

Care of the Patient with Learning Related Vision Problems



American Optometric Association

A. DESCRIPTION AND CLASSIFICATION

Learning related vision problems are deficits in visual efficiency and visual information processing that can interfere with the ability to perform to one's full learning potential. The prevalence of visual efficiency problems in the school-aged population is thought to be in the 15-20 percent range. Estimates of the prevalence of learning problems among school-aged children range from 2-10 percent. Nearly one-half of these children have been diagnosed with a learning disability, of which as many as 75 percent have particular difficulty with reading.

❑ **Visual efficiency problems include:**

- Reduced visual acuity
- Uncorrected refractive error
- Ocular motility and/or alignment problem(s)
- Dysfunction of accommodation and vergence control systems

❑ **Visual information processing problems include delays or deficits in:**

- Visual spatial orientation
- Visual analysis skills
- Visual integration skills

The most severe form of learning problems involve learning disabilities, i.e., disorders in one or more of the basic psychological processes involved in understanding or in using spoken or written language.

❑ **Learning disabilities include problems in:**

- Spoken language: delays, disorders, or discrepancies in listening and speaking
- Written language: difficulties with reading, writing, or spelling and may involve dyslexia, i.e., a neurocognitive deficit related to reading and spelling
- Mathematics: difficulties in performing mathematical functions or comprehending basic concepts
- Reasoning: difficulties in organizing and integrating thoughts and turning them into effective actions
- Associated traits: impulsiveness, low frustration tolerance, and difficulties with social interactions and situations

B. COMMON SIGNS AND/OR SYMPTOMS

❑ **Clinical signs and/or symptoms of learning related vision problems may include:**

- Asthenopia
- Blurred vision
- Diplopia
- Task avoidance
- Skipping words or losing place when reading
- Delayed learning of the alphabet
- Difficulty with copying tasks

NOTE: This Quick Reference Guide should be used in conjunction with the Optometric Clinical Practice Guideline on Care of the Patient with Learning Related Vision Problems (June 20, 2000). It provides summary information and is not intended to stand alone in assisting the clinician in making patient care decisions.

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Signs and/or symptoms of learning disabilities may include:

- Inadequate ability to listen, think, speak, read, write, spell, or do mathematical calculations
- Failure to use or properly understand phonological information when processing written or oral language
- Difficulties with short-term or long-term memory that affect comprehension
- Decreased word processing speed and efficiency, reduced reading rate, and compromised reading comprehension
- Distractibility, inattentiveness
- Distinct visual information processing deficits

Signs and/or symptoms of specific visual deficiencies associated with learning related problems are summarized in Table 1.

C. EARLY DETECTION

Emphasis is on early detection of learning related vision problems. It is recommended that vision examinations be scheduled by 6 months, at 3 years of age, and at entry into school. If there is a history of developmental delay, a screening test (e.g., Denver Developmental Screening Test) can be performed. If visual information processing problems are suspected, a more extensive evaluation is indicated.

D. EVALUATION

Care of the patient with learning related vision problems involves:

- Patient history
- Evaluation of visual efficiency
- Evaluation of visual information processing ability
- Evaluation of visual pathway integrity

A comprehensive patient history is the initial component of the care process, and is outlined in Table 2. Table 3 summarizes the evaluation components, assessments, and tests for patients with learning related vision problems.

Supplemental testing for reading disabilities may include:

- Standardized tests for reading and spelling:
 - Boder Test of Reading-Spelling Patterns
 - Dyslexia Determination Test

E. MANAGEMENT

Management of the patient with learning related vision problems is based on evaluation of the patient history, clinical signs and symptoms, test results, behavioral observations, and review of previous reports and present levels of care. Optometric intervention is specific and problem oriented. Interdisciplinary communication, consultation, and referral are vital for the most effective management of the patient.

1. Basis for Treatment

Treatment of learning related vision problems is directed toward four goals:

- Identify and treat specific visual deficits
- Improve visual function to the appropriate level
- Reduce or eliminate the signs and symptoms associated with particular visual deficits
- Prepare the individual to take full advantage of the opportunities for learning by maximizing visual performance

2. Available Treatment Options

Learning related vision problems are usually managed in a progressive sequence:

- Correction of refractive error
- Treatment of visual efficiency deficits with lenses, prisms, and vision therapy
- Treatment of vision information processing deficits with vision therapy beginning with visual spatial orientation, then visual analysis, and concluding with visual-motor integration
- Vision therapy for uncomplicated cases may require 1 or 2 office visits per week for 12 to 24 weeks with supportive activities performed at home 4 to 5 days per week for 20 to 30 minutes each day. Occupational or physical therapy may be required when deficiencies are severe.

