

Brain injury Visual Assessment Battery for Adults (biVABA)

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Objectives

Participants will **conduct at least two components** of a basic vision screen.

Participants will **describe how to clinically interpret** assessment results for clients.

Participants will identify at least **two treatment strategies** for enhanced visual accessibility.

Participants will review and **discuss a vision rehabilitation case** example to determine a plan of care.

Participants will locate at least **two vision providers or resources** for client referral



Approach to Vision Assessment

Visual impairment includes *both* low vision and blindness

About **50%** of clients with acquired brain injury experience visual deficits (Dube et al., 2021)

- Between **50 – 68%** of TBI survivors and between **30 – 85%** of CVA survivors (As cited in Kaminsky & Powell, 2023)

National Institute of Health reports it is often **underestimated** (Berthold-Lindstedt et al., 2017)

Goals of vision assessment:

- Identify clients who might benefit from rehabilitation
- Evaluate functional needs
- Evaluate need for possible low vision devices
- Educate family and caregivers
- Provide appropriate referrals to other vision service providers



Tripathi & Agarwal, 2022
Bulson et al., 2023, Goodrich et al., 2013, Magone et al., 2014, Schlageter et al., 1993, Khan et al., 2008 as cited in Kaminsky & Powell, 2023

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Hierarchy of Vision

Foundational skills

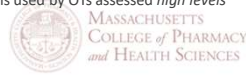
- Acuity, oculomotor control and visual fields

Intermediate skills

- Identification and recognition of objects in space (scanning, attention)

High level processing skills

- Mental manipulation of visual information
- Ability to integrate with other sensory information to make decisions
- Most assessment tools used by OTs assessed *high levels* of vision



Dube et al., 2021
Kaminsky & Powell, 2023

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Assessment Process

Evaluation tools for diagnostic purposes used by vision specialists

- Optometrists and ophthalmologists

Screening and assessment tools used by clinicians to identify visual dysfunction, build intervention plans and monitor changes

Test battery

- Multiples tools used in combination

Clients with ABI in rehabilitation setting “generally do not receive a formal vision assessment by vision specialists” (Dube et al., 2021)

The biVABA “enables a therapist to **screen for visual impairment** so that an **appropriate referral** can be made and to provide information to **plan interventions** to effectively address the **limitations in daily occupations** resulting from visual impairment” (Warren, 2006, p. iv)



Dube et al., 2021

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About the Assessment

Can assess both clients with brain injury and persons with visual impairment or low vision

- AMD, diabetic retinopathy, glaucoma or other conditions
- For clients age 14 and older

-Kit includes:

- Manual for administration instructions and interpretation of each subtest
- All assessment forms and test charts
- Penlight
- Eye patch
- Occluder

-Assessments:

- Many are designed by experts from **ophthalmology** and **optometry**
- Others designed by Dr. Mary Warren based on research
- Not a diagnostic tool

-Interpretation of results:

- Manual includes instructions for documenting test results, writing intervention goals and designing effective interventions.
- Task analysis approach: No mention of cut-off scores or scores in general



Warren, 2006

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Standardized Assessments

LEA charts:

- Developed by Dr. Lea Hyvarinen, M.D.
- Developed for children, normed for pediatrics and adults
- High degrees of validity and reliability
- Used as gold standard in research and clinic
- Can be obtained through: LEA Test Intl. LLC <https://www.leatest.com/catalog/contrast-sensitivity>; Precision Vision <https://www.precision-vision.com/>; or Bernell <https://www.bernell.com/>

Damato Campimeter:

- Developed by Bertil Damato, M.D.

Warren Text Card:

- Modification of the Lighthouse Near Vision Reading Card
- Meets standards for reading acuity testing

Oculomotor screening:

- Comprised on standard screening tests routinely used by ophthalmology and neurology

*Need for more research on the biVABA battery:

The full assessment used in one published study to identify visual deficits in persons post brain injury



Tripathi & Agarwal, 2022

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biVABA

Contents: **Visual acuity**

Contrast sensitivity function

Visual fields

Oculomotor function

Visual attention



Warren, 2006

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Warren, 2006

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Visual acuity

Pupillary responses

Eye dominance

Warren Text Card - reading acuity

LEA Low Vision Numbers – intermediate acuity test chart

Picture by Butler, A.
Warren, 2006

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Intermediate acuity: LEA Low Vision Numbers

Test procedure:

