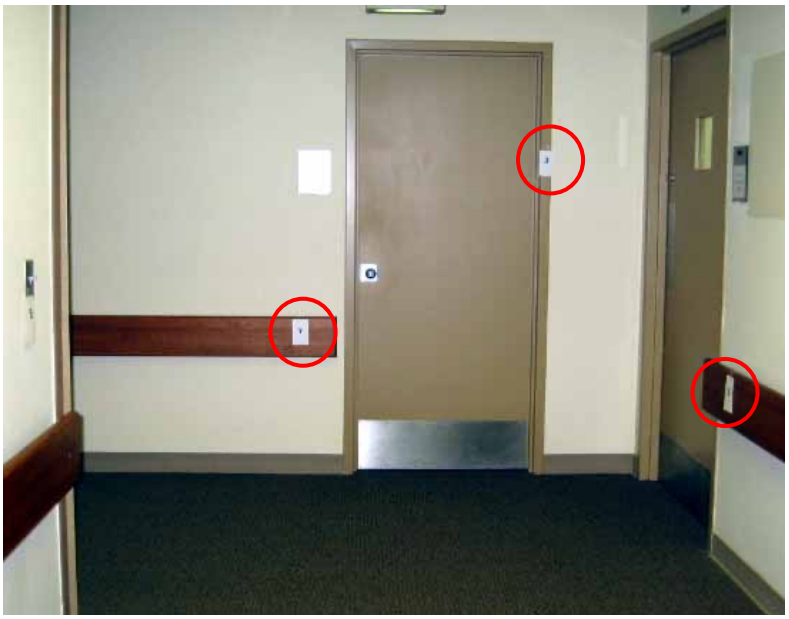

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Test Instructions

- Bring the client to one end of the hallway
- Instruct the client to identify the targets while walking down the hallway
  - Client must identify the cards while moving; stopping to search for a target is counted as an error
- Follow the client down the hallway and keep a silent count of the number of targets missed on each side of the hallway
  - The client does not have to accurately identify the target; the client must only accurately locate the card

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Test Instructions

- If the client missed targets, calculate the percentage of correct responses on each side of the hallway
  - EX: client located 8/10 target cards on the right side of the hallway represents 80% accuracy in locating the targets on the right side
- Record the number and percentage of targets the client located on the Visual Attention Assessment form under **Trial 1**
- If the client missed targets, provide this feedback to the client and instruct the client to walk down the hallway again to see if they can improve their performance
- Repeat the test (Trial 2) with client **reversing course** and walking down hallway in the **opposite direction** of the first trial
- Re-calculate the percentage of accurate results and record the percentage on the recording form under **Trial 2**

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Instructions to Client

This is a test to see how well you can search for targets when you are walking. I have placed 20 cards with *[number/letters]* on them like this one *[show example]* in various locations on both sides of this hallway. You must read out the *[number/letter]* on the cards as you walk by them. Do not stop and look for the cards, you must continue walking and read the *[number/letter]* on the card as you walk by.

If the client makes errors on Trial 1

You missed *[X number of targets]* on the right side and [X number of targets] on the left side. It may be because… [*provide specific feedback such as-you didn't turn your head far enough to the left side… you were looking at your feet…].* Let's try it again, this time be sure to … *[repeat feedback]*.

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Importance of Feedback and a Do-Over

- Always provide feedback to the client on their performance on the 1st trial before completing the 2nd trial
  - If performance improves on the second trial, it indicates that the client **can benefit** from feedback to improve compensation
  - If performance does not improve-it may indicate that the client has inattention/neglect

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ScanCourse Performance

- **Good** compensatory strategy
  - Head up, locates targets without stopping to search during ambulation
- **Inadequate** compensatory strategy
  - Misses targets, fixates on the floor, stares straight ahead, stops to search and locate targets
- Driving is **not an option** for a client who performs poorly on this test

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Recording Performance

ScanCourse: *2 trials; instruct client to point out targets on each side while walking through course; provide feedback on performance after trial 1; reverse course for trial 2.*

Trial 1 Performance: R side: _____/10 Percent: _____ L side: _____/10 Percent: _____
Trial 2 Performance: R side: _____/10 Percent: _____ L side: _____/10 Percent: _____

Key Observations:
Observed components of expected/normal performance
_____ moved smoothly through course, searching both sides to identify targets
_____ identified all targets on both sides
_____ improved performance on trial 2 following feedback
Observed deviations from expected/normal performance
_____ used unpredictable random search strategy
_____ confined search to _____ R side _____L side
_____ missed targets on _____ R side _____L side
_____ identified the same target more than once
_____ stopped walking to locate and identify targets
_____ did not improve performance on trial 2 after feedback

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Customize the ScanCourse to meet Your Needs

- ScanCourse was designed as an observational tool to help understand client's limitations in vision and visual attention
- Modify it to fit your needs
  - Client with aphasia/alexia is unable to reliably identify letters
    - Use shapes or colors as targets; ask client to point at the target
  - Low functioning client with limited attention span
    - Reduce number of targets and increase their size, place them within client's line of sight
  - Client has difficulty sustaining attention
    - Place cards in sequential order-1,2,3 or a,b,c and see if the client can reach 10
  - Client is inattentive to detail
    - Count it as an error if the client misidentifies the target
  - Client is very slow searching towards the blind side
    - Time the task and compare speed between the 2 directions

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Ida Documentation

The ScanCourse test was given to determine the client's ability to complete a dual task during ambulation. Test accuracy: 100%. Time required to locate targets: 45 seconds on right side; 15 seconds on the left side. She stopped 4 times to identify a target placed at knee or foot level on the right side. She complains of difficulty and anxiety navigating dynamic community environments.

The client completed the ScanCourse test to determine her ability to complete a dual task during ambulation. She correctly identified all targets on the test but was significantly slower identifying right sided targets-45 sec total vs. 15 sec-for left sided targets. She moved her head more slowly to locate right-sided targets and stopped 4 times to identify a target placed at knee or foot level on the right side. Similar slow search towards the right was observed on the Dynavision test. She complains of difficulty and anxiety navigating dynamic community environments.

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Interpretation

The client misses targets only on one side of the hallway during Trial 1. This observation suggests the presence of a hemianopia or neglect. If after receiving feedback on Trial 1, the client accurately completes Trial 2, the errors committed on the first trial suggest inadequate compensation for a possible hemianopia and not inattention. If the client, after receiving feedback on Trial 1, makes as many or more errors on Trial 2, it suggests the influence of neglect.

The client randomly misses targets on both sides of the hallway. This observation suggests difficulty attending due to non-lateralized inattention from neglect especially when observed in a client with right hemisphere injury (see section 4.4.1.5). A Less common cause is the presence of significantly restricted peripheral vision (e.g., tunnel vision) from an anoxic brain injury, a bilateral optic nerve injury, glaucoma, or severe retinal disease.

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Interpretation

The client must stop to locate and identify the target. This suggests that the client is unable to integrate vision with ambulation and must complete one or the other. Having to stop to search is observed in clients in early recovery from hemianopia. The behavior usually ceases following intervention that teaches the client to compensate for the hemianopia during ambulation.