- ❑ Re-evaluation of patient using the same visual information processing tests as employed previously and seeking an improvement in signs and symptoms
- ❑ Additional therapy if signs and symptoms persist to some degree
- ❑ Home-based maintenance program 2 to 3 times per week for 10 to 15 minutes each time for 3 months
- ❑ Referral to another health care professional or the educational system should be considered at any time if underlying physical or neurological problems, cognitive deficits, or emotional disorders are suspected.

Goals for visual information processing therapy are summarized in Table 4.

3. Patient and Parent Education

- ❑ Communication with the patient's parents or caregivers should include:
 - Review of chief complaint
 - Explanation of the nature of the vision problem and its relationship to the presenting signs and symptoms
 - Review the test outcomes
 - Presentation of the management and prognosis
 - Importance of continuing eye care
- ❑ Communication with educational professionals should include:
 - Diagnosis (presence and nature of the learning related vision problems and their relationship to extant learning difficulties)
 - Proposed management plan
 - Expected outcomes

T A B L E 1

Clinical Signs and Symptoms of Deficiencies in the Visual System

Deficiency	Signs and/or Symptoms
Ocular motility dysfunction	Moving head excessively when reading; Skipping lines when reading; Omitting words and transposing words when reading; Losing place when reading; Requiring finger or marker to keep place when reading; Experiencing confusion during the return sweep phase of reading; Experiencing illusory text movement; Having deficient ball-playing skills
Accommodative-vergence dysfunctions	Asthenopia when reading or writing; Headaches associated with near visual tasks; Blurred vision at distance or near; Diplopia; Decreased attention for near visual tasks; Close near working distance; Overlapping letters/words in reading; Burning sensations or tearing of the eyes during near visual tasks
Visual spatial orientation skill deficiency	Delayed development of gross motor skills; Decreased coordination, balance, and ball-playing skills; Confusion of right and left; Letter reversal errors when writing or reading; Inconsistent directional attack when reading; Inconsistent dominant handedness; Difficulty in tasks requiring crossing of the midline
Visual analysis skill deficiency	Delayed learning of the alphabet (letter identification); Poor automatic recognition of words (sight word vocabulary); Difficulty performing basic mathematics operations; Confusion between similar-looking words (apparent letter transpositions); Difficulty spelling nonregular words; Difficulty with classification of objects on the basis of their visual attributes (e.g., shape, size); Decreased automatic recognition of likenesses and differences in visual stimuli
Visual-motor skill deficiency	Difficulty copying from the chalkboard; Writing delays, mistakes, confusions; Letter reversals or transpositions when writing; Poor spacing and organization of written work; Misalignment of numbers in columns when doing mathematical problems; Poorer written spelling than oral spelling; Poor posture when writing, with or without torticollis; Exaggerated paper rotation(s) when writing; Awkward pencil grip
Auditory-visual integration deficiencies	Difficulty with sound-symbol associations; Difficulty with spelling; Slow reading
Visual-verbal integration deficiencies	Difficulty learning the alphabet (letter identification); Difficulty with spelling; Faulty sight word vocabulary (word recognition); Slow reading

TABLE 2

Clinical Signs and Symptoms of Deficiencies in the Visual System

History	Components	History	Components
Chief concern or complaint	Elicit reason for visit	Academic/educational history	Previous assessments and interventions Current assessment, interventions, and placement Occupational/physical therapy Speech and language Learning disability Psychoeducational Remedial reading Behavioral
History of present illness	Visual Ocular		Current achievement levels Reading Spelling Mathematics Writing
Medical history	Exploration of risk factors Perinatal events Childhood illnesses/diseases		Academic/education-related medical history Pediatric Neurological Audiological Medications
Developmental history	Gross motor Fine motor Language Personal/social milestones		
Family history	Visual/ocular Medical Academic/educational		

TABLE 3

Evaluation of Patients with Learning Related Vision Problems

Visual System Component	Assessment	Tests
Visual Efficiency:		
Visual acuity	Monocularly and binocularly at distance and near point	Snellen chart HOTV Broken Wheel Tumbling E
Refraction	Measurement of refractive error	Static retinoscopy Subjective refraction Cycloplegic refraction, if indicated
Ocular motility and alignment	Fixation stability Saccadic and smooth pursuit eye movements Qualitative analysis	Cover test NSUCO SCCO 4+ Developmental Eye Movement Test King-Devick Saccade Test
Accommodative-vergence function	Accommodation and vergence amplitude	Cover test Near point of convergence Heterophoria, distance and near Fusional vergence amplitudes, distance and near Vergence facility Amplitude of accommodation Accuracy of accommodation (lag) Relative accommodation Accommodative facility Fixation disparity analysis Stereopsis

