

## FIVE VISION TESTS FOR PARENTS AND TEACHERS

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If your child (or one of your students) has learning or reading difficulties, he or she may have a functional vision deficit. (See below for Signs and Symptoms.) A child (or adult) can have poor visual skills even if their “eyesight” tests at 20/20. Below I’ve described five tests of functional vision. If your child does poorly on just one test, you may not be convinced that poor vision is causing their learning problem, but poor skills on several of these tests should convince you. You may be concerned that you lack the professional training and experience to test your child’s performance but if you first test a child without a learning problem, the differences will be easy to see.

You may want to use the recording sheets for these tests I’ve included below. The purpose of recording the details is not so much for diagnosis (if there are deficits they will be obvious) but as a baseline record to see if there is improvement.

### THE TESTS

#### 1. NEAR POINT OF CONVERGENCE

Can your child look with both eyes at a target held near to their face? Does one eye lose fixation and turn out? If so, this child has convergence insufficiency and must strain to prevent double vision. This causes discomfort, fatigue, inflexibility and poor reading. It can lead to other vision problems if ignored.

**Far-to-near break:** Tell the child to look at a pen, pencil or small toy you hold at about 20 inches in front of their eyes. Move the target toward their nose at a slow speed (5 seconds to reach the nose). Notice how their eyes converge (cross) as the target approaches. Observe whether one eye turns out. Use a ruler to measure the distance from this point to their eyes. This is called the near-point of convergence. Both eyes should be able to follow the target to within four inches from their nose before they move apart.

**Near-to-far recovery:** After the break, slowly move the target back out. Instruct the child to try to look at it. Look at their eyes and slowly pull the target farther away as you continue to encourage them to look at it. Watch for the two eyes to move in to look together at the target. Measure this distance. This recovery of convergence should be closer than seven inches from the nose.

If you find poor convergence (near-point of convergence) greater than a 8-inches and/or recovery of convergence 12-inches or more), test again while urging them to try harder to focus on the target. Have them touch the target with a finger to see if convergence improves. If not, convergence is very weak. Remember to try this with several children.

## **2. Eyes Following A Moving Target**

Do your child's eyes move easily when pursuing a moving target? Eye movements should be smooth and with no head movement. If the eye(s) lose the target or seem to jerk as they move, reading efficiency and visual performance can suffer.

**Horizontal movements:** The child stands and looks at a target held just below eye level about 14 inches in front of their eyes. Move it to the right about eight inches. Tell them to "Follow this target with your eyes," as you move it horizontally left and right (16" excursion). Do this three times. Remind them to keep their eyes on the target. Each excursion should take about 3 seconds in each direction. Observe their eyes. Can they follow the target with ease at all times? Test with both eyes looking together.

- **Quality of movement.**

Can they follow the target smoothly or do you see their eye(s) move off the target? They should not lose visual contact more than once or twice during three left-right excursions of the target. Record the number of fixation losses.

- **Recovery:**

If they lose fixation can they regain it quickly and easily? Recovery should be instantaneous, a slight jerk in the smooth eye movement. If recovery takes a second or longer, the problem is more significant.

- **Midline jerk:**

Do their eyes jerk as the target passes directly in front of the body? Midline jerks represent a lag in neurological development and a lack of integration between both halves of the body.

- **Body strain:**

Is their body balanced or awkward? Posture should be relaxed and balanced without excessive strain or effort.

- **Head movement:**

Is the head held still, relaxed, and not cocked to the side? If they do cock or move their head, ask them to keep their head erect and still and to move only their eyes. Do they move their head even when asked not to? They should be able to.

- **Unequal eyes:**

Look for differences in the quality of each eye. When testing each eye alone and both together, does one eye and not the other follow easily? Do they do fine with either eye but not with both? If so, there is a problem.

### **Moving in a Circle**

Slowly move the target in a 20-inch diameter circle. Watch as their eyes circle up, right, down, left and up again as they follow it around. Make three clockwise and then three counter-clockwise circles. Each full revolution should take about five seconds. Look for smooth movement, steady balance, and minimal head movements as above.

If the eye movements are poor, help them find a detail on the target and have them look at it while testing them. Poor visual/motor following skills can impact their learning and reading. The difference between a poor and adequate performance will be obvious.

