



American Optometric Association
Sports Vision Section



VISION EVALUATION PROTOCOLS

for the

2010 AAU Junior Olympic Games

The AOA SVS Sports Vision Evaluation Program at the 2010 AAU Junior Olympic Games is made possible by a generous grant from:



DIVISION OF

Johnson+Johnson Vision Care, Inc.

JULY 2010

STEPHEN BECKERMAN, O.D., F.A.A.O. - Illinois College of Optometry

STEVEN HITZEMAN, O.D., F.A.A.O. - Indiana University School of Optometry

© 2010 American Optometric Association. All rights reserved.

No part of this work may be reproduced, distributed, or transmitted without written permission of the AOA Sports Vision Section.

CONTENTS

Consent	3
History	4
Visual Acuities	6
Cover Test	7
Near Point Convergence	11
Color Vision	12
Randot Stereopsis at Nearpoint	16
Pupils	18
Ocular Motilities	20
Pursuits/Saccades	22
WSVP Dominance Wand	24
Dominant eye/hand	25
External	26
Internal	28
Eye movements - Ober II Visagraph	30
Wayne Footspeed	32
Wayne Saccadic Fixator	33
Wayne Saccadic Fixator (Hand Speed)	35
Wayne Saccadic Fixator (Balance Board)	37
Wayne Peripheral Awareness Tester (P.A.T.)	38
Tachistoscope	39
Vectorvision contrast sensitivity	41
Howard Dolman Stereoacuity	43
Wesson – Fixation Disparity Card	45
Vision and Balance	47

CONSENT

For the consent to participate in a vision screening and research study

Read the following to the Athlete:

I, the undersigned, give my permission for a Sports Vision Screening to be performed on me by the members of the AOA Sports Vision Section Screening Team (AOA SVSST). In granting this permission, I release agents and representatives of the Junior Olympics and the AOA SVSST from any and all liability, which may arise from the screening examinations or tests. I realize that a screening should not be considered a complete examination and that responsibility for any recommended follow-up care is mine alone.

Having come to the AOA SVSST for this screening, I voluntarily consent to allow the information in my record (including test results, photographs and other pertinent information) to be inspected (reviewed) and/or used for the purpose of research, student education, scientific studies or other professional purposes. During my examination, the clinician or optometrist assigned to me will explain the benefits and risks of specific testing procedures to me. I understand that my name will remain confidential (will not be used) if the information in my record is reviewed.

Furthermore, I am aware that I may refuse to allow the use of my record, but that such refusal would in no way affect the level of care to which I am entitled.

Present the above information to the Athlete and allow for questions to be asked.

If the Athlete agrees to the vision screening have him/her to sign in the appropriate location on the recording form. If the athlete is a minor, have their legal guardian sign the form.

HISTORY

It is important to get an accurate ocular and medical history in order to fully utilize the screening information. Ask the Athlete the following questions about their ocular and medical health and sport's involvement. Allow the Athlete to ask questions and offer additional information and record the answers in the appropriate area on the recording form.

Demographic info:

Patient initials:

Age (at time of screening):

Sport: record primary competitive sport

Male/ Female:

Competition level: record highest level achieved

Rx History

What was the date of your last eye Exam in an Eye Doctor's office?
What is your Eye Doctor's name?

Do you wear corrective lenses?
If yes, do you wear them for sports?

Ask which of the following describe the Athlete's current spectacles.

- None
- ASTM f803 approved Eyewear (Prescriptive)
- Plano Polycarbonate Shield
- Standard Spectacle

If the Athlete uses contact lenses ask which of the following applies.

- Soft Sphere Daily Wear
- Soft Sphere Extended Wear
- Soft Disposables
- Soft Toric
- Rigid Gas Permeable

Ocular Symptoms

Ask the Athlete if they ever experience or have been told they have any of the following symptoms:

- Difficulty seeing*
- Sensitivity to lights*
- Lack of Consistency of Play*
- Easily Distracted from Visual Target*
- Difficulty following moving objects*
- Reduced Peripheral Vision*
- Reduced Performance as Stress Builds*
- Headaches*
- Poor Depth Perception*
- Blurred Vision After Close Work*

Ask the Athlete if they have any reason to believe they have an eye or vision problem.

Medical History

Ask the Athlete to describe their current medical health and to list any medications they are currently taking.

VISUAL ACUITY (SNELLEN)

Evaluates: The Snellen chart uses minimum separable angle techniques to determine visual acuity. The fraction result that is obtained is the reciprocal of minimum angle of resolution (this is based on one minute of arc).

Test Distance: 20 feet

Illumination: Standard illumination

Position: Standing relaxed

Critical Factors: Sequence for testing is OD followed by OS

Criterion: Crisp 20/20 (1 minute of arc) OD, OS

Instructional Set: "Please cover your left eye and read the row of letters above the red line. Then the smallest line below the red line you can with out squinting. Guess if you have too." Repeat this with the right eye covered.

Record: Record BVA (best visual acuity) as the smallest line where the patient gave >50% correct.

STANDARD CHART ANSWERS

200:E
100:F,P
70:T,O,Z
50:L,P,E,D
40:P,E,C,F,D
30:E,D,F,C,Z,P
25:F,E,L,O,P,Z,D
20:D,E,F,P,O,T,E,C
15:L,E,F,O,D,P,C,T
13:F,D,P,L,T,C,E,O
10:P,E,Z,O,L,C,F,T,D

COVER TEST

- Evaluates:** This test assesses the presence and magnitude of a phoria or a tropia (strabismus). If motor fusion is present (there is no strabismus) the cover test measures the demand put on the Athlete's fusional vergence system.
- Equipment:** Occluder, Snellen chart, near point target, and a prism bar.
- Set-up:** This test is done at both distance (20 feet) and near (16 inches). The Athlete should wear his/her habitual Rx for the distance being tested. The room illumination should be full. For distance testing the target should be a isolated Snellen letter 2 lines above best visual acuity for the patient's poorer seeing eye. *See figure 1.* For near testing the target should be an isolated near target letter. *See figure 2.*
- Instructions:** Inform the athlete that this test measures the ability of his/her eyes to work as a team. Instruct the athlete to look at a particular detail of the target letter ("look at the tip of the A"). Tell the athlete to keep that detail clear throughout the entire test. It is very important that the athlete does not look around during this test.
- Procedure:** 1. First perform the unilateral cover test (UCT). This portion of the test determines if a strabismus (tropia) is present. Begin the UCT with the occluder in the midline position (over the patient's nose). Cover the patient's right eye while observing the left eye. Repeat this several times noting any movement of the left eye only. Then cover the patient's left eye while observing the right eye. Again, repeat this several times noting any movement of the right eye only. Be sure to hold the occluder over the eye for 2-4 seconds to allow the deviating eye (if present) to regain fixation. Note the direction and magnitude of any movement. If no movement is present on this test the athlete does not have a strabismus. Perform the above procedure at both distance and near. *See figure 3.*

2. Now perform the alternating cover test (ACT). This allows the determination of the presence of a phoria if a tropia has already been ruled out by performing the unilateral cover test. Alternately occlude the right and left eye for at least 5 cycles. Watch the eye that is uncovered as you move the occluder to the other eye. It is important to make sure the athlete is not binocular at any time. The occluder is in place over the eye for 2-4 seconds but it should be moved quickly between the eyes in order to avoid binocularity. Note the direction of the movement of the eye as it is uncovered in order to determine the type of deviation present.

1. If the eye moves in when uncovered = exo deviation (the eye was out)
2. If the eye moves out when uncovered = eso deviation (the eye was in)
3. If the eye moves down when uncovered = hyper deviation (eye was up)
4. If the eye moves up when uncovered = hypo deviation (eye was down)

Also perform the ACT at both distance and near. See *figure 4*

3. In order to determine the magnitude of the deviation hold the appropriate base prism over 1 eye and perform the alternating cover test.

BO prism for eso

BI prism for exo

BD prism for hyper

BU prism for hypo

Begin with low amounts of prism and increase the amount of prism and repeat alternate occlusion until no motion is seen. The magnitude of the deviation is determined when no motion is noted. See *figure 5*.

Recording:

Phorias: record the magnitude and direction of the deviation.

Tropias: Record the type of deviation, laterality (unilateral or alternating), magnitude of the deviation (in prism diopters), frequency of the deviation (constant or intermittent), and the direction. The prime sign (') indicates a near deviation.