The client misses cards placed in unexpected locations. This suggests that the client does not monitor the entire visual environment while walking. It is observed in clients in early recovery from hemianopia who tend to look straight ahead or at the floor when traversing the course. The behavior usually ceases following intervention that teaches the client to compensate for the hemianopia during ambulation

The client misidentifies the target on the card. The intent of the ScanCourse is to determine if the client can and will turn the head both directions to locate targets in sequence. Accuracy in identifying the target on the card is a secondary concern. Therefore, misidentifying the target is NOT considered an error on this test. You can use colors or symbols on the target card instead of numbers or letters if the client has alexia or the client can simply point to the cards. That said, you may have reasons for requiring that client accurately identify the target. For example, you may want to assess the client's attention to detail. Modify the test as needed to provide the observations that you feel will enhance your understanding of the client's strengths and weaknesses in this dual task.

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Key Lesson Take Aways

- Clients with hemianopia often have difficulty monitoring the support surface while simultaneously searching for items as they walk
- Dual task activities help identify these limitations
- The ScanCourse provides a structured observational assessment to identify the client's strengths and weaknesses in performing the dual task of scanning while walking

19

This Lesson will Cover

- Assessments to use to evaluate the client's ability to effectively search the peripheral visual field
- Assessments that provide objective data on the client's ability to quickly search during dynamic activities
- Observational assessments that identify key characteristics of field loss during activities that require mobility and navigation

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How does the HH limit client's ability to search the peripheral visual field?

- The HH and accompanying perceptual completion disrupts the client's ability to search the blind field
  - Search of the blind field is slow and incomplete
  - Characterized by short stair-step saccades, long fixations, abbreviated eye movement
- Client can't obtain the complete and accurate overview of surroundings needed to
  - Detect and locate objects
  - Avoid obstacles
  - Maintain orientation

Howard & Rowe 2018; Kasneci et al. 2014; Machner et al. 2009; Pambakian et al. 2000; Sand et al. 2013; Rowe et al. 2017

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Evaluating Search Performance

- To compensate for the HH
  - Client must use **remaining vision** to quickly and **efficiently search** the blind field
- Evaluation determines
  - Whether client demonstrates the **essential components** of a **successful compensatory** search strategy
  - Identifies the client's **strengths and weaknesses** in using vision for mobility and navigation

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Compensatory Search Strategies

Effective	Ineffective
• **Consistently monitors** both sides of field • **Frequently checks** blind field • **Turns head widely** to view blind field • Uses an **efficient** search strategy	• **Monitors only** intact field • **Occasionally checks** blind field • **Does not turn** head or turn head **far enough** to check blind field • Uses a **time-consuming strategy** to search blind field

6

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Light Boards

- Primarily intervention tools
- Provide opportunity to observe
  - Slow scanning and processing on blind side
  - Slow processing on sound side
- Help quantify performance for documentation
  - Compare performance between the fields

Dynavision- D2
Blackwell et al., 2020

Vision coach
Brooks et al., 2017

Bioness Integrated Therapy System
Stephenson et al., 2019

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Client Compensating Well for HH

- 66 year old client with a complete left HH of 2 years
- Trained on Dynavision as part of therapy to prepare him to resume driving
- Currently has been driving without an accident for 18 months in a metropolitan area
- Performance was completed under good lighting-typically dim room lighting to increase target visibility
- Notice how client consistently monitors left field and displays many of the behaviors listed in table on slide 6

8

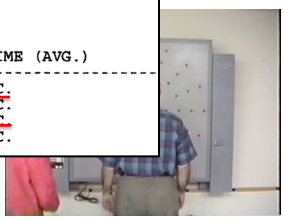
8

Ida- Key Dynavision Observation

- Key observations
  - More lights shown on left side (8)compared to right (5)during this run
- Strengths
  - Located lights on both sides
  - especially on right side

I.D.# - _____ DATE - _____ NAME - _____
SCORE - 028, AVERAGE REACTION TIME - 2.07
PROGRAM IDENTIFICATION: RUNTIME - 60 SECONDS, PROGRAM - MODE "A"
QUADRANTS - ALL
AREA - FULL

QUADRANT	LIGHTS	HITS	PERCENT	REACTION TIME (AVG.)
QUAD 1	05	05	100%	2.85 SEC.
QUAD 2	12	12	100%	1.55 SEC.
QUAD 3	03	03	100%	4.10 SEC.
QUAD 4	08	08	100%	1.57 SEC.



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Characteristics of a Good Light Board Performance

Good Performance	Deficient Performance
• Searches **blind field first** • **Turns head** towards blind field to view periphery of board • Uses an **efficient** search strategy • **Attends equally to** both sides of the board	• Searches **sound field first** • **Does not** turn head or turn head far enough towards blind side • Uses a **time-consuming** strategy • Focuses **attention on one side** of the board

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Poor Man's Light Board

- Laser pointer
- Project dot onto various locations on a blank wall; instruct the client to locate the dot and touch it
- Test all quadrants
- Observe the pattern client uses to locate dot
- Estimate the time client takes to locate the dot in the different quadrants and compare differences between search times

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Client's Perception

- It is very useful to hear how the client describes their vision and understands their field loss
- Clients like Mr. L in lesson 8 who can describe how they see half of something until they move their head towards the field cut are on their way to learning to compensate for the field loss using compensatory scanning

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biVABA Key Observations

Key Complaints/Observations-Mobility: *Observe client move through a crowded area with obstacles-walking or in wheelchair.*

_____ collides or comes very close to obstacles consistently on one side _____R side _____L side
____ fixates straight ahead target (doorway, chair...) and moves towards it without looking to either side
____ stares at the floor immediately in front of feet (e.g., shoe gazing)
____ turns head and consistently stares to one side _____ R side_____ L side.
____ stays close to one side of the wall when moving down a hallway _____ R side _____ L side
____ uses fingers to "trail" wall to guide self when moving down a hallway or around an obstacle
____ stays half step behind companion when walking, unwilling to take the lead
____ stops moving when approaching or passing by another moving object or person
____ complains of feeling off balance to one side _____ R side _____ L side
____ slows down, appears hesitant when transitioning floor surfaces (carpet to vinyl, over a curb, or onto a curb cut) _____ expresses a fear of falling
____ appears anxious, uncertain, uncomfortable moving in crowded or community environments
____ refuses/resists going into crowded or community environments

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biVABA Key Observations

Key Complaints/Observations-Navigation/Orientation: *Observe client move through environment towards a specific destination.*

_____ difficulty/unable to locate destination
_____ avoids obstacles in familiar environments but collides with obstacles in unfamiliar settings
_____ reads only half of a wide sign or misses signage on one side when moving
_____ complains of disorientation when moving self through environment
_____ complains of disorientation when riding in a car or pushed in a wheelchair
_____ has dropped out community activities due to fear of getting lost
_____ depends on family/others to guide them through an environment
_____ avoids crowds and crowded environments such as shopping centers

14

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Observations of Mobility/Navigation in Different Environments

- Important to observe client navigate different settings to determine how environmental features influence performance
  - **Visibility of** features
  - Noise and distractions
  - Unfamiliar environments
  - Other demands on the client's attention
- Observe for signs of stress
  - Hesitant, uncomfortable, and anxious
  - Trailing or attempts to follow you
  - Tentative, uncertain in responding to certain features
  - Appears or complains of disorientation

