



## **Optometric Evaluation For Learning Related Vision Problems**

When we examine a patient who is experiencing difficulty with school or athletic performance, and/or has difficulty using the computer for long periods of time, the optometric evaluation must be much more comprehensive. There are three types of evaluations. The first is the Primary Care Exam, which tests for eye disease, determines the need for eyeglasses or contacts, as well as screens for basic visual skills. The second is referred to as the Visual Efficiency Evaluation and consists of detailed tests designed to determine if the patient can coordinate the actions and movements of the eyes in an efficient and task-appropriate manner. The third type of evaluation is the Visual Information Processing Evaluation, which assesses a child's ability to analyze and interpret visual information and compares their visual processing skills with age and grade norms.

Good vision is more than seeing 20/20. To perform optimally, vision must be clear, comfortable and efficient, especially during prolonged visual tasks. The following information provides pertinent details about the optometric evaluation of a patient with visual skills-related problems.

### **Description of Primary Care Examination**

#### **Visual Acuity**

Visual acuity represents clarity of eyesight and is reported in Snellen fractions, 20/20, 20/30, etc. This relates to the ability to distinguish a letter of a certain size at a specified distance. It gives no information as to whether meaning is obtained from visual input, how much effort is needed to maintain clear and single vision, and whether vision is less efficient when using both eyes as opposed to each eye individually. The measurement of visual acuity is typically done at school or pediatric screenings.

#### **Optics (Refractive Error)**

An important test in the primary care examination is determination of the refractive error or optical status of the eye. This refers to whether the child is nearsighted (has myopia-blur at far, clear at near), farsighted (has hyperopia-blur mainly at near, clear at far), or has astigmatism-blur at both far and near. When a significant degree of refractive error is present, eyeglasses are prescribed to compensate for the refractive error.

#### **Ocular Health**

Good eye health is important in maintaining efficient vision. If eye disease that affects the cornea (front surface of eye), retina (back surface of eye) is present, or the eye pressures are elevated, it can also directly impact the ability to obtain clear and single vision.

#### **Basic Skills Screening**

The three types of visual skills, eye tracking, eye focusing, and eye teaming are described below. They are screened for their level of efficiency during our primary care examination.

### **Description of Visual Efficiency Examination**

The Visual Efficiency Examination involves testing of three types of Visual Efficiency Skills. They are:

- 1) Eye Tracking (Pursuit and Saccadic Eye movements)
- 2) Eye Focusing (Ocular Accommodation)
- 3) Eye Teaming (Binocularity)

#### **Eye Tracking**

Eye tracking is the ability to make accurate eye movements from one target to another, as in reading or sports.

Symptoms of inadequate eye movement (oculomotor) control include using a finger to keep the place of reading, loss of place when reading or copying from the board, skipping words when reading, and difficulty in sports requiring rapid eye-hand coordination ability.

#### **Eye Focusing (Accommodation)**

Eye focusing is the ability to adjust the eye for optimal clarity and identification. This visual skill is used during rapid shifts from one distance to another, such as from desk to chalkboard or from computer screen to across the room. It also permits a person to maintain clear focus at the normal reading distance over prolonged periods of time.

Symptoms of an eye focusing problem may include blurred vision while reading, inability to clear vision at distance after reading, fatigue or headaches while reading, day dreaming, avoiding close work, poor reading comprehension or difficulty keeping a moving ball clear in sports.

#### **Eye Teaming (Binocular Vision)**

Eye teaming is the ability to control and coordinate the eyes so they stay in exact alignment at all times.

Symptoms of inadequate eye teaming include double vision, headaches or eyestrain, inability to sustain at a visual task for any prolonged period of time. Poor eye teaming skills symptoms also include poor depth perception in sports and difficulty watching 3D movies.



There are several different types of eye-teaming problems that can occur. Sometimes one eye may actually turn in or out intermittently or even all of the time. A more common and subtle form of eye-teaming problem, however, occurs when the eyes have a difficulty staying in exact alignment at all times during reading, computer use or sports related visual activities.

### **Description of Visual Information Processing Evaluation**

In the Visual Information Processing Evaluation, 5 skill areas are evaluated. They are:

- Visual Spatial Skills
- Visualization
- Visual Analysis
- Visual-Motor Integration
- Visual Memory

In addition, reading, comprehension and dyslexia screening tests are administered.

#### **Visual Spatial Skills**

These skills allow the individual to develop normal internal and external spatial concepts, such as right, left, front, back, up, and down. Visual-spatial skills are important in motor planning, sequencing, and direction of letters and numbers. Sub skills that are evaluated include bilateral integration, laterality, and directionality.

Bilateral integration is the ability to be aware of and use both sides of the body separately and simultaneously. Laterality is an important developmental skill that involves the establishment of internal coordinates from which visual-spatial organizational skills can develop such as knowing right vs. left with regard to your body. Directionality is the ability to project this set of internal coordinates into space so as to know right and left in others.

If visual-spatial skills are inadequate, number/letter reversals and sequence errors (was/saw) may occur. Another consequence of poor visual spatial ability is difficulty with planning a motor task such as writing or performing written math.

#### **Visual Analysis Skills**

These skills contribute to the individual's ability to analyze and discriminate visually presented information. Visual analysis skills are particularly important in seeing small likenesses and small differences. They are used during number, letter, and word recognition.

Visual analysis problems may result in confusion of words with similar beginnings or endings and even entire words.

#### **Visual Memory Skills**

Another important subcategory of Visual Information Processing is visual memory. Obtaining maximum information in the shortest possible time provides for optimal performance. The ability to retain this information over an adequate period of time is essential for reading comprehension and spelling.

Dysfunction in visual memory may cause prolonged time in copying assignments, difficulty recognizing the same word on the next page, difficulty retaining what is seen or read, and spelling problems.

#### **Visualization**

Visualization is the ability to form and manipulate an internal picture or use our "mind's eye." It is used in spelling, arithmetic, and reading comprehension. If visualization is inadequate, long-term retention of the spelling of words, mental math, and reading comprehension may be compromised.

#### **Visual-Motor Integration Skills**

Visual-Motor integration is a Visual Information Processing skill that is important in written work. It is the ability to integrate visual information to plan and execute a motor task.

Deficiencies in the area of visual-motor integration skills may make handwriting more difficult, resulting in poor spacing, inability to stay on the line, and excessive erasures. The child's ability to complete written work within an allotted period of time may also be affected. Copying from board to desk or book to paper may also suffer if there are deficiencies in the area of visual-motor integration.

### **Summary**

**If any of the visual skills are below expected norms, a Vision Skills Related Problem may be present. A child or adult with poor Vision Skills will have difficulty achieving up to their potential in school, have difficulty with long term computer use or notice decreased athletic performance. When present, a Vision Skills Problem can usually be overcome with Vision Therapy.**