P = phoria

T= tropia = strabismus
E= eso deviation
X = exo deviation

Examples: 2 XP = 2 prism diopters of exophoria at distance
10 EP' = 10 prism diopters of esophoria at near
5 CLET = 5 prism diopter constant left esotropia at distance
30 IAXT' = 30 prism diopter intermittent alternating exotropia at near

Referral Criteria: Any strabismus that is present.
A phoria greater than 2 exo or 2 eso at distance.
A phoria greater than 6 exo or 2 eso at near.

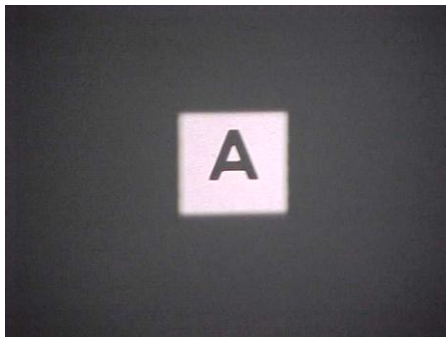


Figure 3: Unilateral cover test.



Figure 4: Alternating cover test. Be sure to watch the eye being uncovered. Movement is in the direction of the yellow arrow.



NEAR POINT OF CONVERGENCE (NPC)

- Evaluates:** The ability of the eyes to converge while maintaining fusion.
- Equipment:** Near point target, Penlight, red-green glasses
- Set-up:** The athlete can either sit or stand and should be wearing his/her habitual Rx with the red-green glasses over. Penlight placed at 24 inches on the midline and slightly below eye level.
- Instructions:** Instruct the athlete to look at the penlight. Determine how many lights are seen, there should be one. Tell the athlete that you are going to be bringing the penlight in towards his/her nose. Instruct the athlete to report if the target splits into two lights.
- Procedure:** Start with the fixation target slightly below the athlete's eye level at 50cm (24 inches).
- Bring the target slowly up the midline towards the nose. If the patient reports two lights or if the examiner notices an eye turn, note the distance from the eye. This is the break point.
- Now bring the light back towards yourself until the patients reports that the light is now one or until you witness the eyes regaining bifixation. This is the recovery point.
- Repeat the procedure three times recording the result of the third trial.
- Recording:** Record the break point and recovery point in centimeters. Also note if diplopia was reported or if the examiner saw an eye deviation. If the athlete maintains bifixation all the way to his/her nose record TN (to nose).
Examples: 5/8 (broke at 5cm and recovered at 8cm)
- Referral Criteria:** Any break or recovery greater than 10 cm.

COLOR VISION
(Color Vision Testing Made Easy)

- Evaluates:** To detect the presence of any red-green color deficits.
- Test Distance:** 75 cm (30 inches)
- Illumination:** True Daylight Illuminant (TDI), Standard Illumination “C”
- Position:** Sitting or standing
- Critical Factors:**
Binocular testing
- Criterion:** If the athlete was able to identify 8 out of 9 plates, the test is complete. If the athlete identified the sample plate but scored less than 8, present all of the 9 plates a second time.
- Instructional Set:**
Part 1: “Please tell me if you see a circle (or ball) on these cards.” Present the first card to the binocular athlete and allow 3 seconds per plate. If they fail the first attempt, repeat the test.

Part 2: “Please tell me what object you see on each of these cards. Do you see a dog, boat, balloon, or nothing?”
- Recording:** Record the number of correct responses attempted out of nine (X/9) by the trial number. Don’t include the demonstration card in this number. Classify any color deficiency.

STANDARD CHART ANSWERS:

Part 1

<i>Card No.</i>	<i>Normal Color</i>	<i>Deficient Color Vision</i>	<i>Normal Color</i>	<i>Deficient Color Vision</i>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing
7	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing
8	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing
9	<input type="checkbox"/>	Nothing	<input type="checkbox"/>	Nothing

Part 2

	<i>Normal Color Vision</i>	<i>Deficient Color Vision</i>
<input type="checkbox"/> A <input type="checkbox"/>	Boat	Nothing
<input type="checkbox"/> B <input type="checkbox"/>	Balloon	Nothing
<input type="checkbox"/> C <input type="checkbox"/>	Dog	Nothing

If patient responds car, then diagnose as malingering.

COLOR VISION (Ishihara Color Plates)

Evaluates: Presence of any deficits in sensitivity to various wavelengths of light

Test Distance: 50 cm

Illumination: True Daylight Illuminant (TDI), or Standard illuminant type "C"

Position: Sitting or standing

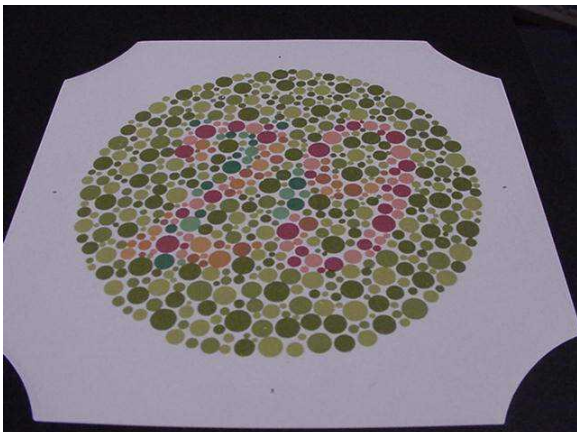
Critical Factors:
Binocular testing

Criterion: The athlete is not allowed to miss any plates binocularly. If any plates are missed, retest monocularly. The first plate is for demonstration and should not be missed by anyone, or the athlete may be malingering. For plates 1-15, only show every other plate (1, 3, 5, etc...), then show plates 16 and 17.

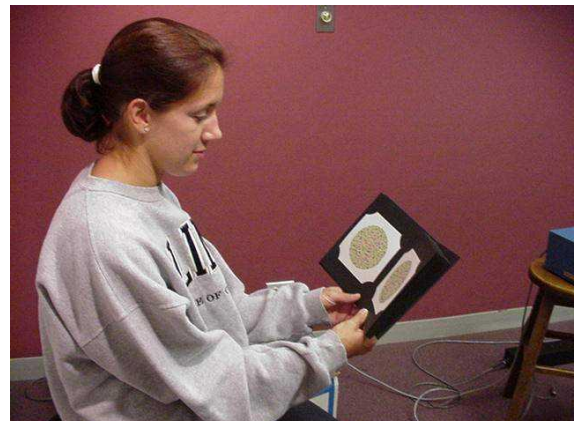
Instructional Set:
"Look at the plates and tell me what the dots form."

Recording: Record the number of correct responses (X/10) per response attempted. Classify person as Red-Green deficiency, Protan, Deutan, or Total Color deficiency.

Example of Color Plate



Example of proper testing position



Answers for Ishihara Color Plates (Normative and Color Deficient responses):

Plate	Normal Person	Person with Red-Green Deficiencies				Person with Total Color Blindness
1	12	12				12
2	8	3				X
3	29	70				X
4	5	2				X
5	3	5				X
6	15	17				X
7	74	21				X
8	6	X				X
9	45	X				X
10	5	X				X
11	7	X				X
12	16	X				X
13	73	X				X
14	X	5				X
15	X	45				X
		Protan		Deutan		
		Strong	Mild	Strong	Mild	
16	26	6	(2) 6	2	2 (6)	
17	42	2	(4) 2	4	4 (2)	

RANDOT STEREOPSIS

Evaluates: Near sensitivity to binocular disparity depth information presented vectographically.

Test Distance: Exactly 40cm

Illumination: Normal room lighting

Position: Sitting or standing.

Critical Factors:

Must test the forms located in the six boxes on the right side of book first. All six boxes must be correctly identified before the test is continued. Then test the circles, there must be no head tilting, or turning of the book. Time limit of 5 seconds per line for response. Test at **exactly** 40 cm. **Note:** Many patients have difficulty at #6, please encourage guessing until #10.