### **3. EYES JUMPING BETWEEN TARGETS**

In reading, the eyes naturally jump from one word group to the next and from the end of one line to the beginning of the one below. These movements should be quick, accurate, and easy.

#### **Jumping eye movement test**

Make a dot in the top left and right corners of a sheet of paper (see the dot and star targets included below). The targets should be positioned horizontally, at eye level and 14-inches in front of the child. Tell them to move from one target to the other several times.

Observe the ease and accuracy of their eye movements. Practice this to prepare for the timed test. Set a metronome at sixty beats per minute (you can download metronome apps for you computer or smart phone) or tap or snap your fingers once per second. Demonstrate what you mean by alternately touching each target with your finger on the beat. Tell them, “This is how I want your eyes to move, back and forth from target to target with each beat. Move just your eyes and not your head.” Can they do this for at least a minute? Very good readers can move back and forth at 140 beats per minute or more. Some can’t do this at all, others only slowly. Some under-shoot and others over-shoot the target with their eyes. Problems will be apparent if you check several children of similar age.

### **4. PERIPHERAL AWARENESS TEST (Visual Field)**

Many underachieving children have poor awareness of their side vision. This condition is called a functional visual field constriction. Functional means that the problem is *not* due to a permanent pathological degeneration in anatomy like a retinal tear or stroke that cannot be cured. Functional means the loss *is* reversible. Children with narrow fields have difficulty seeing the big picture making it hard for them to keep their place in reading or to see what’s coming next in sports and other activities.

#### **Testing for a collapsed functional field**

Make a test sheet using the 8 1/2” x 11” piece of blank paper. Draw a 1” x 1” inch cross at the center. Also make a target strip by cutting a 3/4” x 8 1/2” strip from a similar blank white sheet. At one end of the strip, draw a black dot about half the size of a hole-punch chad. Arrange the page on a desk or tabletop with the long edge horizontal to the child. Center the cross 12 inches in front of the open eye (rest the child’s chin on a 12 inch ruler) with the child looking down onto the cross. It is important that the distance between the page and the eye always stays at 12 inches.

Test one eye at a time by blocking one eye with your cover. You can hold it, tape it over the eye, or use an eye patch from a drug store. Hold the target strip on the undotted end with the black dot visible to the child. Then place it at the top edge of the test sheet. Have the child look at the black dot and say, “See this black dot?” When they see it, instruct them to move their eyes to the center of the cross and to always look there. Say to them, “I’m going to bring my dot to the center of the cross. I want you to tell me the moment you first notice the black dot moving towards the cross.” Constantly remind them to look at the cross, “Don’t take your eye off the center of the cross.” “Look as hard as you can at the cross.” If you are not sure your child is keeping on the cross, position yourself to see their eye and remind them to re-fixate when they move off. If it is hard for you to see

their eye, place a small mirror near the test sheet in a position that allows you to see their eyes.

Slowly bring the dot to the cross (it should take 2-3 seconds to move from the edge of the paper to the cross). Use a pencil to mark the place where they first report seeing the dot. Move the dot to the left edge and bring in until it is first seen. Mark that spot. Constantly repeat the instructions. "Keep your eye on the cross and tell me when you first see the dot." Move the black dot from the left, bottom and finally from the right edge of the page. With a ruler, measure the distance from the center of the cross to the mark. A distance of less than 1 1/2 inches indicates a significant functional field restriction. Try it on yourself and others for comparison. Normal fields extend to near the edge of the page anything less than this is a field constriction. About fifteen per cent of children have fields 5-inches in diameter or smaller. These children struggle to keep up and often have learning and reading difficulties.

## **5. THE COVER TEST FOR EYE POSTURE**

Most people naturally posture to point their two eyes together at the same target. This is called binocular fusion, but some people have to make an effort to do this because their eye posture is slightly misaligned. (They can fuse eyes but if you cover one eye it will move slightly to its misaligned posture and move back to fuse when you uncover the eye.) This is not the same as being cross-eyed or wall-eyed. They can't fuse at all.) The constant effort to keep single vision may cause ocular discomfort, fatigue, or headache and make reading, drawing and writing more difficult. When tired, you may notice the child squint or close one eye, wear their hair to cover an eye, turn their head to block an eye with their nose or hold their book to close. The cover test is the most difficult to see.