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FLASH Test

- Newly published observational test to indicate presence of HH in clients with severe acquired brain injury
  - Uses some of the behaviors included on the biVABA checklists
- Compared to Humphrey test
  - 81% sensitivity, 77% specificity
  - Good inter-rater reliability ICC .954 and internal consistency Cronbach Alpha.874
- Open access article includes link to supplementary materials and the recording form

Lucatello, S, De Angelis, S., Di Lorenzo, C., Iosa, M.,.Magnotti, L., Di Paola, M…Tamontano, M. (2023). Functional assessment scale of hemianopia (Flash): A new multi-disciplinary tool to assess hemianopia in patients with severe acquired brain injury, Healthcare,11, 2883. https://doi.org/10.3390/healthcare11212883

16

Documentation

The client demonstrated behaviors while walking to a specified destination that suggest vision loss on her right side may be interfering with her ability to safely navigate through environments. These include walking slowly, staring straight ahead and not searching her surroundings and appearing stressed. She had difficulty locating a door handle on her right side and looked at her feet as she walked through the doorway. The client reports that she is bothered by other people moving by her and worries that she will hit them. She reports feeling …

The client was observed walking down a hallway without assistance. She walked slowly, stared straight ahead and did not search her surroundings. She appeared stressed. She had difficulty locating the right-sided door handle to enter the clinic and looked at her feet as she walked through the doorway. The client reports she is bothered by other people moving by her and worries that she will hit them. She reports feeling uncomfortable when she walks in areas other than her home and worries that she will get lost. She relies on her neighbor to drive her to appointments and help her shop.

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Key Lesson Take Aways

- The client's strengths and weakness in using vision for navigation is determined using a combination of objective assessments and field observation
- Light boards are objective assessments that provide data on speed and accuracy under different conditions
- Field assessments provide observational information about performance during completion of daily activities

18

18

This Lesson will Cover

- How to use the biVABA Telephone Number Copy Test to evaluate the client's accuracy in reading numbers
- How to interpret the client's performance on the assessment and link it to occupational performance

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Assessing Client's Ability to Accurately Read Numbers

- A client who has difficulty reading words, will also have difficulty accurately reading numbers
- Numbers present a special challenge
  - They have similar configurations
    - 3,6,8,5,9
  - Client receives no or delayed feedback when mistakes occur
    - Is the phone number 823-6667 or 828-6687?
    - Is the credit card bill $688.00 or $633.00?

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biVABA Telephone Number Copy Test

Client copies down a series of 10 telephone numbers

Brain Injury Visual Assessment Battery for Adults

TELEPHONE NUMBER COPY

Client: ______________ Examiner: ______________

Date: ______ Diagnosis: ______________

908-2368 ______________

356-7876 ______________

288-9876 ______________

515-6687 ______________

338-9769 ______________

486-6384 ______________

884-2633 ______________

533-8767 ______________

495-5843 ______________

623-7391 ______________

Set Up

- Test Items
  - Visual Attention Assessment form
  - Paper copy of the Telephone Number Copy Test (biVABA Appendix C)
  - Black medium point pen
  - Timer
- International Users:
  - You may modify the test form to create numbers that correspond to the format used in your country
    - Use **18-point size bolded font** for the telephone numbers and match the spacing on the form
    - Use the Visual Attention Assessment form to record the client's performance

biVABA Telephone Number Copy Test

- Environment
  - Well lighted room with non glaring light source directed from behind the client onto the subtest- ensure the light is not shining directly into the client's eyes
  - The test requires the client's full attention ensure the room is free from visual, auditory, physical distractions

7

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Test Instructions

- Seat client comfortably at a well illuminated writing surface
- If client wears prescription or over-the-counter eyeglasses for reading, they must be worn for this assessment
- Place the test at the client's midline
- Hand the client the black medium point ink pen
- Instruct the client to copy each telephone number on the left side of the page onto the line next to it and to place the pen on the table when finished
- The client may reposition the form. Note these changes on the recording form
- Begin timing when the client begins reading the first telephone number
- Stop timing when the client places the pen on the table

8

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Test Instructions

- Observe and record client's search strategy on corresponding line on the Visual Attention Assessment form
- Provide verbal, physical, or visual cues if client is struggling
- Examples of verbal cues
  - "Remember a telephone number contains 7 numbers"
  - "Remember to look at the numbers closely, some numbers look alike"
- Examples of physical cues
  - Gently turn client's head towards left or right side of the test
  - Place client's hand on the left or right side of test to draw attention that side
  - Point to the left or right border of the test
  - Point to the copying line
- Examples of other cues
  - Draw a bright red anchoring line on left side of test, remind client to look for the red line
  - Provide an auditory cue (like a chiming ring tone on your phone) on HH side to draw attention to that side

9

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Test Instructions

- Count and record the number of errors the client made in copying the **individual** numbers
  - 80 possible errors: 70 individual numbers and 10 dashes
- Errors
  - **Omission**- leaving a number/dash out of the sequence
  - **Misidentification**-writing down an incorrect number
    - If the client copied down a number incorrectly but immediately corrected the error without cuing, note this on the recording form but **do not count** it as an error
- Tell the client the number of **individual errors** made in copying down the numbers
- **Then instruct the client to find and correct all errors**

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Test Instructions

- Begin timing when the client begins to search the test to locate the **first error**
- Record the number of errors made **before and after self-correction** on the recording form
- Record percentage of correctly copied telephone numbers **before and after self-correction**
  - Each telephone number is considered a **single item** when calculating the percentage.
    - For example: a client who copies down 8 of the 10 telephone numbers correctly would have a test accuracy of 80%
- Calculate and compare the percentage of correct telephone numbers before and after self-correction

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Instructions to Client

Before the test begins:

"There are 10 telephone numbers on this sheet. Read each telephone number carefully and copy it down on the blank line next to it *[indicate the line].* Place your pen on the table when are you are finished. Try to be as accurate as you can. I am going to count the number of errors you make in copying the numbers."

After the client completes the test-if errors are made:

"You made __ errors in copying down the numbers. Please recheck your work and try to find and correct your errors. When you have finished, place your pen on the table."

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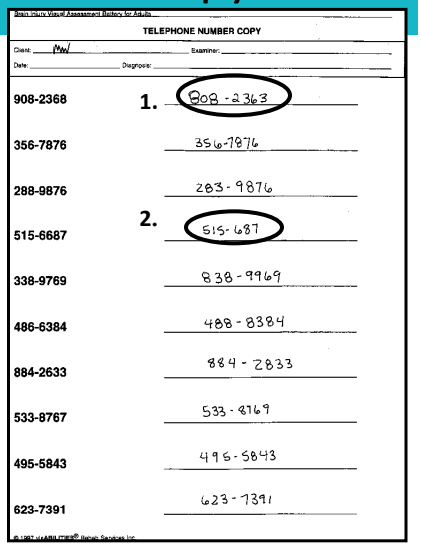
The Telephone Number Copy Test

Example of errors

1. Client copies down similar but incorrect number
   - **8**08-236**3** instead of **9**08-236**8**
     - 8 instead of 9
     - 3 instead of 8
2. Client omits the first number (6) after the dash
   - Should be 515-**6**687
   - Uncommon error only observed on client's with HH



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Expected Performance of Client with HH