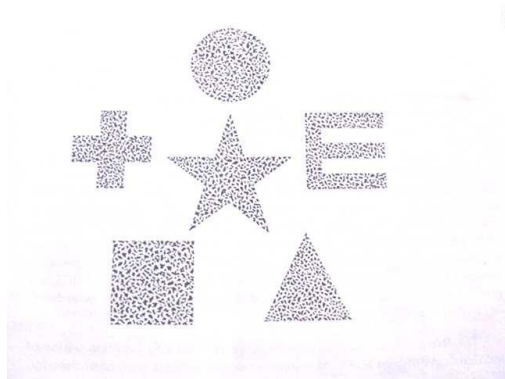
Criterion: 6/6 on forms and 7/10 dots without hesitation
Norms: 8.71 ± 1.94

Instructional Set:

Have the athlete wear vectographic spectacles over habitual Rx. Present the example figures shown below and on the cover of the book to the athlete and have them identify those figures in the six boxes on the right side of the book by asking, "What shapes do you see hidden in each of these panels?" If all figures are seen, present the rows of circles on the left. "Tell me which of the circles, left, middle, or right appears to be floating slightly above the other circles." Have the judgement made on all ten rows of stimuli.

Record: Record the number of figures identified correctly. The first incorrect response on the circles will be considered the limit of disparity except when the patient identifies two consecutive finer stimuli correctly.

ANSWER KEY	<u>Scoring Key:</u>	<u>Sec of Arc</u> <u>at 16 in:</u>	<u>Scoring Key:</u>	<u>Sec of Arc</u> <u>at 16 in:</u>
	1 ⇒ L	400	6 ⇒ M	50
	2 ⇒ R	200	7 ⇒ L	40
	3 ⇒ L	140	8 ⇒ R	30
	4 ⇒ M	100	9 ⇒ M	25
	5 ⇒ R	70	10 ⇒ R	20



Example of Stereo forms



Example of proper testing position

PUPILS

- Evaluates:** The direct, consensual, and afferent pupillary responses.
- Equipment:** Fixation target with low accommodative demand, transilluminator.
- Set-up:** The athlete is standing with his/her eyes directed at a fixation target 20 feet across the room.
- Instructions:** Explain to the athlete that you are assessing how well his/her eyes react to light. Instruct the athlete to keep fixation on the distant target while you shine the transilluminator in his/her eyes.
- Procedure:** Shine the light into the right eye, without interfering with the athlete's visual axis, and observe the size of the pupil and the speed of the constriction in the right eye for three cycles. This is the direct response of the right eye.
- Continue to shine the light in the right eye, while observing the pupil of the left eye for 3 cycles. This is the consensual response of the left eye.
- Shine the light into the left eye and observe the direct response of the left eye for three cycles and the consensual response of the right eye for three cycles.
- Check the athlete's pupils for an afferent pupillary defect (APD) by moving the light alternately between both eyes rapidly, while sustaining a period of 4 seconds per eye. Observe the responses of the eyes as the light moves to each of them. Be sure to indicate for each eye whether or not constriction occurs (normal) or if an initial dilation occurs (abnormal) as the light shines on the eye.
- Recording:** Record the relative appearance of the pupils (pupils equal round: PER), if the pupils were responsive to light (RL), and if a APD is present or not (- or + APD). Be sure to record any difference in size or shape between the two pupils.
- Referral Criteria:** Any abnormal response including diminished light response, presence of an APD, or differences between size and shape.



OCULAR MOTILITIES

- Evaluates:** This test assesses the athlete's ability to perform conjugate eye movements.
- Equipment:** Transilluminator
- Set-up:** The athlete should stand facing the examiner 50cm away. The room illumination should be full and the athlete should remove his/her habitual Rx.
- Instructions:** Tell the athlete that you are testing the ability of his/her eyes to move in different directions. The athlete should be instructed to keep their head still and to follow the light with their eyes. *See figure 1.* Instruct the athlete to report if he/she feels pain or has double vision at any time during the test.
- Procedure:** Beginning in primary gaze move the penlight into the cardinal positions indicated in the physiological "H" pattern. *See figure 2.* Be sure to move the penlight to the athlete's extreme limits of gaze. Throughout the procedure observe the smoothness of movement, the accuracy of following the penlight, and the extent of eye movement. Be aware of the positioning of the light reflexes in the pupils, any asymmetry may represent a muscle problem. At the extreme limits of a healthy person's gaze it is normal to observe a low amplitude nystagmus, termed end-point nystagmus.
- Recording:** If the athlete follows the penlight smoothly and accurately in all positions record FROM (full range of motion). Record the presence of any pain, diplopia, or restriction in the position that it occurred.
- Referral Criteria:** The presence of any oculomotor restriction.

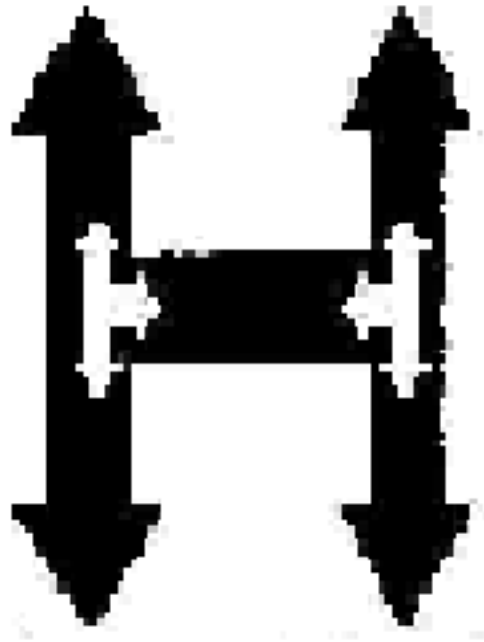


Figure 2: Physiological H pattern

PURSUIITS/SACCADES

- Evaluates:** The quality of the athlete's pursuits and saccades.
- Equipment:** Two near targets of different colors.
- Set-up:** The athlete should stand facing the examiner 50cm away. Room illumination should be full and the athlete should wear his/her habitual sport's Rx.
- Instructions:**
- Pursuits: Tell the athlete that you are testing his/her ability to follow a moving near target. Instruct the athlete to look at the target and follow it wherever it goes only using his/her eyes and without moving his/her head.
 - Saccades: Tell the athlete that you are assessing his/her ability to change fixation from one target to another. Instruct the athlete to look at one near target and to look at the other target as quickly and accurately as possible when you call the color of the second target.
- If any head movement occurs during either test instruct the athlete to try to hold their head still and only move their eyes. If the athlete is unable to resist head movement grade them as a 1 on that section.
- Procedure:**
- Pursuits: Use one near target and move it left to right, right to left, up and down, down and up, and then in a circular pattern. Be sure to maintain the 50cm working distance and not to exceed a pattern greater than the circumference of the athlete's face. *See figure 1.*
 - Saccades: Use both near targets held at a distance of 10cm apart. Direct fixation from one target to the other for a total of 5 cycles. Be careful not to get into a predictable rhythm. *See figure 2.*
- Recording:** Record according to the following scales.
- | | | |
|-----------|----|--|
| Pursuits: | 4+ | smooth and accurate |
| | 3+ | one fixation loss |
| | 2+ | two fixation losses (fail) |
| | 1+ | more than two fixation losses or any head movements (fail) |

- Saccades: 4+ smooth and accurate
3+ some slight undershooting
2+ gross undershooting or overshooting or increased latency (fail)
1+ inability to do task or greatly increased latency, any head movements

Referral criteria: A score of 2+ or 1+ on either test.



DOMINANT EYE/HAND

(WISCONSIN SPORTS VISION PROJECT [WSVP] DOMINANCE WAND)

Evaluates: To determine the dominant eye and hand.

Test Distance: The examiner is 10 feet from the athlete.

Illumination: Standard illumination

Position: Standing relaxed

Critical Factors:

The athlete is to hold the handle of the WSVP dominance wand with both hands and arms extended, in the midline of the body a few feet below primary gaze. The examiner points to their dominant eye and instructs the athlete to slowly raise their arms in the midline and capture the eye within the circle.

Instructional Set:

“Hold the wand between both hands at the center of your body. Look at the eye I’m pointing to with both eyes open. Bring the wand up and look at my eye through the hole.”

Record: Record whether the patient is left or right handed. Circle the dominant eye, and record strong, mild/moderate preference, or central or cyclopean tendency, or alternate/undetermined preference. Refer to diagram at station.

STRONG



MILD/MODERATE



CYCLOPEAN



note: Alternating non-established athletes will appear as mild/moderate with both eyes (eye dominance may switch from one to the other)

DOMINANT EYE/HAND

Evaluates: To determine the dominant eye

Test Distance: An isolated 20/40 letter is placed 6 to 15 feet from the athlete.