### **Testing for misalignment**

The child looks at a small target (a dot, letter or pen point) held at 14-inches, on the midline, and just below eye level. Use a card, a 2"x 6" strip of paper, or a soup spoon to cover one eye. Move the cover to block the other eye. Practice with a quick motion and make sure to fully block each eye. Observe the eye behind the cover just as you move to cover the other eye. If this eye drifts off axis, you will see it make a quick jump to refixate the target. Be sure you are looking at the moment the cover moves to the other eye. Move from right to left several times to observe the movement. Then test from left to right. A trained observer can see 1/32<sup>nd</sup> of an inch of movement. You should be able to see movements 1/16<sup>th</sup> of an inch. To make it easier to see movement, use a penlight or a candle as a target and watch its reflection move relative to the pupil. The greater misalignment of the blocked eye, the greater the movement to regain fixation.

### **Eye Movement. Direction:**

On the cover test, almost everyone's eyes move. Some barely move and others move several millimeters. How much movement is too much? It depends on which way the covered eye moves when it is uncovered. For example, suppose the child over-converges, moves the covered eye inward towards their nose). In this case you will see the right eye move out (away from the nose) when you change to cover the left eye. (When the left eye is covered, it also over-converge and you'll see it move out when the cover is moved to the right eye.)

Even a small over-convergence is a potential visual strain. The child tries too hard to pay attention. When over-convergers read (or draw or write), they strain to keep their eyes

from crossing and seeing double. Reading suffers and so the child tries harder, the tendency to cross becomes stronger, and more of their energy is required in the struggle to keep single vision. Finally fatigue, discomfort, and/or frustration overcomes the child. Even small outward movements on the cover test are important.

Eyes should turn out slightly when covered so that when the cover is switched to the other eye you'll see it move inward. But if this outward movement is large, more than a few millimeters, can also indicate a visual problem that interferes with learning, especially if the near point of convergence is large, 8 inches or more. In this case, the child may have poor attention for details.

The cover test may show a vertical imbalance in eye posture. Vertical movements on the cover test happen when the eye drifts up or down when covered. Any vertical misalignment is important because the eyes really have to strain to keep from seeing double. Vertical jumps are hard to see on the cover test because usually they are small and often combined with horizontal movements. To improve your chances of detecting a vertical imbalance, look for the following signs:

- Head tilt: People who consistently tilt their head to one side often show vertical movement on the cover test. They often have chronic neck pain.
- Look at the eyelashes, they follow up and down movements of the eye. If they consistently move up for one eye and down for the other when the cover is moved from eye to eye, a vertical imbalance is suspected.
- Ask the child tell you if they see the target move up or down on the cover test. If so, and their head is straight, there is likely a vertical misalignment in eye posture.

Practice makes you a better observer so be sure to check several people before making any judgment about your child. You can even check yourself. Look at a target, cover one eye, quickly switch the cover to the other eye, refocus and move it back to the first eye. Keep your head still. Do you notice the target move? If you don't see movement, it likely means that your resting eye posture is too small to worry about. If you see vertical movement and you have symptoms of eye discomfort, fatigue, headache, or poor reading, you may have diagnosed your problem. Large horizontal movements of the target can also bring these symptoms, especially if the target appears to move in the opposite direction of the movement of the cover.

### **IF YOUR CHILD HAS POOR VISUAL SKILLS**

You have now assessed five important visual skills. If your child does poorly on several of these tests, is not performing as well at school as expected, and they have some of the signs and symptoms listed in this article, there is a great likelihood that vision problems are keeping your child back.

What causes functional vision problems? Heredity, pregnancy or birth problems, high fever, head trauma (including minor head injuries), nutritional or glandular imbalance, anxiety and emotional trauma can all diminish visual skills.

The next question is what can you do if these skills are subnormal. A more complete functional evaluation would be prudent. A vision therapy program may be appropriate for

your child. For 80 years, eye doctors have been successfully using vision exercises, training lenses, prisms, and therapy devices to help children with learning disabilities and other visually related problems.