- Client **may misread specific** numbers
  - Usually those that have similar configurations
- But the client **locates and corrects** errors on the do-over
- **Performance may be slow**, but client **attends well** throughout both portions of the test
- The client may **reposition** the test or use a **specific compensatory strategy** to complete the test
- **In contrast client with neglect may**
  - Quickly complete the test without attention to errors
  - Have difficulty sustaining attention throughout the test
    - Attends well at first but performance quickly declines
  - Be unable to self-correct errors on the do-over

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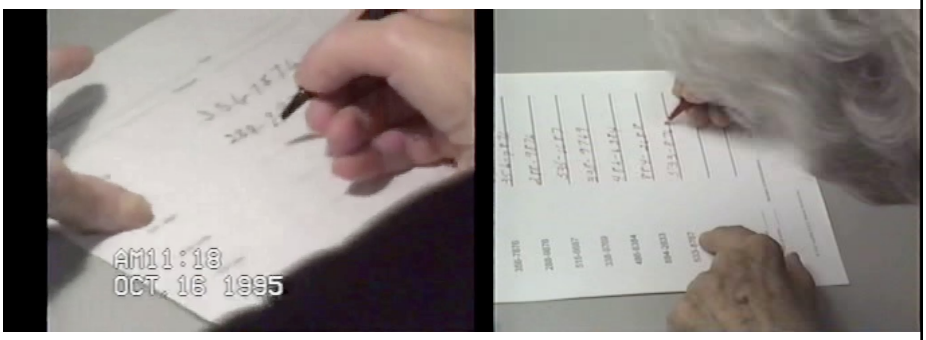
Two Clients with R HH completing the Telephone Number Copy Test



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biVABA Recording Form

Telephone Number Copy Test: *Place test at midline; client may reposition test. Instruct client to copy numbers and place pen down when finished. Time performance. Count single errors; instruct client to correct errors. Time performance rechecking errors.*

Initial Performance:
Correct responses _____/10 Percent correct: _____Time: _____
Errors: _____/80 _____omissions _____ misidentifications
Repositioned form: _____
Provided cue: _____verbal ____ visual ____ physical ____ benefit ____ no benefit

Key Observations:
_____ uses fingers of non-dominant hand to keep place on the line while reading and writing
_____ omits _____first number(s) in sequence _____last number(s)in sequence _____ in middle of sequence_____ first number after the dash
_____ handwriting drifts on the line _____ writes on top of other numbers in the sequence

Self-Correction of Errors:
_____Located all errors Located _____/_____ errors Time: _____

Percent of Telephone Numbers Correctly Copied after Self-Correction: _____

16

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Interpretation of Key Observations-biVABA Section: 4.5-(4.5.2.1.1)

- **The client uses the fingers on the non-dominant hand to maintain their place and guide their search** across the line as they copy the telephone numbers. Use of this strategy suggests that the client may have a hemianopia that is affecting the fovea. Persons with hemianopia must alter their search strategy to compensate for the vision loss. Using this strategy improves accuracy BUT it also increases completion time which can cause frustration and fatigue.
- **The client copies a number incorrectly but immediately corrects the error.** Persons with normal visual attention sometimes write down the wrong number or transpose numbers. Realizing and correcting the mistake suggests good capability to attend and accurately identify numbers.
- **The client omits one digit in the number sequence**. This may suggest the presence of a hemianopia or other central visual field deficit or inattention. Clients with hemianopia sometimes leave out a digit when copying a sequence of numbers and do not detect the error until they recheck their work. A client with inattention may not locate the error on recheck.

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- **The client writes down a similar but incorrect number**. This may suggest the presence of a hemianopia or other central visual field deficit. Persons with hemianopia may write down a similar but incorrect number because they do not see the entire number. For example, a client with left hemianopia may see a 3 or 9 when viewing an 8 and a client with a right hemianopia may see a 6 when viewing an 8. The numbers most often misidentified are 3,6,5,8,9, and 4. Persons with hemianopia most often make mistakes reading numbers located on the affected side and persons with neglect make mistakes on the neglecting side. The client with hemianopia should be able to locate and correct errors when rechecking their work, whereas the client with neglect may not be able to correct their errors.
- **The client omits the first number(s) in the sequence.** This may suggest the presence of a left hemianopia or neglect. If the error is due to solely to hemianopia, the client will likely locate the error when rechecking their work and correct it. If neglect is present, the client may not locate the error on the recheck even with cuing.
- **The client omits the first number after the dash**. For example, instead of 884-2633, the client writes 884-633. This error is uncommon and has only been observed in clients with hemianopia.

18

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- **The client drifts on the line when writing down the numbers**. This may suggest a hemianopia that extends into the fovea. Clients with a complete hemianopia located on the same side as their dominant hand, often drift on the line. This occurs because the field deficit prevents them from seeing to monitor their pen tip. The same handwriting behavior is observed in clients with central scotoma from an age-related eye disease like macular degeneration.
- **The client's performance improves in response to cuing**. This is an important observation because it shows that the client can modify attention to improve performance. Most persons with hemianopia possess this capability but persons with neglect lack it. Determine the type of cues that work best for the client and incorporate them into interventions
- **The client does not respond to cues to improve performance**. This is an important observation because it shows that the client is unable to use attention to improve performance. Most persons with hemianopia possess this capability but persons with neglect lack it.
- **The client doesn't locate errors when rechecking performance**. This suggests neglect. Clients with neglect are often unable to focus their attention to locate errors when rechecking their accuracy while clients with hemianopia can use attention to correct errors.

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Documentation

The Telephone Number Copy Test was given to evaluate the client's accuracy reading numbers. She used her left thumb to guide and keep her place as she copied each individual number. This strategy was effortful and time consuming. The client accurately copied all numbers. Completion time 8 minutes. She reports significant difficulty completing financial management….

The client completed the Telephone Number Copy Test to evaluate her accuracy reading numbers. She attended well throughout the test and accurately copied each telephone number. She used her left thumb to guide and keep her place as she copied each individual number. This strategy was effortful and time consuming. It took her 8 minutes to copy the 10 numbers on the test. She reports significant difficulty completing financial management….

20

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Key Lesson Take Aways

- Accurately reading numbers is an important component of many I-ADLs
- The Telephone Number Copy Test provides a structured observational assessment to identify limitations in numeracy
- Persons with HH may use compensatory strategies to ensure accuracy that slow reading causing the client to drop out occupations that require numeracy

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This Lesson will Cover

- How to use the **Pepper Visual Skills for Reading Test** and the **S-K Read** chart to evaluate the client's accuracy in reading
- How to document the client's performance on these assessments and link it to limitations in occupational performance

3

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Key Clinical Observations

Key Complaints/Observations-Reading: *Observe client read aloud a paragraph of print (12 point).*

Key Complaints/Observations-Reading:

_____ abbreviates search on one side of page-omitting words _____ R side _____ L side
_____ transforms numbers: example reads an "8" as a "6"
_____ uses finger to guide reading across line of print/maintain place on the line
_____ consistently loses place on the line on one side of the page _____ R side _____ L side
_____ hesitates when reading a word; misreads word initially then corrects self; reads slowly

4

4

Assessing Reading Performance

- Reading deficiencies can be observed in different assessments
  - Makes errors reading text on reading acuity cards
    - Warren text card from biVABA
  - Omits optotypes on blind side on distance acuity chart
    - LeaNumbers Intermediate Acuity Test Chart
  - Makes errors on the Pepper Visual Skills for Reading Test and S-K Read chart
  - Makes errors on biVABA Telephone Number Copy Test