Illumination: Standard room

Position: Standard relaxed

Critical Factors:

Insure the athlete is looking through the circle aperture and not moving it once the task is understood. The athlete's body needs to be centered with the target.

Instructional Set:

"Look at the target across the room with both eyes open. While holding the circle aperture, bring it up and center the distant object in the circle." The examiner is to cover up the right eye and ask "Can you still see the object through the circle?" Cover the left eye and ask if the object is still seen.

Recording: The dominant eye sees the object while the other eye is covered. Record OD dominant or OS dominant. Record whether patient is right or left handed.

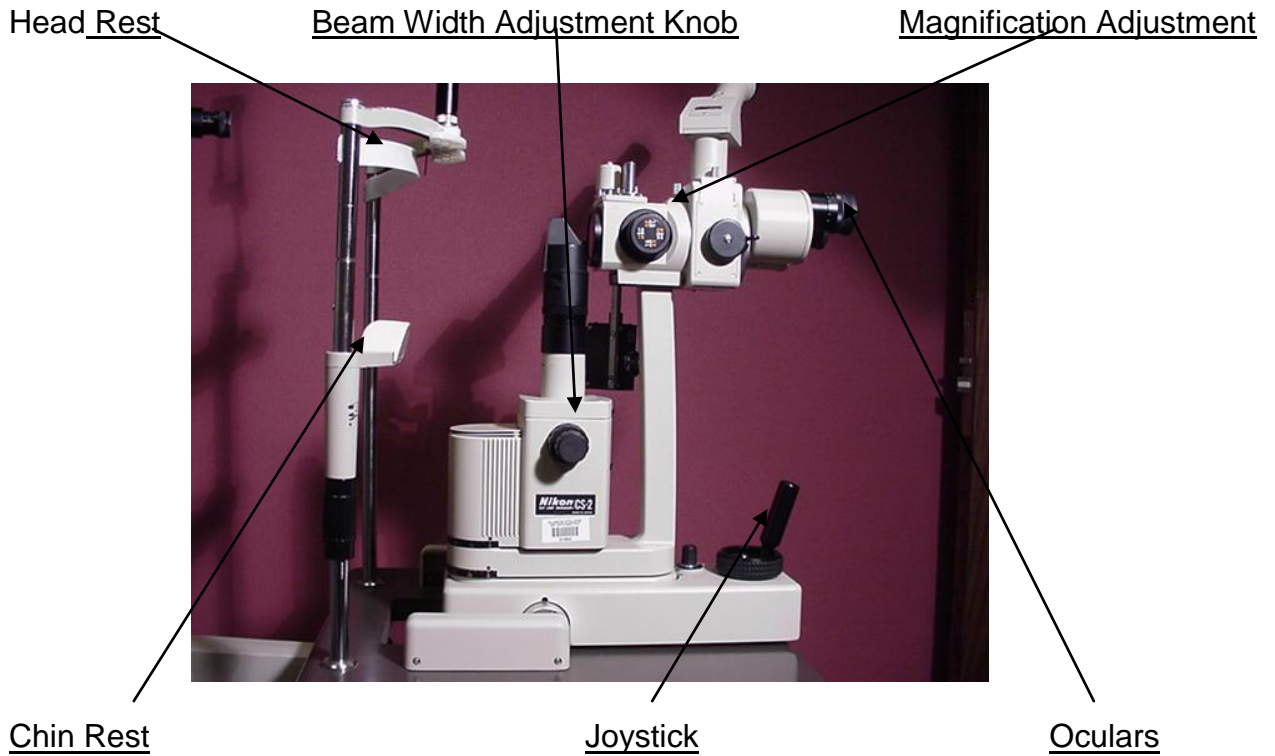
EXTERNAL EVALUATION

- Evaluates:** External and anterior segment health of the eye.
- Illumination:** Dim
- Position:** Athlete seated. If biomicroscope is available, have athlete put their chin in the chin rest and have their forehead touching the upper bar.
- Critical Factors:** Steady fixation to a target point as directed by the examiner.
- Criterion:** **LIDS**- Look at the edges of the eyelids. Observe for signs of inflammation, discharge, and crusting or debris on the eyelids. If crusting debris is found, the athlete may have blepharitis.
- CONJUNCTIVA**- The peripheral conjunctiva should appear smooth. Note the presence of papillae (a vessel is located in the center) or follicles (a raised bump with out a central vessel). If the papillae are very large, GPC may be present. Common disorders of the bulbar conjunctiva include Pinguecula and Pterygia, these should be noted if the athlete has either or both conditions. Also note if the athlete has any injection (this is graded on a 1+ to 4+ scale).
- CORNEA**- Scan the cornea for any scarring, note location and level within the cornea layer if a scar is found. Infiltrates (made up of Polymorphonuclear leukocytes) should also be noted.
- ANTERIOR CHAMBER**- Look for signs of cell and flare (both are graded on a 1+ to 4+ scale with 1+ being trace and 4+ dense). The depth of the chamber angle is measured by comparing the depth of the anterior chamber with the corneal thickness at the limbus.
- LENS**- Look for any opacifications and note location: anterior of posterior subcapsular, cortex, or nucleus.

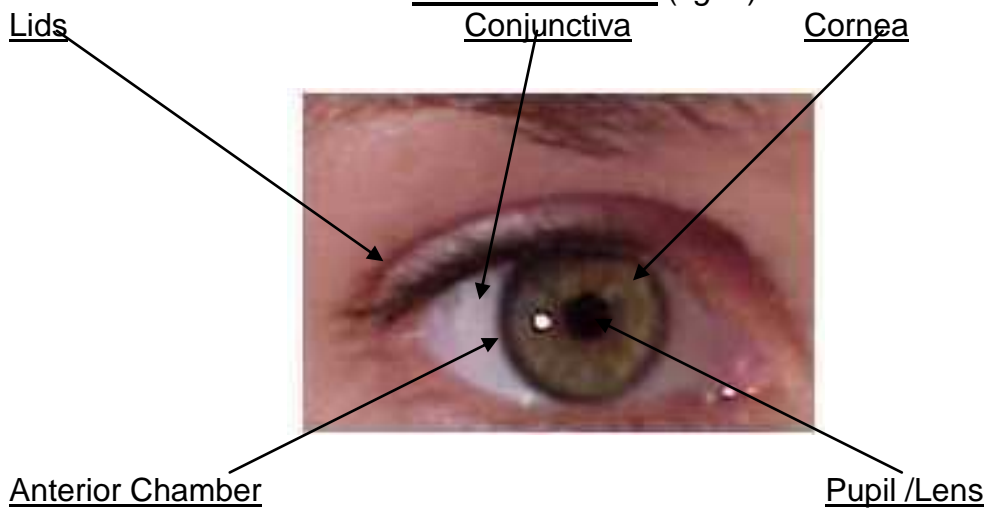
Instructional Set: "This procedure evaluates the health of the front of the eye. Place your chin on the rest and forehead against the bar. Try to keep your head still and hold your eyes on whatever target I direct you to."

Record: Record status of lids, conjunctiva, cornea, anterior chamber, and lens.

SLIT LAMP (fig. 1)



EXTERNAL EYE (fig. 2)



INTERNAL EVALUATION

- Evaluates:** The health of the internal structures of the eyes.
- Equipment:** A direct ophthalmoscope, a distant target
- Set-up:** The athlete should be seated and the target should be set up at 20 feet. The room illumination should be dim in order to encourage dilation of the pupils.
- Instructions:** Tell the athlete that you are evaluating the health of the back of his/her eye. Instruct him/her to look at the distance target and continue to look in the direction of the target if you get in the way.
- Procedure:** Hold the ophthalmoscope with your right hand, placing it over your right eye in order to examine the athlete's right eye. Position yourself at about 15 degrees off the axis of the athlete's eye in order to allow the athlete to continue to fixate on the distance target. *See figure 1.*
- Dial in +8.00D to +10.00D in the ophthalmoscope in order to investigate the iris of the athlete.
- Slowly reduce the power in the ophthalmoscope (less plus/more minus) in order to focus on the vitreous. Monitor the vitreous for clarity.
- Continue to reduce plus in order to focus on the fundus. Look for the red reflex.
- Evaluate the optic nerve head including the disc margin, rim tissue (contour and color), and the cup/disc size and depth.
- Evaluate the adjacent posterior pole including the macular area and the surrounding vasculature. Note the following: color and clarity of the macular area, presence of a foveal reflex, and the artery/vein (A/V) ratio.
- Recording:** Record the cup/disc ratio, the A/V ratio, and the macular status.
- Referral Criteria:** Refer if any abnormal findings are found.



