Objectives
- Understand the importance of vision
- Define visual perception
- Provide assessment and treatment synopsis for four types of visual perceptual dysfunction…
  - Focus on importance of search strategy

Topics of Discussion
- Overview of Visual-perceptual hierarchy
- Assessment and Treatment for:
  - Acuity
  - Visual Field Deficits
  - Visual Attention Deficits
  - Oculomotor Dysfunction

Vision is our most far reaching sensory system
- First to alert to danger
- Enables us to be anticipatory
- And plan for situations

Vision provides speed
- Conveys a tremendous amount of information in seconds
- Instant identification of objects

Speed is critical to adaptation to dynamic environments
- Two types of environments
  - STATIC
  - DYNAMIC
Dominance of Vision

- Decision Making
- Social interactions
- Motor and Postural Control
  “don’t forget your angry eyes!”

Definition of Visual Perception

Integration of visual input within the CNS to turn the raw data supplied by the retina into cognitive concepts of the perception of objects and space that can be manipulated and used for decision making.

Visual Perceptual Hierarchy

- Oculomotor control, visual fields, visual acuity
- Attention = Alert and attending
- Scanning
- Pattern recognition
- Visual Memory
- Visuocognition

Two most affected daily activities:

- Driving and Reading
- and a third: Mobility

ADAPTATION THROUGH VISION
Visuocognition
- Ability to use visual input to complete cognitive processing
- Cannot alter vision without altering cognition

Visual Memory
- Supports visual cognition
- To understand and mentally manipulate visual input, you must have visual memories of objects to compare and contrast

What do you see?

Pattern Recognition
- Determines:
  - Memory laid down
  - Memory accurate
  - Used by CNS?
- Involves identification of salient features of objects

What makes it different?
Comprised of Two Abilities

- Ability to see the pattern holistically
- Ability to see details

Visual Search and Scanning

Sub-serves pattern recognition
Occurs on two levels
  - Automatic reflexive
  - Voluntary purposeful
Organized efficient and predictable pattern
  - Left to right
  - Top to bottom

Adding Cognition to Visual Search…

Visual Attention

- Sub-serves visual search/scanning
- Critical component of complex visual processing
- Varies from global to focal depending on type of visual analysis needed

Foundation Functions

- Oculomotor control
  - Provides perceptual stability
- Visual Acuity
  - Provides clarity - ability to see details
- Visual Field
  - Provides awareness of objects

Visual Perceptual Hierarchy

- All levels must work together!
  - Loss or impairment at one level affects functioning of all other levels
OT Evaluation

- Determine limitation in occupational performance
- Link performance deficit with presence of impairment
- Determine if intervention is necessary
- Id most appropriate intervention

Acuity

Ability to see detail and colour

Assessments

- Acuity Tests
  - Standard
  - Low Vision Test Charts
- High Contrast Tests
- Reading Acuity Test
- Low Contrast Acuity
- Task Analysis

Snellen Chart

Intervention

- Address correctable vision loss
- Referral
- Compensatory strategies
  - Increase visibility of task/environment
  - Organize
  - Simplify Tasks

Low Contrast-Water on Floor
Low Vision Aids

The Visual Field
Area of visual world that can be seen when looking straight ahead

Measuring the Visual Field
- Computerized Perimetry Testing

Four Behavioral Changes - Hemianopsia
- Adopt a narrow search pattern confined to midline and sound side
- Person scans very slowly towards deficit side
- Missing and/or “misidentifying” visual detail on the “blind” side
- Reduced visual monitoring of the hand

ADL Challenges
- Driving
- Shopping and community events
- Yard work
- Meal preparation
- Financial management
- Functional communication
- House Keeping
- Self-care

Evaluation-To inform treatment!
- Reading Task
- Scan Course
- Telephone Number copy
Best Strategy - Education

- Compensation requires conscious cognitive strategy
  - Increase visual search strategies
- Must believe vision cannot be trusted on deficit side
- Awareness allows client to develop “intellectual over-ride”

Visual Attention Deficits

Changes in visual search caused by visual inattention

Normal Search Strategy

- Driven by need to know
- Efficient
- Uses saccadic eye movements to shift visual attention from object to object

Normal Search Pattern

Subjects with brain injury

Structured Array
**Unstructured Array**

**Visual Hemi-inattention / Neglect**
- The impaired or lost ability to react to or process visual stimuli presented to the hemi space contralateral to the side of the hemispherial lesion
- Variety of behavioural deficits
- Exacerbated by primary sensory deficit

**Hemi-inattention/ Spatial Neglect**
- Heterogeneous disorder
  - Neglect of near and far space
  - Intentional and attentional
  - Visual, tactile, motor
  - Personal, peripersonal, extra-personal

**Visual Spatial Neglect** (common characteristics)
- Unable/difficult to initiate search to left
- Initiates and confines search to right side
- Attracted to most peripheral stimuli on right
- Reluctant to rescan an array once viewed

**Visual Spatial Neglect** (common characteristics)
- Does not process objects on left when viewing straight ahead
- Does not process left half of object regardless of head position
- Cognitive involvement
Impact on Pattern Recognition