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Pepper Test
Visual Skills for Reading Test

- Developed in 1990 to assess scotoma interference in reading in persons with AMD
- Validated for hemianopia in 2016 to assess how HH border in the foveal field interferes with reading
- Provides profile of
  - Reading accuracy (as a percentage)
  - Corrected reading rate
    - Most persons read continuous text 1.6x faster than Pepper score
  - Prevalent types of errors
    - Shows influence of border of the HH

Watson, et al. 1990; Blaylock et al. 2016; Fork in the Road Vision Rehabilitation Services-lowvisionsimulators.com

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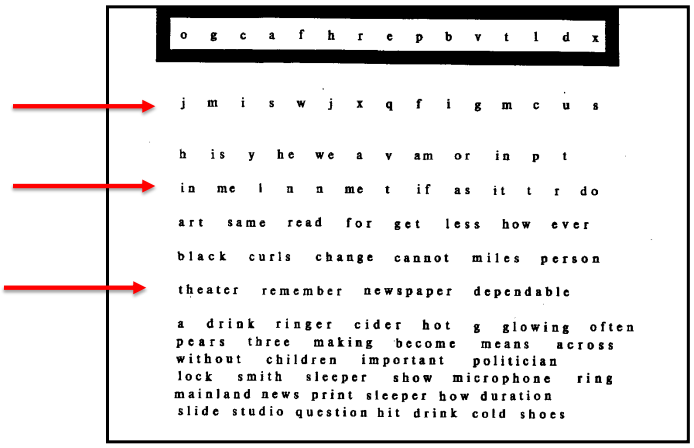
Pepper-Visual Skills for Reading Test (VRST)



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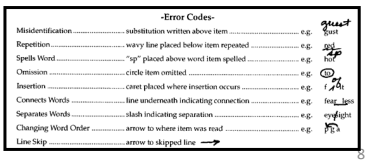
Test Instructions

- Select card with print size 1-2 sizes larger than client can read
- Instruct client to read letter/words on card out loud
- Listen and record errors on scoring sheet
- Time client performance

- TYPES of Errors
  - Misidentification
  - Repetition
  - Spells word
  - Omission
  - Insertion
  - Connects words
  - Separates words
  - Changes word order
  - Skip lines



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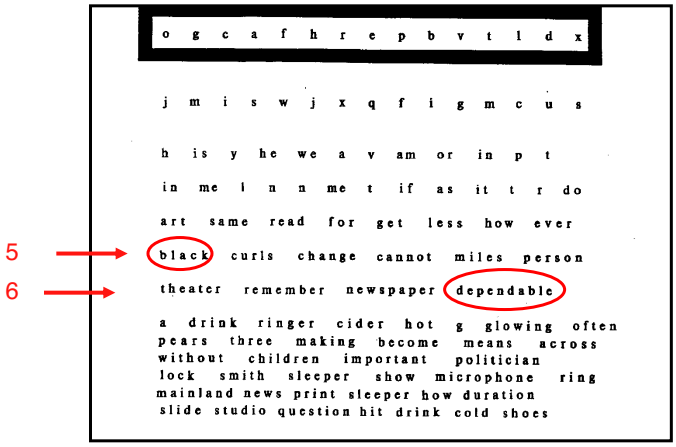
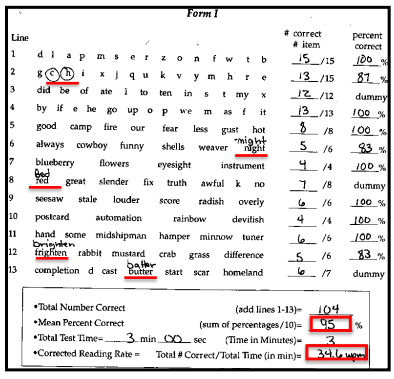
Example of Reading Errors

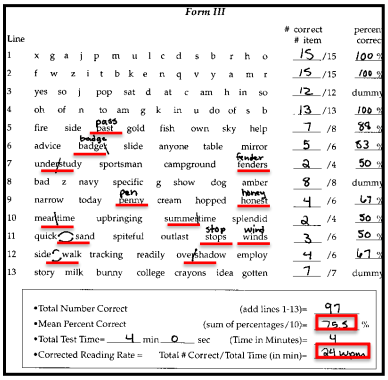


Row 5: Client with LHH might read “black” as “lack”
Row 6: Client with RHH might read “dependable” as “depend”

Examples of Client Performance Documented on Scoring Sheet

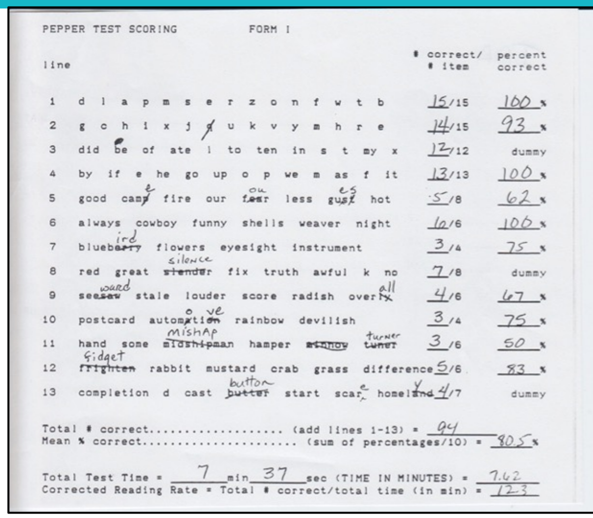


Client with left HH: makes left side **omissions** due to abbreviated scanning towards left and **misreads** left letters of words causing misidentification



Client with right HH: misses or **misreads** right letters of words causing misidentification and **splits** longer words and **connects** shorter words

Ida's Pepper test



PEPPER TEST SCORING FORM I

line		# correct/ # item	percent correct
1	d l a p m s e r z o n f w t b	15/15	100 %
2	g c h i x j d u k v y m h r e	14/15	93 %
3	did be of ate l to ten in s t my x	12/12	dummy
4	by if e he go up o p we m as f it	13/13	100 %
5	good camp fire our fear less gust hot	5/8	62 %
6	always cowboy funny shells weaver night	6/6	100 %
7	blueberry flowers eyesight instrument	3/4	75 %
8	red great slender fix truth awful k no	7/8	dummy
9	seesaw stale louder score radish over fix	4/6	67 %
10	postcard automation rainbow devilish	3/4	75 %
11	hand some midshipman hamper minnow tuner	3/6	50 %
12	frighten rabbit mustard crab grass difference	5/6	83 %
13	completion d cast butter start scar homeland	4/7	dummy

Total # correct.................. (add lines 1-13) = 94

Mean % correct...................... (sum of percentages/10) = 80.5 %

Total Test Time = 7 min 37 sec (TIME IN MINUTES) = 7.62

Corrected Reading Rate = Total # correct/total time (in min) = 12.3

- **16 errors**: 14 errors on right side of words; 2 omissions
- 80.5% accuracy, 12.3 wpm corrected reading rate