EYE MOVEMENTS-OBER II VISAGRAPH

- Evaluates:** This series of tests assesses fixation stability, saccadic speed and accuracy. Test I evaluates the ability to point the eyes accurately. Test II measures how quickly the eyes move from point to point.
- Set-up:** Turn on the computer and click on the “Visagraph” icon, **not Visa 4.3**. Click on the ‘DePaul10’ group on the drop down menu on the main page. At the bottom of the page, click on ‘New’ under Student Options. A new window should pop up. On the left hand side of the screen, enter in the first initial of the athlete’s first name under ‘First Name’ and the first two initials of the athlete’s last name under ‘Last Name’. Under the grade level drop down menu, choose ‘College’. Choose yes or no under the glasses drop down menu and choose the correct gender under the gender drop down menu. Once this is all entered, click ‘Apply’ at the bottom of the page and then click ‘New Recording’. Once the new window comes up, make sure that ‘Visual Skills’ is selected at the top of the page. The athlete should be standing at a 5 foot test distance and with standard room illumination. It is important that the athlete be eye level with the targets. The goggles must be properly adjusted and calibrated to the athlete’s pupillary distance.

Instructions and Procedure:

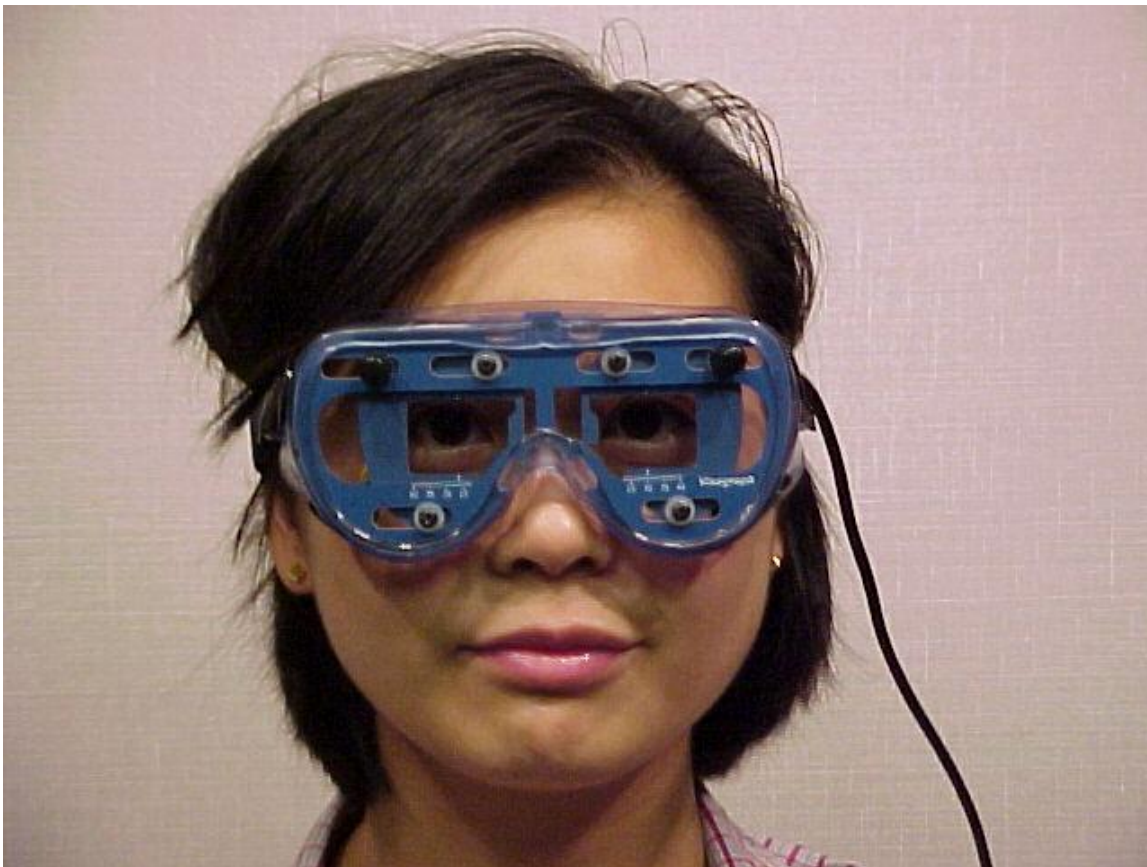
Test I - Fixation maintenance. Instruct the athlete to look at the center ‘O’ target without moving his/her eyes or head until you tell them to stop. Allow *at least* 15 seconds until the computer terminates the test. Press the ‘start’ key to begin the test. The software will take you to the next test.

Test II - Motilities - Lateral Saccades. Tell the athlete to move his/her eyes back and forth between the two ‘X’s’ as fast as he/she can. The two ‘X’s’ should be separated by 50 cm. Stress accuracy and speed during this procedure, avoiding head movements. Test this for *at least* 20 seconds, beginning and ending the procedure the same as for Test I.

Record “fixations” (under Fixation Maintenance) as **“Fixation Loss/10 sec.”** Only record the right eye. Record “excursions” and “fixations” (under Motilities) as the **“Saccadic Speed/15 sec.”** Only record the right eye for this as well. Click ‘Close’ and ‘New Student’ to start the next athlete.

Visagraph 1 data

	Age < 7	Age 7-11	Age 12-15	Age 16-25	Age > 25
Fixation loss 10 sec	10±7	8±6	7±5	6±4	4±3
Saccadic Speed 15 sec	17±8	20±7	24±8	28±8	29±6
Pursuit Fixation Loss 10 sec	26±7	24±6	21±6	17±6	15±6



WAYNE FOOT SPEED

Evaluates: Perceptual reaction time and motor footspeed.

Test Distance: 7 feet.

Illumination: Standard room (Approx. 7ft candles)

Position: Athlete stands with left foot on the center footplate, knees bent in a ready position.

Critical Factors:

Do not allow athlete to put pressure on left footplate until instructional set is completed. Footplates are secured horizontally separated by 7 feet on a hard surface. Push Enter-9-99-Enter to program the test.

Criterion: Junior Olympics 1997

	Grade Shcl.	Jr. High	High Shcl.	Cntrl./coaches	Entire pop.
Footspeed	.66+.6	.49+.18	.48+.19	.55+.39	.54+.29
Release Footspeed	1.5+.6	1.2+.6	1.2+.3	1.6+.9	1.3+.5

Instructional Set:

“This test evaluates reaction time and footspeed. When you place your weight on the center footplate a green light will illuminate on the board in front of you. After about 3 seconds a beep will sound and a red light will appear on the board at the 12:00, 3:00, 6:00, or 9:00 position. If a light appears at 12:00 move to the front footplate as fast as you can. 3:00 to the right, 6:00 behind you, 9:00 to the left. As soon as you hear the beep and see the light change, move as fast as you can and touch the other footplate with your right foot. We will do this three times.”

Record: Record the release time first followed by footspeed. Two numbers will flash, the footspeed number is followed by a period. Record the direction of movement by checking a box on the score sheet for each of the trials. Enter the trials for each position in the computer.

Reprogram Codes:

- 1 => 13
- 2 => 0
- 3 => 0
- 4 => 3
- 5 => 4
- 6 => 0

WAYNE SACCADIC FIXATOR Double Wide

Test Distance: 30 inches

Evaluates: Visual motor response to visual stimuli based on a precise, visually guided motor response (finger pressing a lighted target). Measures eye-hand coordination.

Illumination: 20 foot candles incident on the instrument in a dimly lit room.

Position: Center of instrument at eye level. Subject should be able to reach top and bottom of instrument without changing the test distance.

Critical Factors:

Illumination and the test distance are critical. Testing is conducted using one finger of the dominant hand. Both sub-tests one and two run for 30 seconds. Allow a demonstration of the task by allowing the athlete to correctly press 5 lights then restart the test by touching the green light.

Sub-test 1 (Proaction): Enter; 9,1,<enter>

Sub-test 2 (Reaction): Enter; 9,21,<enter>

Criterion: Proaction: Mean= 33 Std. Dev.= 7
Reaction: Mean= 22 Std. Dev.= 5
Speed: Mean= 85 Std. Dev.=12

Instructional Set:

“This instrument measures eye-hand coordination and hand speed. For the first test, using either hand, I want you to touch the lighted circles. As soon as you touch another circle will light up in another random position. Touch as many circles as you can in 30 seconds.”