Delicious Eight
licious Fight

Intervention

Remediation or Compensatory

Questions to be asked…

- Has a change in visual search occurred?
  - INITIATE an organized search?
- How has the search strategy changed?
  - Can they carry it out in organized way?
  - Scan completely/get all the detail?
  - Does performance decrease with complexity?
- What is the cause of the change?
  - Inattention, VFD, apraxia, arousal

biVABA Visual Search Subtests

- Not designed to be diagnostic
  - No cut-offs, tool to assist tx planning
- Observational test
  - Provide structured task analysis format to observe effectiveness and limitations of search pattern
- 7 visual search subtests
  - Increase in complexity

Characteristics of Ineffective Search Patterns

- Abbreviated and incomplete
- Asymmetrical
  - Initiated and confined to one side
- Random-no predictable pattern
- Inconsistent accuracy in target identification
- Breaks down as complexity increases

Hemianopsia vs. Inattention

- Hemianopsia-primary sensory loss
  - Abbreviated search pattern but good strategy
- Hemi-inattention:
  - Disorganized, disrupted
Visual Scanning Training (VST)
- Considered important even critical for persons with neglect
- Remedial Approach

VST Focus
- Initiating search from left
- Executing a complete search pattern
- Observing all visual detail
- Anticipating visual input coming from the left
- Rapidly dividing/shifting attention between fields
- Sustaining attention in dynamic environments

VST Approach
- Ensure client takes in visual information in an organized and systematic way
- Assist client to employ "normal" search strategies by using therapeutic activities that emphasize:
  - L to R and top to bottom search

Scanning…

Circle the letter

Cognitive and Visual Demand
VST Approach
- Augment with occlusion
- And anchoring

Anchoring

Compensatory Approach
- Environment centered
- Good approach for high and low functioning
- May be the only successful approach for low functioning

Other Approaches
- Visualization
  - Lighthouse Strategy
- Language/cognitive Strategies
  - Self instruction
  - State strategy used
  - Analyze performance

Environmental Modification
- Reduce factors that stress visual processing:
  - Reduce background pattern
  - Ensure there is adequate illumination
  - Increase background contrast
  - Organize and structure environment

Oculomotor Impairment
  Controlled and stabilized eye movement
Primary Types of Eye Movement

- Those that change the line of sight
  - Saccadic
- Those that stabilize vision
  - Smooth pursuit eye movements
  - Cervical vestibular ocular responses

Saccadic Eye Movements

- Bringing target into fovea
- Activated by attention
- Used to scan environment
- Quick movements-short latency and rapid speed

Functional Scanning Test

Smooth Pursuit Movements

- Holding a moving image on the fovea
- Triggered by movement of the target
  - Causes retinal slip

Performance Limitations

- Focusing deficiencies
  - Accommodation
  - Convergence insufficiency
- Altered perception
  - Diplopia
- Disruption of balance and mobility
  - Disrupts sensory triad
  - Constant “Funhouse experience”

Assessment

Determining if oculomotor impairment exists AND interferes with occupational performance
Initial Interview
- Look and listen approach
- Obtain visual history
- Identify functional complaints
- Look for pattern in responses
- Observe head and Eyes appearance

Normal Eye Movements

Assess Diploplia
- Record subjective complaints
  - Lateral or vertical splitting of images
  - Present at near or far distances
  - Direction of affected gaze
  - Minimize or exacerbated by head position
  - Experiences blurring vision with head movement

Diploplia - 20% Misalignment

Assess Eye Dominance
- Dominant Eye
  - Directs fixation
  - As resistant to change as hand dominance

Assess Practical Field of View
- Head movement used predominantly to change line of sight
- Eyes rarely move more than 10 degrees off of center
- Required for searching
  - Full trunk and neck ROM
  - Gaze stability
Eye Movements
- Observe binocularity
- Observe just smooth pursuit
  - Saves time
- Convergence

Intervention
- Occupational Therapy Approach

Occlusion
- Complete
- Incomplete/Partial

Diploplia patching

Prisms
- Prescribed and fitted by OD
- Fresnel Press-on plastic prism
- Gradually wean client by reducing optic strength

Eye Exercises
- Used to restore “teaming” of eyes for binocular function
- Lacks evidence for effectiveness
Eye exercises…

Eye Exercises Continued…

Gaze Stability in Communication

Surgical Intervention

- Eye Realignment is the goal
- Cut tendons of extra-ocular muscles reattach to change eye alignment
  - Delicate surgery
  - Not always successful
- Indications
  - Diplopia in primary gaze
  - Can’t maintain binocular vision without conspicuous head positioning
  - Strabismus persists

Valuable Resources

- http://www.ebrsr.com
- http://elearning.strokengine.org/
- AOTA Low Vision Listserv
  - Access through AOTA
- Vision Rehabilitation

Putting it all Together!

- Adaptation through vision
- Occupational Therapists in a prime role to assess and treat visual-perceptual deficits
Follow-up/Next Steps

- Need to practice assessment and treatment approaches
- Take the Course
- Use your biVABA
- For 2 additional documents go to: www.neostrokestrategy.com
- Email questions: Joanne.410@gmail.com