Typical Reading Challenges for Client with HH

- Read **more slowly** than person without HH
  - 50-75 words per minute-about 50 wpm less than normally sighted adult
- Commit **reading errors**
  - 75% of participants made errors
  - Most common: omissions and misidentifications
    - Also spelled words, connected words, skipped lines
- Have a **reduced reading accuracy**
  - Average 90% accuracy

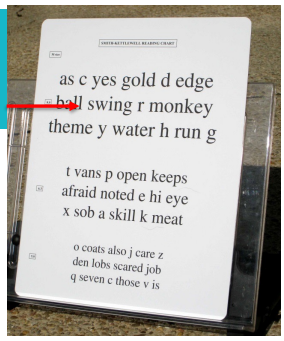
Age	Reading Speed
55-64	102
65-69	102
70-74	93
75-79	87
80-84	80
85 +	70

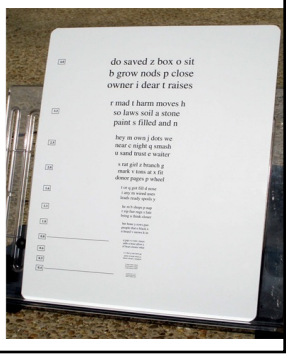
Blaylock et al. 2016; Lott et al. 2001

S-K Read

- Mixture of random words and letters
- Print size from 8M to .4M
- Like the Pepper, words/letters are omitted or misread with central field deficits
  - e.g., swing might be read as “wing”
- Observational test
  - No specified distance
  - Instruct client to read chart out loud
  - Listen for errors and mark the form
  - Time performance and record errors on recording form
- Validated on persons with macular scotoma in 2015

MacKeben, et al. 2015





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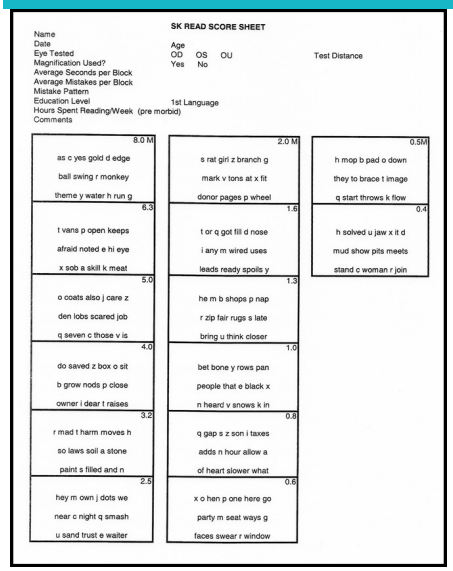
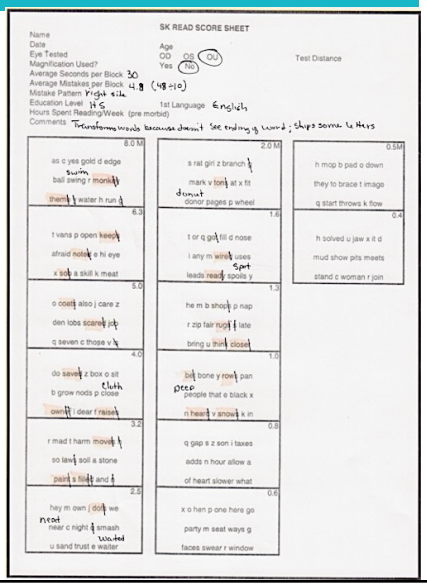
Example: Reading Deficits on S-K Read





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Documentation

- The Visual Skills for Reading Test was used to assess reading performance. The client's reading accuracy was 80.5%. She made 14 right-sided errors-misreading letters on the right side of words and skipped 2 words. Her corrected reading rate was 12.5 words per minute compared to 87 words per minute for a person her age on this test. The client reports that she has significant difficulty locating important information on bills, financial statements, instructions. labels and other reading materials. She requires significant time to complete these activities and often seeks help from her neighbor.

- The S-K reading chart was used to assess the client's ability to read words accurately. The client read 10 lines of the chart between 5M-1M print size. She demonstrated a consistent pattern of missing or misreading letters on the right side of words causing the word to be read incorrectly. The client complains of slowness and difficulty accurately reading printed materials. She reports difficulty shopping, participating in Church services, and other reading activities and depends on others to assist her in these activities.

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Key Lesson Take Aways

- Readers with HH make predicable errors that indicate the influence of the HH on the perceptual span
- The Pepper test has been validated as a reading assessment for persons with HH but is out of print
- S-K read chart provides a useful alternative to the the Pepper but has not yet been validated on persons with HH
- Both charts provide insight into the client's challenges in reading

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16

This Lesson will Cover

- How to use the biVABA visual search subtests to identify strengths and weaknesses in the client's ability to search the central visual field
- How to distinguish between the influence of HH and the influence of neglect on client performance
- How to interpret client performance and link it to occupational limitations

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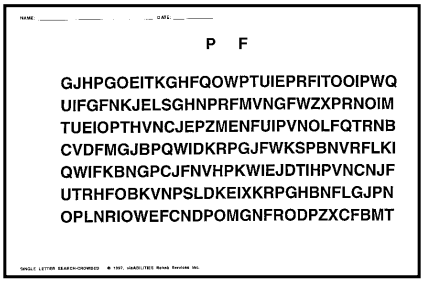
Cancellation Tests

- Observing performance on a cancellation test provides quick way to get a sense of client's ability to search the central field
- Client crosses out or "cancels" a target like a letter or symbol
  - Identify strengths and weaknesses of the search performance
  - Note accuracy and time required to complete search

biVABA: Single letter search test



Benjamins et al. 2019; Warren et al. 2008; Vallar et al. 2018; Butler et al. 2009

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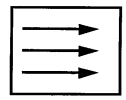
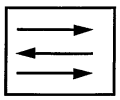
Normal Search Patterns on Cancellation Tests

- Left-to-right and top-to-bottom linear pattern
- Symmetrical
- Consistent-uses same pattern **throughout** a subtest
- Accurate
- Resilient-uses same pattern **on all subtests**
- Checks accuracy when uncertain about performance
- No difference between men and women
- Age difference-older adults complete tests more slowly than younger adults and are more likely to recheck work



Horizontal left to right



Horizontal rectilinear

Warren, et al. 2008; Benjamins, et al. 2019

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biVABA Visual Search Subtests

- A series of 7 cancellation tests
  - Vary in format and complexity
- Not designed to be diagnostic
  - No cut off scores
  - **Tool** to assist intervention planning
- Observational test
  - Uses cancellation format to provide a structured task to observe effectiveness and limitations of client's visual search pattern
    - This insight is very important for intervention

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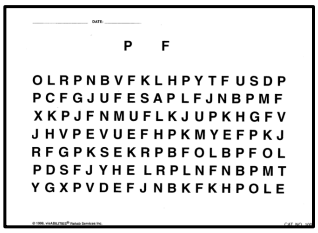
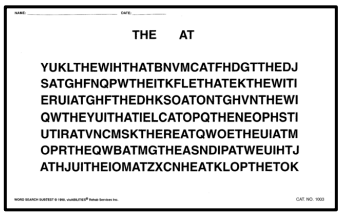
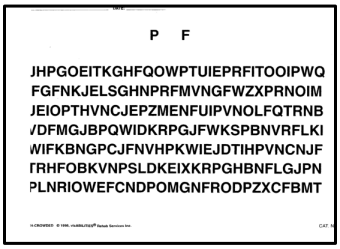
These are the biVABA subtests typically used to assess clients with hemianopia