“The second test is similar to the first except the light may not wait for you. If you don’t get it in time the light is going to move to a new location so keep on trying to touch it. The faster you start going the faster the lights will start moving. Try to get as many as you can in 30 seconds.”

Recording: Sub-test 1: Record # of buttons touched (from display)
Sub-test 2: Record # of buttons touched and presentation speed. Hit #3 to access presentation speed.

Program Codes:Proaction

1 ⇒ 1

2 ⇒ 30

3 ⇒ 0

4 ⇒ 3

5 ⇒ 1

6 ⇒ 0

7 ⇒ 0

8 ⇒ 0

9 ⇒ 0

Reaction

1 ⇒ 14

2 ⇒ 30

3 ⇒ 57

4 ⇒ 3

5 ⇒ 1

6 ⇒ 0

7 ⇒ 0

8 ⇒ 0

9 ⇒ 0

WAYNE SACCADIC FIXATOR (HAND SPEED)

Evaluates: Visual motor response to visual stimuli based on a precise, visually guided motor response (finger pressing a lighted target). Also measures eye-hand coordination and hand speed.

Test Distance: At comfort of the subject

Illumination: Critical at 40-70 cd/M² incident on the instrument in a dim room.

Position: Center of instrument at eye level. Subject should be able to reach 3:00 and 9:00 position of instrument without changing the test distance.

Critical Factors:

Illumination and the test distance are critical. The subjects gaze their eyes at one point or follow the stimulus and the subject may only use one hand but any finger.

Sub-test 3 (Hand-Speed): Enter; 9,18,<enter>

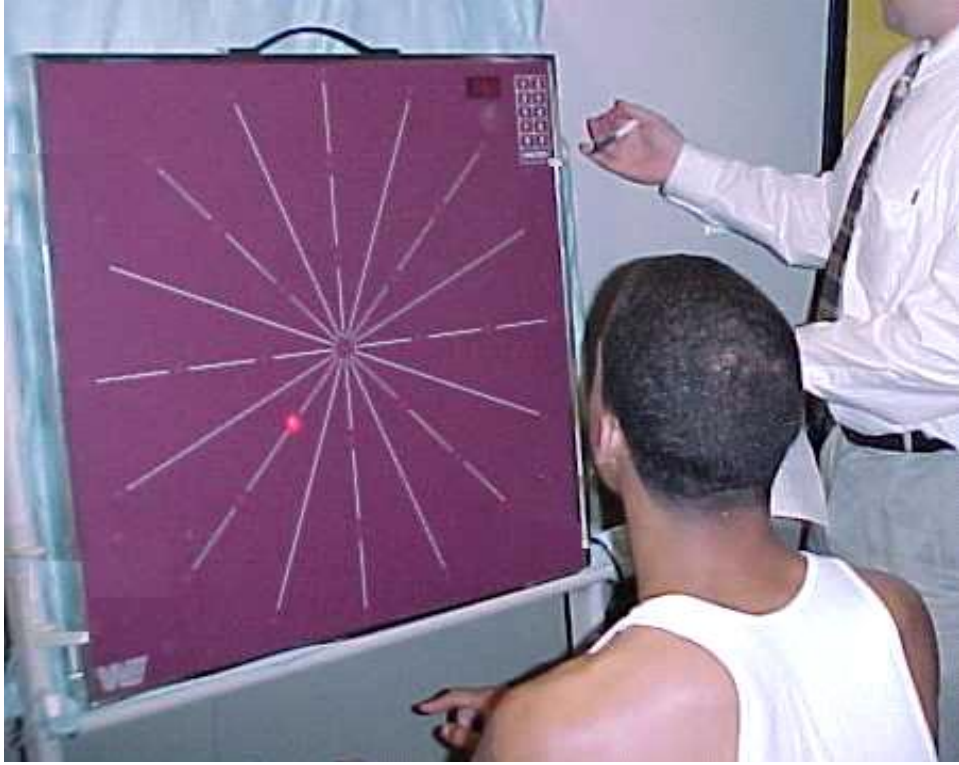
Criterion: Hand-Speed: 0.28 ± 0.07

Instructional Set:

“This instrument measures eye-hand coordination and hand speed. You can use all your fingertips of any one hand. I want you to touch this button (9:00), then touch this button (3:00). Do this only on time.” Record speed. “Do it again.” Record speed. “One last time. Now, try to do it faster” Record again.

Recording: Record all three trials. Circle the best one and enter it into the computer.

Program Codes: 1 ⇒ 11 6 ⇒ 0
 2 ⇒ 0 7 ⇒ 0
 3 ⇒ 3600 8 ⇒ 0
 4 ⇒ 4 9 ⇒ 0
 5 ⇒ 1



WAYNE SACCADIC FIXATOR (BALANCE BOARD)

Evaluates: Visually directed balance

Test Distance: 7 feet

Illumination: Standard room

Position: Standing on balance board facing the Wayne Saccadic Fixator

Critical Factors:

Good balance to start procedures. Stable position. Allow the athlete to move the board in the various directions to get a feel of the balance shifts required.

Enter; 9,26,<enter>

Criterion: To be determined

Instructional Set:

“This instrument measures visually directed balance. While you balance on the board, a light will appear at the 12:00, 3:00, 6:00, or 9:00 positions. If it appears at the 12:00 position, tilt the board forward, if 3:00, tilt right, if 6:00, tilt back, and if 9:00 tilt left. Be very careful not to go in the wrong direction, since any wrong move will lose all your points. The task will continue for 30 seconds.”

Record: Record the number attained after 30 seconds.

Program Codes: 1 ⇒ 11
2 ⇒ 0
3 ⇒ 0
4 ⇒ 3
5 ⇒ 1
6 ⇒ 121
7 ⇒ 0
8 ⇒ 0
9 ⇒ 0

WAYNE PERIPHERAL AWARENESS TESTER (P.A.T.)

Evaluates: Visual motor response time (via lever press) to peripheral stimuli in eight visual field locations.

Test Distance: 30 inches

Illumination: 3-5 foot candles

Position: Standing relaxed with center of Wayne Saccadic Fixator at the subjects eye level. Alignment is especially critical with those athletes whose spectacle Rx might restrict their visual field.

Critical Factors:

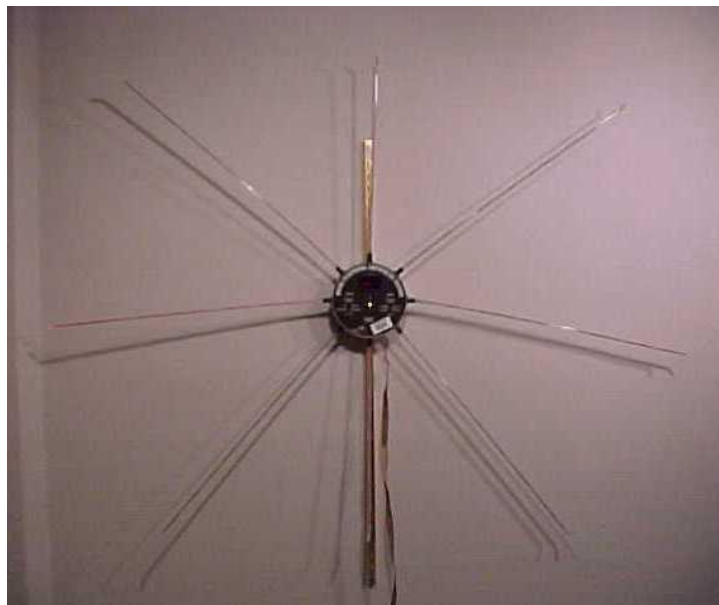
All PAT screening should be performed in accordance with PAT diagnostic testing protocols: Instrument should be mounted against a neutral light-colored background. It is critical that the patient fixates on the red center light of the unit continuously during the testing procedure.

Enter; 9,125,<enter>

Criterion: Criteria < 0.6 sec per location.

Instructional Set:

“This instrument measures peripheral vision. I’d like you to always keep your eyes on this center yellow light. When you see a light at any one of the edges, move the joystick quickly in the direction of that light and release it. One of the lights will turn on every 2-4 seconds.”