- 1 meter fixed test distance
- Glasses on if worn
- One eye at a time, then both eyes
- Even and good quality illumination
- Begin at highest level

Interpretation of results:

- Client needs to obtain more than half items on the line to be given credit

Barlow & Warren, 2019
Whittaker et al., 2016

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Warren, 2006

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LEA Contrast Sensitivity Flip Chart

Test procedure:

- Glasses on if worn
- Complete with both eyes together
- 16" reading distance
- Start with highest contrast
- Ask for the first picture on the line
- If client reads first symbol without effort, they are given credit for the entire line
- If client hesitates or makes an error, return to the line previously read and instruct client to read entire line, then try reading the next line again.
- If client does not see a symbol at first, encourage client to focus on symbol and see if it appears.
- Client obtains at least 3/5 items on the line to be given credit
- Record number of lines client read accurately

Contrast levels
25%, 10%, 5%, 2.5%, and 1.2%



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Considerations

Testing Considerations

- Do not touch surface of contrast charts, only use pointer
- Luminance affects threshold values. Variation in results caused by variation in illumination need to be considered.
- Test should be at a fixed distance from the light source

Functional Interpretation

- Dr. Hyvarinen has provided functional interpretation of results included in the biVABA:
- Identify level of impairment for CSF and impact on functional ADL and IADL tasks.
- Supportive for intervention planning and documentation



Barlow & Warren, 2009
Good-Lite, n.d.
Warren et al., 2006

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Intervention Planning and Documentation

Client sees all 5 levels of numbers (25%-1.25%)

- Good CS for function and mobility

Client reads the first three lines only (25%-5%)

- May have difficulty seeing facial expressions, detecting low contrast drop offs such as curbs, sidewalks and alteration in terrain.

Client reads first two lines only (25%-10%)

- Difficulty with subtle changes in support surface, poor quality print, facial features, water spilled on floor/counter and pouring

Client reads first line only (25%)

- Will need enhancement of contrast to function safely; may require assist to complete functional mobility safely; driving performance should be carefully evaluated

Client does not see any numbers

- CS extremely limited, driving highly questionable



Warren, 2006

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Warren, 2006

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Visual Fields

Confrontation testing

Damato 30 Point Multifixation Campimeter

Good life, n.d.
Kaminsky & Powell, 2023

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Warren, 2006

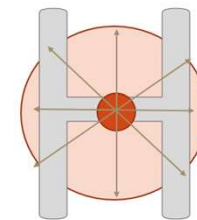
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Oculomotor Function

Observation of corneal reflections

Eye movements (9 cardinal points of gaze)

Binocular smooth pursuit eye movements

Warren, 2006
Kaminsky & Powell, 2023

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Sample assessment record form

Documentation for oculomotility and tracking eye movements



Warren, 2006

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Oculomotor Function

Phoria = deviation present when binocular fusion is interrupted

Tropia = misalignment when looking with both eyes uncovered

Testing fusion with **cover/uncover test**

**Multiple cover tests and instructions for each included*



Whittaker et al., 2016

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Sample assessment record form

Documentation for testing diplopia and cover tests



Warren, 2006

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Oculomotor Function

Near Point of Convergence

- Observe if client is able to *converge* eyes together to see two of object

Normal convergence results:

- BREAK** is where *convergence breaks*. The distance at which patient reports double vision (4 – 6" from bridge of nose)
- RECOVERY** is when *convergence is recovered*, and object is seen as one again

If client is **UNABLE** to converge, there is a strabismus (misalignment) and need to identify with cover-uncover test



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Sample assessment record form

Documentation for testing
convergence



Warren, 2006

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biVABA

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Warren, 2006

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Visual Attention

Hemi-inattention vs. Hemianopia
Structured visual array
Unstructured visual array
Telephone number copy
Design copy
ScanBoard
ScanCourse



Warren, 2006

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Considerations for Intervention



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Using Assessment Results to Develop Goals and Intervention Planning

Developing an intervention plan:

- **Lighting** – even, high quality illumination, reduce glare
- **Contrast** – color, clutter/patterns
- **Magnification** – relative distance and relative size
- **Organization** – reduce the need for vision
- Effective **search patterns** and **scanning**
- **Reading and writing**
- Selective **partial occlusion**

Referral to vision specialists:

- Orientation and mobility specialist
- Certified low vision therapists
- Optometrist with specialization in vision rehab (COVD)
- Ophthalmologist (medical doctor = surgery)