If you do get a traditional eye examination be forewarned *that most eye doctors don't test or treat for visual function deficiencies and they might advise that nothing is wrong and that reading problems are not related to vision.* If so, tell them of your testing results or do the tests right there and ask for an explanation. The doctor may try to make you doubt the significance of your observations but if you have tested several children you will know the difference. They will also tell you that children outgrow reading and learning difficulties anyway so there is nothing you need to do about it. *Usually these problems do not self-correct but persist through adulthood with academic, emotional and work-related consequences.* Obviously eyes that work well together help bring greater achievement and ease in learning and living.

For more information about functional vision care and behavioral optometry call: Parents Active for Vision Education (P.A.V.E.) at 1-800-PAVE-988 or visit their web page at <http://www.pave-eye.com/vision/index.html> or

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These **SIGNS AND SYMPTOMS** may indicate that YOU or your CHILD has a VISION PROBLEM

#### PHYSICAL CLUES

- Red, sore, or itching eyes
- Jerky eye movements, one eye turns in or out
- Squinting, eye rubbing, or excessive blinking
- Blurred or double vision
- Headaches, dizziness, or nausea after reading
- Head tilting, closing or blocking one eye when reading

#### PERFORMANCE CLUES

- Avoidance of near work
- Frequent loss of place
- Omits, inserts, or rereads letters/words
- Confuses similar looking words
- Failure to recognize the same word in the next sentence

#### SECONDARY SYMPTOMS

- Smart in everything but school
- Low self-esteem, poor self image
- Temper flare-ups, aggressiveness
- Frequent crying
- Short attention span
- Irritability
- Day dreaming

#### LABELED

- Lazy
- Dyslexic
- Attention deficit disorder
- Slow learner
- Behavioral problem
- Juvenile delinquent
- Working below potential

From Parents Active for Vision Education (P.A.V.E.)  
<http://www.pavevision.org/>

STUDENT \_\_\_\_\_ TESTER \_\_\_\_\_ DATE \_\_\_\_\_

NEAR POINT OF CONVERGENCE: DO three times from two feet to nose

- 2
- 1) Break @ \_\_\_\_\_ " Recover @ \_\_\_\_\_ " See two? YES NO  
2) Break @ \_\_\_\_\_ " Recover @ \_\_\_\_\_ " See two? YES NO  
3) Break @ \_\_\_\_\_ " Recover @ \_\_\_\_\_ " See two? YES NO

Comments:

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### EYES FOLLOWING A MOVING TARGET

**Horizontal movements:** Left and right slowly moving target three round trips:

Eyes stay on target Total times loses fixation \_\_\_\_\_

4 Recovery after loss: (<1sec) (>1 sec) (>5 sec) time to regain fixation

Midline Jerk: Never Occasionally Every Time

Body strain Head Still Head Moves Head moves even with warning

Left eye poor Right eye poor Both together poor

Look for differences in the quality of each eye. When testing each eye alone and both together, does one eye and not the other follow easily? Do they do fine with either eye but not with both? If so, there is a problem.

### Moving in a Circle 3x CW CCW

Smooth, Body balance, no head mvts Jerky Loses fixation \_\_\_\_\_ times/circle

6 Comments:

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### EYES JUMPING BETWEEN TARGETS

Timed 60 beats/minute jumping test: Easy Does with Strain Can't Head mvt

Comments:

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### Visual Field

8 Right eye First sees Right@ \_\_\_\_\_ mm Left@ \_\_\_\_\_ mm Above@ \_\_\_\_\_ Below@ \_\_\_\_\_

Left eye First sees Right@ \_\_\_\_\_ mm Left@ \_\_\_\_\_ mm Above@ \_\_\_\_\_ Below@ \_\_\_\_\_

Comments:

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### THE COVER TEST FOR EYE POSTURE

Cover LEFT eye and observe the RIGHT eye: No mvt Noseward Earward Up Down

When the cover moves from one eye to the other, the just uncovered eye moves horizontally towards: **NOSE EAR slightly** 1/4" 1/2"

Vertical movement observed lid moves up and down Right eye up Left eye up