TACHISTOSCOPE

Evaluates: Speed and span or recognition

Test Distance: Athlete is 10 feet from the screen

Illumination: 35 foot/candles

Position: Standing comfortable

Critical Factors:

Numbers must be 3.5 cm high (20/80 acuity). There will be 6 numbers per set and each set is shown at 0.05sec.

Criterion:

Junior Olympics 1997

Grade school	Jr. High	High School	Cntrl./coaches	entire pop.
9+4	12+3	13+3	13+2	12+4

Instructional Set:

“On the wall between the 2 stickers there will appear a set of numbers such as these.” Push the external shutter to show 6 numbers. “They will appear this fast.” Push shutter initiate to show how fast they will appear. “Look between the 2 stickers, remember the numbers in order and recite them back to me.” Each athlete has 3 trials (18 total numbers).

Record: Number correct out of 18 (three trials).

Scoring: Subject allowed one transposition per slide, example: numbers as they appear (123456) they recite (123465) number correct equals 5 out of 6 because 4 were correct plus 1 point for transposition.

Answers:

	<u>Set 1:</u>	<u>Set 2:</u>	<u>Set 3:</u>	<u>Set 4:</u>	<u>Set 5:</u>
<u>Demo:</u>	360842	842907	728053	264073	739201
<u>1:</u>	254698	302658	394625	628149	583902
<u>2:</u>	628407	620174	873142	802476	831927
<u>3:</u>	602391	905281	984527	219684	730159

TACHISTOSCOPE CONTROL PANEL

Shutter Initiate

Shutter Time

Interval Timer

External Shutter



VECTORVISION CONTRAST SENSITIVITY

Evaluates: Visual contrast sensitivity; visual discrimination ability.

Test Distance: 12.5 feet

Illumination: Test is backlit with an internal light source.

Position: Standing relaxed

Critical Factors: Test only OD, OS

SPATIAL FREQUENCY EXAMPLES FOR VARIOUS TESTING DISTANCES IN CYCLES/DEGREE

	ROW A	ROW B	ROW C	ROW D
8 Feet	3	6	12	18
10 Feet	3.75	7.5	15	22.5
12.5 Feet	4.7	9.4	18.75	28.1

Criterion:

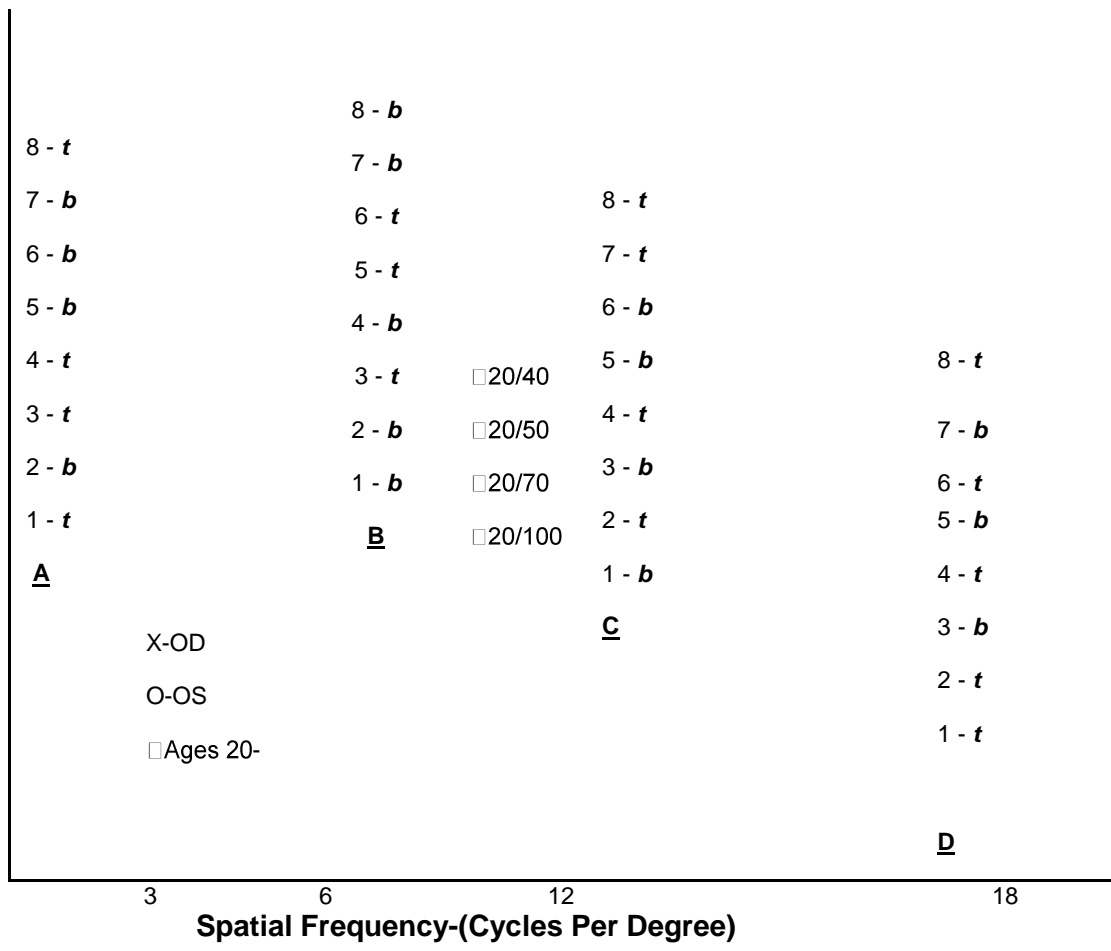
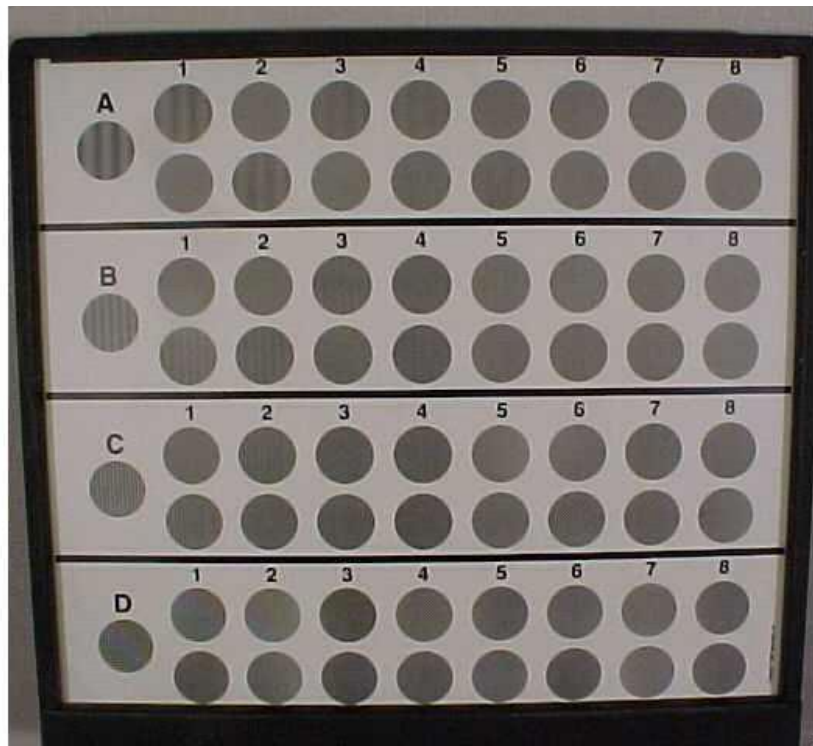
Junior Olympics 1997

	Grade School	Jr. High	High School	control/coache	entire pop
CSFOD1	6+2	6+1	6+1	6+2	6+2
CSFOD2	6+2	6+2	6+2	6+2	6+2
CSFOD3	6+2	6+2	6+2	5+6	6+2
CSFOD4	6+2	6+2	6+2		6+2

Instructional Set:

“On each panel there are two rows of circles, for each pair one of the circles will contain some lines. Tell me for each pair whether the top or bottom contains the lines. Some of the lines will be faint, try to guess if you’re unsure.”

Record: Record the number or grids called correctly in each of the four plates on the Vectorvision chart.