Single Letter Search-Simple



Single Word Search



Single letter Search-Crowded

7

Set Up

- Test Items
  - First page of Visual Attention assessment recording form
  - Paper copies of the selected visual search subtests
  - Red felt tip marker
  - Timer
- Environment
  - Well lighted room with non glaring light source directed from behind the client onto the subtest-ensure the light is not shining directly into the client's eyes
  - The test requires the client's full attention-ensure the room is free from visual, auditory, physical distractions

8

Test Instructions

- Place the cancellation subtest at client's midline
  - Client may reposition the subtest after you place it
    - Note this on the recording form
- Instruct client to cross out the designated target(s) and place the red marker on the table when finished
- Begin timing when the client initiates the search
- Use the checklist recording form to record the client's performance
- Record accuracy
- Record completion time

9

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General Instructions to the Client:

"I am going to give you some tests to find out if you can look for information and objects in an organized way. Brain injury can cause your ability to search for things to become disorganized. This can make it difficult for you find the items and information you need to complete your daily activities. These tests look at how you use your vision to search and will help me figure out how to improve your ability to find the items you need."

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Provide Cues When Needed

- Provide verbal, physical, visual cues when client is struggling to locate targets (section 4.4.1.6)
- Examples of verbal cues
  - "Remember the sheet is very wide"
  - "There are more [circles/letters/words] on your [left/right] side"
  - "There are [insert number] [circles/letters/words] on the sheet"
  - "There are [insert number] [circle/letters/words] left to find [on the left or right side]"

11

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Cuing

- Examples of physical cues
  - Gently turn client's head towards left or right side of the subtest
  - Place client's hand on left or right border of subtest to draw attention to it
  - Point to left or right border of subtest
- Other cues
  - Draw a bright red anchoring line on left or right side of subtest, remind client to look for the red line
    - This cue often works well for the client with hemianopia but not the client with neglect
  - Provide an auditory cue on neglecting side such as a chiming ring sound on your phone

12

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Recording the Client's Performance

- Record correct responses on assessment form
  - Flip side of plastic template shows location of targets to help you quickly and accurately count the correct responses
- Cancelling **wrong target** (e.g. E instead of F) is **counted as an error**
- Cancelling wrong target but **immediately correcting** mistake without cuing **is not counted as an error**
- Use table in **Appendix F** to quickly calculate percentage of correct responses

13

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biVABA Search Times

Performance of Typical Adults on the biVABA Visual Search Subtests

Subtest	Median Time	Fastest Time	Slowest Time
Single letter search simple	63	32	141
Single letter search crowded	79	42	215
Word search	79	38	166
Structured complex circles	43	24	120
Random open circles simple	22	13	43
Random open circles complex	48	30	99
Random complex circles	60	24	196

Time reported in seconds (section 4.4)

Warren et al. 2009

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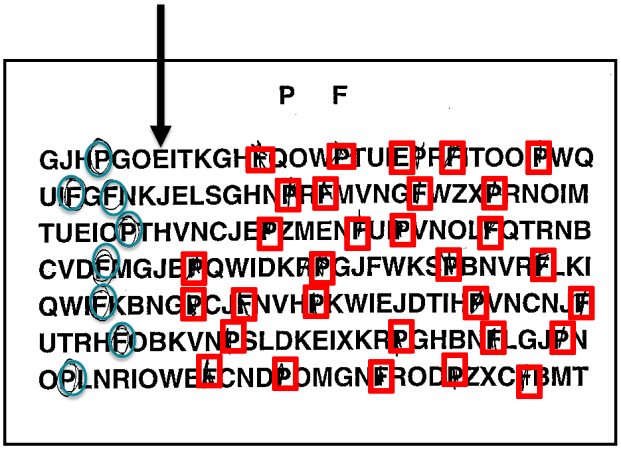
Example: Client with Left Hemianopia



- Arrow indicates where client begins and scans each line in the array
- Blue circles indicate letters client omitted when searching resulting in errors on the test

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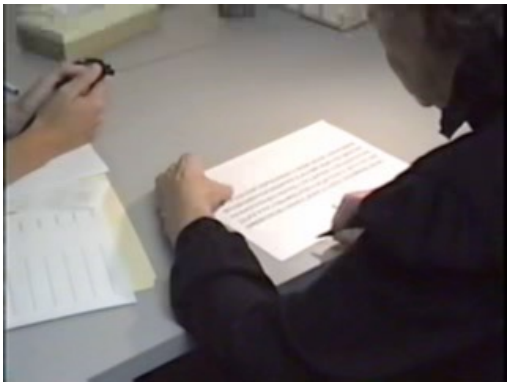
Ida completing a cancellation test

- Letter cancellation assessment-Behavioral Inattention Test
- Limitations: reading, financial management, shopping, driving
- Note how she
  - Uses her left hand to help maintain her search pattern
  - Skips a line when she returns to the left side



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Documentation of Ida's Performance

- Summary

  The client used a normal reading strategy to identify targets on a letter cancellation test. She accurately located all targets using her left-hand fingers to maintain her place on the line. This strategy was slow and effortful. She skipped one row of targets and had difficulty locating the end of the right side of the line. She reports difficulty locating important information on bills, labels and other printed materials. She requires significant time to complete these activities and seeks help from her neighbor.

- Descriptive

  The client's ability to search the right side to locate information was assessed using a letter cancellation task. The client used a normal reading strategy to identify targets. She used her left-hand fingers to guide and maintain her place on the line to search each row. She was accurate, but her strategy was slow and effortful. She had difficulty determining where the letters ended on the right side of the rows and skipped a line of targets when returning to the left side of the sheet. She reports significant difficulty locating important information on bills, financial statements, instructions, labels and other printed materials. She requires significant time to complete these activities and seeks help from her neighbor.

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Key HH Observations Cancellation Tests

- **Strengths**
  - Search pattern is **organized**
  - Search pattern is **complete** within seeing field
  - **Sustains attention** throughout task
  - **Responds to cuing**
- **Weaknesses**
  - **Abbreviated** search
    - Does not see targets on blind side
  - **Tedious and slow** search
    - Cannot tell how far to move into blind field
    - Often adopts strategies to move into blind field that significantly slow down search

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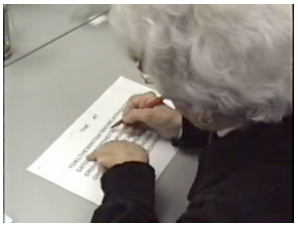
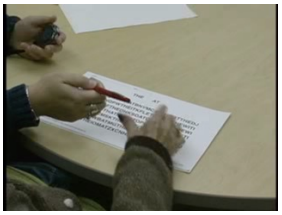
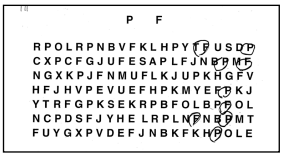
Difference between Neglect and HH

Hemianopia	Neglect
• Abbreviated search pattern with omissions on blind side • Pattern usually slow, tedious but **ORGANIZED** • Ability to sustain attention (measured by time) is appropriate for the task • Improves with cuing and practice	• Abbreviated search pattern towards left with omissions • Pattern is **asymmetrical, random, disorganized** • Short completion times with little or no re-scanning to check accuracy • Can't incorporate cue, less improvement with practice