TABLE 3

Evaluation of Patients with Learning Related Vision Problems

Visual System Component	Assessment	Tests
Visual Efficiency:		
Visual system integrity	Evaluation of the anterior segment Evaluation of the posterior segment Color vision testing Assessment of pupillary responses Visual field screening	
Visual information processing:		
Visual spatial orientation skills	Bilateral integration	Body Knowledge and Control – Standing Test Chalkboard Circles Test
	Laterality and directionality	Piaget Right-Left Awareness Test Reversals Frequency Test Jordan Left-Right Reversal Test – Revised
Visual analysis skills	Visual discrimination	Visual Discrimination subtest of the Test of Visual Perceptual Skills – Revised Form Constancy subtest of the Test of Visual Perceptual Skills – Revised Form Constancy subtest of the Developmental Test of Visual Perception – 2 Matching Familiar Figures Test Visual Discrimination subtest of the Motor Free Vision Perception Test
	Visual figure-ground	Visual Figure-Ground subtest of the Test of Visual Perceptual Skills – Revised Figure-Ground subtest of the Developmental Test of Visual Perception – 2 Figure-Ground subtest of the Motor Free Vision Perception Test Figure-Ground Perception subtest of the Southern California Sensory Integration Test
	Visual closure	Visual Closure subtest of the Test of Visual Perceptual Skills – Revised Visual Closure subtest of the Developmental Test of Visual Perception – 2 Picture Fragments subtest of the Detroit Test of Learning Aptitude – 3 Gestalt Closure subtest of the Kaufman – Assessment Battery for Children Visual Closure subtest of the Motor Free Vision Perception Test
	Visual memory	Visual Memory subtest of the Test of Visual Perceptual Skills – Revised Visual Sequential Memory subtest of the Test of Visual Perceptual Skills – Revised Spatial Memory subtest of the Kaufman – Assessment Battery for Children Letter Sequences subtest of the Detroit Test of Learning Aptitude – 2 Design Sequences subtest of the Detroit Test of Learning Aptitude – 4 Visual Memory subtest of the Motor Free Vision Perception Test
	Visualization	Spatial Relations Test of the Primary Mental Abilities

T A B L E 3**Evaluation of Patients with Learning Related Vision Problems**

Visual System Component	Assessment	Tests
	Composite visual perception assessment	Motor Free Visual Perception Test – Revised
	Visual-motor integration	Beery-Buktenica Developmental Test of Visual Motor Integration – 4 Test of Visual-Motor Skills – Revised Wide Range Assessment of Visual Motor Abilities Copying subtest of the Developmental Test of Visual Perception – 2 Test of Visual Analysis Skills Word Sentence Copy Test
	Eye-hand coordination	Grooved Pegboard Test Eye-Hand Coordination subtest of the Developmental Test of Vision Perception – 2
	Auditory-visual integration	Auditory-Visual Integration Test
Visual-verbal integration	Rapid naming of arrays of visually presented objects or numbers	Vertical subtest of the Developmental Eye Movement Test Rapid Automatized Naming Test Boston Naming Test

T A B L E 4**Goals for Visual Information Processing Therapy**

- Develop motor planning ability to accomplish isolated and simultaneous movements of the extremities
- Develop motor memory of the differences between the right and left sides of the body
- Develop an internal awareness of both sides of the body, including identification of body parts
- Develop the ability to project directional concepts to organize visual space, including the spatial orientation of alphanumeric symbols
- Develop an understanding of the distinctive features of objects; namely size, shape, color, and orientation
- Develop the ability to select and attend to a stimulus from an array of distracting stimuli, as well as the spatial relationship of that stimulus relative to other background stimuli
- Develop the ability for identification of visual stimuli from incomplete information
- Develop short-term visual memory abilities, including the recall of the spatial characteristics of the stimulus and the sequence of multiple stimuli
- Develop the ability to create a visual image of a previously presented stimulus and the capacity to mentally manipulate it
- Develop the ability to integrate visual processing skills with the fine-motor system to reproduce complex visual stimuli
- Develop the ability to integrate visual processing skills with the language system efficiently and rapidly