HOWARD DOLMAN STEREOACUITY TEST

- Evaluates:** Stereoacuity or depth perception at distance.
- Test Distance:** The athlete is 6 meters from the zero point of the scale on top of the apparatus to the athlete's eye.
- Illumination:** Normal Room Illumination
- Positioning:** Athlete should be seated in front and level with the apparatus. The athlete should be wearing appropriate sports vision correction. Be sure the athlete cannot see the guide tracks on top and bottom on the inside of the box. Adjust chair accordingly.

Testing Sessions:

Four trials should be done for each rod separation in front and behind. Trials are done at 9, 6, 4, 2 and 1 cm separation. Four trials are performed at each separation distance, two trials with the right rod in front and two trials with the left rod in front. Start with the largest separation first. Only move to the next shorter separation if the athlete correctly identifies the movable rod in front or behind the stationary rod 3 out of the 4 trials. When moving the rod in front or behind, stand in front of the box. Stereoacuity is recorded as the last trial that was correctly identified 3 out of 4 times. The athlete should only be given approximately three to five seconds for each response, and he/she shouldn't move their head during the test. After three seconds, urge the patient to answer. If they do not answer, then consider that a fail for that trial. Do not inform the patient of the number of trials or the number of times the left or right rod is in front. Do not pause between testing of different separations. Do not test strabismics or amblyopes.

Instructional Sets:

"This device helps to measure your distance depth perception. There are two rods in the box in front of you. When you see the rods, immediately tell me which one is in front; either left or right."

Test Results:	<u>Separation Distance</u>	<u>Stereoacuity</u>
	9cm	30.94"
	6cm	20.63"
	4cm	13.75"
	2cm	6.88"
	1cm	~3.44"

Record:

Separation Distance

Presentation: Rod in Front

9cm

R, L, L, R

6cm

L, R, L, R

4cm

L, L, R, R

2cm

R, L, R, L

1cm

R, L, L, R



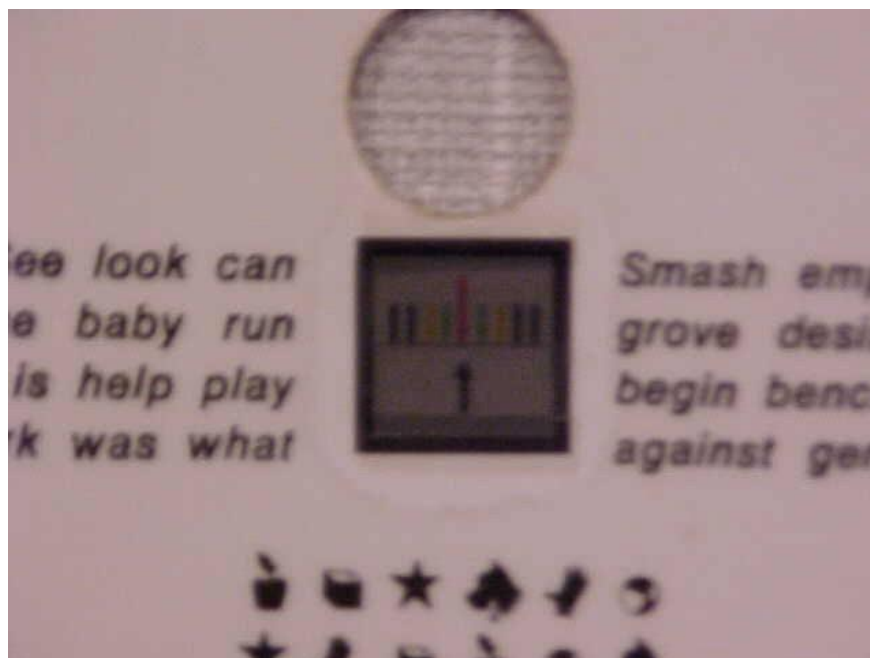
WESSON - FIXATION DISPARITY CARD

- Evaluates:** This test is used to evaluate phoric posture
- Set - up:** The athlete should be standing with his/her head straight. The test should be performed at a near distance of 16 inches and a far distance of 10 feet. Standard room illumination should be used and the athlete should wear **vectograph** glasses.
- Procedure:** Turn on the mallo box and instruct the athlete to look at the box. Ask the athlete to watch the bottom arrow and notice if the top arrow is to the right, left, or directly above the bottom arrow. Next, have the athlete look at one of the horizontal arrows and notice if the other horizontal arrow is above, below, or horizontally aligned with the arrow of fixation.
- Recording:** Record the associated phoria. Note that with standard vectograph glasses the top arrow to the right indicates eso posture and the top arrow to the left indicates exo posture. In addition, the right arrow higher indicates left hyperphoria.
- Referral criterion:** Eso or exo greater than one or any vertical deviation.

		DISTANCE: 40 CM (16 INCHES)	25 CM (10 INCHES)
	↑	F.D. (MIN. ARC)	F.D. (MIN. ARC)
RED	0	0	0
	½	4.3'	6.9'
GREEN	1	8.6'	13.7'
	1½	12.9'	20.6'
ORANGE	2	17.2'	27.5'
BLACK	3	25.8'	41.2'
BLACK	4	34.4'	55'

ESO F.D.: ARROW TO LEFT
EXO F.D.: ARROW TO RIGHT

Smash empty safe stone



VISION AND BALANCE

Evaluates: Visual factors involved in maintaining gross motor balance under various conditions.

Set - up: Standard room illumination is used and test distance is not applicable except for the eye movement sequence and then a 40 cm distance should be used. The athlete should remove his/her shoes and stand on the flat edge of a standard 4 X 4 (3 5/8" X 3 5/8" X 10 ft.). The athlete should place feet heel to toe, parallel to the long dimension of the beam.

Critical Factors: The examiner should read and memorize the scaling definitions in order to avoid the need for reference during screening. Use different colored targets to test eyes.

Scaling Definitions:

1. Highly stressed, tremendous body wavering and struggling. Obvious difficulty staying on the beam. Unable to stay on any longer than 2-3 seconds during tasks.
2. Stressed, with considerable struggling and wavering present; falls off the beam two or more times during the task.
3. Significant wavering, but able to recover. Falls off the board no more than one time during a task. Excessive wavering and struggling (to the point where barely recovers) with no falls.
4. Slight noticeable lean with minimal wavering. No falls or near falls. Maintains a high level of stability during the majority of the task.
5. No wavering and no falls. Maintains a high level of stability throughout the task.

Instructional Set:

The vision and balance testing consists of five subtests, each of which should be carefully scored in accordance with the criteria listed above.

- A. "Stand heel to toe and maintain balance while looking straight ahead with arms at your side (demonstrate). You may use whichever foot you prefer in the forward position." Score 10 seconds.
- B. "Now close your eyes." Score for 10 seconds beginning the moment the athlete closes his/her eyes.
- C. "Open your eyes. I want you to follow this target (bead) with your eyes only. Do not use head movement." Use the following four eye movement probes:
 - 1. Two slow NPC's to nose (break and recovery) over 15 seconds total. One slow NPC 6" from the patients right to nose (break and recovery) over 8 seconds and one slow NPC 6" from the patients left to the nose (break and recovery) over 8 seconds.
 - 2. Rapid saccades between opposite cardinal points at a test distance of 40 cm with the beads separated by approximately 75 cm. Two times each point.
 - 3. Rapid near-far saccades, 3 feet away to 6" away.
 - 4. Smooth eye movements at a 40 cm target distance. Lateral pursuits 2 X 2 round trips full range, oblique pursuits 2 X each, vertical pursuits 2 X each, rotation 1 X each.
- D. Dynamic: Eyes open - "Walk forward to the end of the beam and back using heel to toe. Try to keep your eyes pointed straight ahead."
- E. Dynamics: Eyes closed - "Walk forward to the end of the beam, I will tell you when you are at the end, then reverse and stop."

Recording: Record the performance scale rating on each subtest.

Criterion: The athlete should score a grade 3 on all phases of the screening. The total score is related to computer averages.

Mean = 18
Standard Deviation = 2

Scoring criteria:
(low) 1 2 3 4 5(high)

Example:

An athlete shows good balance with slight wavering during the first test. When the patient closes his/her eyes, he/she has to use a toe touch to keep balanced, but then shows steady balance for the remainder of the test. The athlete falls once when performing eye movements. The athlete uses two toe touches when walking with eyes open, and wavers and struggles to keep balance when walking with eyes closed. The athlete also falls twice during the last test.

Record:

1. 5
 2. 3
 3. 3
 4. 3
 5. 2
- TOTAL = 16