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Interpretation of Key Observations-biVABA Section: 4.4-(4.4.3.1.4)

- ***The client uses the fingers of the non-dominant hand to maintain their place and guide their search across the line as they cancel targets***. Use of this strategy suggests that the client has a hemianopia that is affecting the fovea. Persons with hemianopia must alter their search strategy to compensate for the vision loss. Unless the client also has neglect, you should observe a left-to-right reading search strategy on subtests with structured visual arrays (*letter searches, words search, complex circle search*). Using this strategy improves accuracy BUT it also increases search time which can cause fatigue.
- ***The client initially misses a target but locates it when checking their work***. Rechecking work to locate missed targets on a cancellation test is observed in typical adults.259 It occurs more often on subtests that demand greater attention-those with crowded or random arrays (*single letter search-crowded, word search, structured complex circles search, random complex circles search*). Older adults more frequently recheck their work than younger adults.[259]
- ***The client is unable to cross out the target accurately and places the mark to one side of the target***. This does not suggest reduced visual attention but may indicate reduced eye-hand coordination due to poor acuity, hemianopia, diplopia, or other oculomotor impairment.

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- ***The client slowly but accurately completes the subtest using a structured search strategy.*** This may indicate a general slowness in processing speed, a language deficit such as aphasia, a visual field deficit, or reduced acuity. The observation that the client used effective search strategies and was able to sustain attention to complete the subtest shows a strength in visual attention.
- ***The client's performance improves in response to cuing.*** This is an important observation because it shows that the client can modify attention to improve performance. Most persons with hemianopia possess this capability but persons with neglect lack it. Determine the type of cues that work best for the client and incorporate them into interventions.
- ***The client skips lines on the structured search tests.*** Clients with left hemianopia can have difficulty accurately locating the next line of print due to difficulty/inability to execute an accurate long leftward saccade towards the blind field. This may cause the client to inadvertently skip lines of print. A client also skip lines due to inattention. A client with either condition may have difficulty reading accurately.
- ***The client skips over and does not cross out targets.*** When the targets are omitted only on one side, it suggests the presence of a hemianopia or hemi-inattention or a combination of the two conditions (e.g., neglect). If the client randomly skips over targets throughout the subtest and has difficulty executing an organized search pattern, it suggests impaired non-lateralized inattention. Clients with a complete hemianopia that extends into the fovea may also randomly omit targets throughout a subtest but their search pattern is generally organized.

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Key Lesson Take Aways

- Cancellation tests provide a quick way to screen for strengths and weaknesses in the client's ability to effectively search the central visual field
- Cancellation tests also help differentiate hemianopia from neglect in creating deficiencies in searching the central field

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This Lesson will Cover

- Things to consider when assessing deficits in visual performance

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Screening for Deficits in Visual Performance

- HH creates a permanent vision impairment
- Focuses on the limitations the client experiences using current vision to complete reading, mobility, navigation and eye-hand coordination
- Assessment covers
  - Client's knowledge/insight into the field loss
  - Client's ability to effectively compensate for the field deficit when searching the central field
    - Necessary for reading and writing
  - Client's ability to effectively compensate for the field deficit when searching the peripheral field
    - Necessary for mobility and navigation

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Insight into the Visual Field Loss

- To apply compensatory strategies
  - Client must have good insight into the location of the field deficit and its affect on vision
- Person often misunderstands HH
  - Believes deficit is in one eye only
  - Believes deficit only affects peripheral field
  - Believes deficit is in the eye not the brain
- If you ask a client to describe strategies used to compensate for VFD
  - Often can not verbally state the strategy they use
    - Has no awareness of how to compensate

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Key Characteristics of HH on Visual Search

- **Slow, tedious search** of the blind field due to perceptual completion
- **Missing** critical information needed for accurate and fluent reading due to reduced width of perceptual span
- **Difficulty monitoring** the hand and foot in activities that require precise movement
- **No** impairment of attention, cognition or language-client **normally processes** seen images
  - Organized search pattern
  - Ability to maintain attention throughout task
  - Ability to respond to cuing and use it to improve performance

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Identify other Contributors to Deficient Visual Performance

- **Left HH** or **left neglect**?
  - Both affect ability to effectively search the central and peripheral field to complete occupations
  - **Key neglect** observations
    - Disorganized, ineffective, abbreviated search pattern due to **inattention**
    - Little **insight** into performance deficits
    - Difficulty **initiating and sustaining** attention to effectively complete searching
- **Right HH** or **aphasia**?
  - Both affect reading accuracy and fluency
  - Key aphasia observation
    - **Consistent difficulty accurately identifying certain** clearly visible single letters and numbers- mixing up specific letters and numbers

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Other Contributors…

- **Co-occurring visual conditions-like AMD, DR, glaucoma?**
  - **Key** observations
    - Unable to see complete letters, numbers, words unless print is enlarged
    - Glaucoma-difficulty searching environment during navigation or locating objects especially in environments with low lighting and contrast
- **Missing, broken, outdated glasses?**
  - **Key** observations
    - Confusion, inattention, anxiousness, keeping eyes closed, slowness, refusal to participate
- **Other client factors-**pain, depression, anxiety, fatigue that add effort to completing occupations

Owsley et al. 2007; Elliot et al. 2013; Lotery, et al. 2000; Roche et al 2014

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Assessing HH Influence on Visual Search

- Observational assessments
- **Key** questions to be answered
  - How is the client's vision limiting visual search?
    - How is the **search pattern disrupted**?
  - What are the client's strengths and weaknesses using vision to complete tasks?
    - Does the client use **compensatory strategies**?
    - Does the compensatory strategy **help or hinder** occupational performance?
  - How does the environment help or hinder use of vision?
- Assess two areas
  - Search in **central** visual field
  - Search in **peripheral** visual field

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How is the HH limiting the client's ability to search the **Central Field?**

- Primary functional limitation
  - Reading-related tasks
    - **80% incidence** of *hemianopic dyslexia (d*ifficulty reading)
  - Handwriting/other fine-motor tasks
    - HH on same side as dominant hand/foot
- Person adopts inefficient strategies that require **lots of effort**
  - Reduces participation in reading and writing tasks

Ong et al. 2012

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How is the HH limiting the client's ability to search the **Peripheral Field?**

- Search is often slow and incomplete
  - Uses ineffective search strategies
    - Slow, stair-step saccades, longer fixations, abbreviated search
  - Causes difficulty getting an accurate and complete overview of surroundings needed to
    - Detect and locate objects
    - Avoid obstacles
    - Maintain orientation
- Stops navigating independently
- Avoids participating in dynamic and community environments

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Key Questions to Ask

- Is the client using a specific strategy to locate targets?
- Does the strategy help or hinder performance?
  - Does it increase or decrease accuracy?
  - Does it increase or decrease speed?
- Does it increase the client's confidence and self efficacy?
- Is it feasible and practical for the client to use this strategy to complete a daily occupation?

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Key Lesson Take Aways

- Field deficits are mostly permanent; client must learn to **compensate** for deficit using current vision
- To compensate, the client must understand how their visual limitations affect their functional performance
- Its important to consider all conditions that may affect the client's vision
- Visual field deficits have specific key characteristics that limit functional performance
- Assessment focuses on answering key questions about the client's visual performance

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