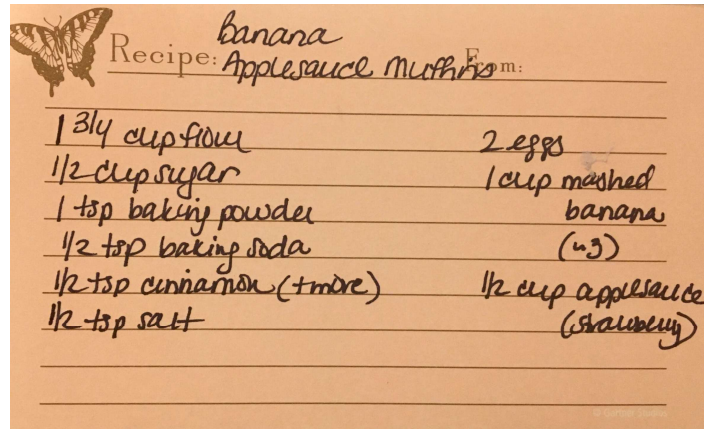
Kaminsky & Powell, 2023
Whittaker et al., 2016

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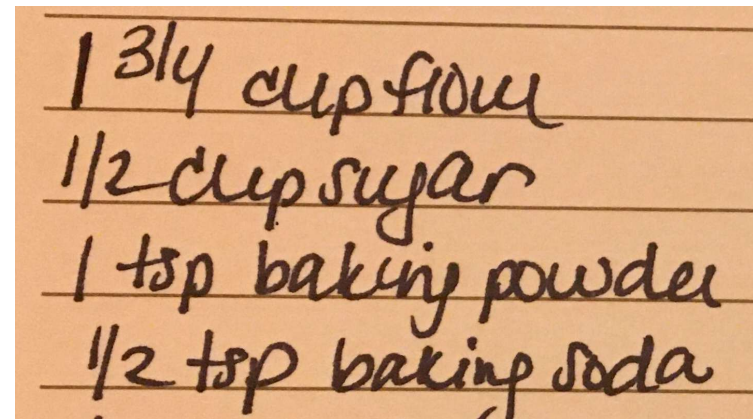
Example modifications

Try your goggles!

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1.75 cup flour
 .5 cup sugar
 1 tsp baking powder
 .5 tsp baking soda

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Case Study

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Michelle's Client Case Study

Client is a 51-year-old woman who is married and resides in a two-story cape in the suburb of Nashua, NH. Client was referred to OT secondary to difficulty with **taking medications and navigating stairs - feels unsteady**. 20/40 corrected vision OU.

Client history includes OA, HTN, and **metastatic breast cancer**. Eye dominance determined to be right eye. Client reports some double vision during reading and light sensitivity. Client reports "**ophthalmologist told me there was nothing more that could be done, but to continue to follow up as needed**". Neuro ophthalmologist appt in one week.

Client's primary complaints: fatigue, headaches, periodic eye pain, blurry vision.



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Occupational Profile and interview with client
 further reveals involvement in brain



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OT Assessment Included

- * Warren Text Card
- * Damato Campimeter
- * Corneal Reflection Test
- * Visual tracking and smooth pursuit appeared **intact** to all 9 Cardinal points of gaze
- * Cover Uncover revealed an esophoria, which could only be detected with this test as the bilateral presentation of the eyes appeared normal



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Case Study Continued



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Treatment

**Must collaborate with OD or referring physician first*

Partial nasal occlusion (PNO) applied to lens of non-dominant eye with paper tape.

This partial occlusion allows for enough central vision occlusion to resolve diplopia by disallowing left eye central field recruitment.

Partial occlusion does not impact peripheral vision thereby client continues to receive maximal visual function while managing diplopia.

Client demonstrated good reading speed and comprehension with PNO.



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Information Reported to OD

- *Order to continue with PNO for valued activity of reading
- *Client educated to purpose of PNO for reading activity (mail, medication, recipes, magazine, book)
- *Precautions include to discontinue if any issues arise with comfort
- *Client educated to the value of seeing optometrist to discuss corrective prism lenses.



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Occupational Therapy Care

Refer to (or back to) OD so that the OD may...

Referral for examination
OD care may include prism glasses and
Appropriate eye exercises



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Occupational Therapy Care

PNO
Use of remaining vision
Proper lighting
Contrast
Glare Shields



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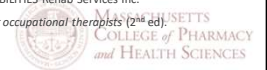


Case examples and questions

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