optc west
Indian Wells, California

Vision Therapy
for Non-Strabismic Binocular Vision Disorders

A Evidence-Based Approach

4-5 April 2013

David A. Damari, O.D., FCOVD, FAAO

Table of Contents

Introduction

Vision therapy, although always an accepted part of the optometric scope of practice, is often thought of as an ugly step-child by many general practice optometrists. This has been especially true in the last thirty years, as our profession has achieved gains in our prescribing privileges. In fact, many in our profession seem to now consider optometry to be the medical branch of eye care, while ophthalmology is the surgical branch.

What makes us unique, however, is that optometrists have always been the type of health-care providers who have counseled as much as we have prescribed, who have worked with the patient instead of attempting to impose our will on the patient. It is this characteristic of optometry that has earned us the trust of our patients, and that trust has earned us the privilege of expanded abilities to care for our patients with pharmaceuticals and new procedures. It is also these traditional strengths that can make vision therapy an effective part of your patient care offerings.

Why do patients go to the optometrist? **They come to us to give them clear, comfortable, useful vision.** They come to optometrists so that they can do their jobs or school work efficiently and without undue fatigue. This has been shown to drive more than 75% of eye care. As our economy becomes more dependent on creative and intellectual productivity, the traditional services unique to optometry become more important. These services have always been backed by some of the best science available. The literature written on uniquely optometric interventions, such as a psychometrically-sound refractive care, low vision care, and vision therapy for binocular and visual information processing disorders, is some of the richest in health care. It has been dismissed out of hand by medicine because it has not been conducted by medicine, but that does not diminish its validity. This validity has been demonstrated recently in most dramatic fashion by the findings of the Pediatric Eye Disease Investigative Group's Amblyopia Treatment Studies (ATS). These multidisciplinary studies have again and again validated what optometrists have studied and known for over 60 years: short, active therapy based on evidence in human neurology trumps invasive, imposed regimens based on medical tradition every time. The tradition said that amblyopia could not be treated after age 7; science has shown that plasticity lasts much longer, and optometrists have been successfully treating amblyopia at any age for decades. The tradition said that full-time patching is the only effective treatment; science has shown that, to be effective, the treatment of amblyopia must be the treatment of a binocular condition of disordered spatial processing, something that could never occur simply by making someone artificially monocular every waking hour. In addition, another NIH-funded, multi-disciplinary and multi-center study, the Convergence Insufficiency Treatment Trial, (CITT) has demonstrated unequivocally that office-based vision therapy programs are more effective than any other type of therapy. Pencil push-ups and prism glasses were no more effective than placebo in reducing symptoms from CI.

Vision therapy is not simple. It cannot be taught in a lecture hall. It cannot be taught during a surgical or medical residency. And while technicians or occupational therapists can guide patients through vision therapy programs, the most effective programs can only be designed by doctors who have an understanding of all the underlying principles of the visual system and human behavior. These obstacles have made it reassuring for many optometrists to believe the myths about vision therapy. Organized ophthalmology continues to enforce these myths to the general public: that VT is based on anecdote and desperation and greed. Yet, with this workshop, we will attempt to demonstrate that vision therapy is one of the most valuable, science-based services doctors of optometry can provide.

This manual for vision therapy attempts to capture the scientific basis and distill it into a rational, systematic program for helping most of your patients with disorders of eye movements, accommodation, and binocular vision. It is hoped that this will help you to help hundreds of your patients

to lead happier, more productive lives. It does not represent a complete program of vision therapy, however. If, after you have begun offering vision therapy based on your experience in this course, you find you have need for more information, congratulations! That means you are doing it well.

As you find you need to know more, there are many resources you can use. The two major organizations involved in vision therapy are the Optometric Extension Program Foundation (OEP) and the College of Optometrists in Vision Development (COVD). OEP offers publications, seminars, discussion groups, and other educational opportunities throughout the United States and the world. You can access their resources through their web site, www.oepf.org. COVD is the certifying body for the specialty of vision therapy. Their fellowship program is the model for board certification in optometry as other professions understand that concept: assurance that a professional has gone through the education and testing to offer expert treatment in a specialty. COVD also offers education at its annual meeting. Their web site is www.covd.org.

Good luck and continued success in your pursuit of excellent patient care!

David A. Damari, O.D., FCOVD, FAAO (david.damari@comcast.net)

Guiding Principles

There are some critical principles of vision therapy that will help determine the success of the individuals who enter your therapy program. They are:

- **A motivated patient is a successful patient.** What is true for refractive surgery is equally true for vision therapy, perhaps even more so because VT is such an active process. If you have to talk a very reluctant patient (or parent) into a program of VT, it will probably not be successful. If a patient is trying to talk you into putting him into a program of VT, his success will probably exceed your expectations.
- **Do not teach a test.** Too often what passes for vision therapy is actually just making the patient repeat a test over and over until the practice effect makes the test look better (think *pencil push-ups*). This method of therapy has very poor transfer to real world skills and poor amelioration of symptoms over the long-term.
- **It is the patient's therapy, not yours.** The effectiveness of any vision therapy program is determined by the changes made in the patient, which makes VT like any other behavior modification program. You must present the patient with challenges to be overcome and then observe the patient developing strategies to meet those challenges. Teaching *strategies* won't help modify behavior over the long term.
- **Learning does not take place in a minute and a half.** The patient must have time to develop a strategy. Be patient with her, and make sure that she is patient with herself. Be encouraging without assisting or smothering.
- **You must start with step one.** You cannot start a patient with the Brock string or lifesaver cards. Starting at the end of therapy forces the patient to develop adaptations that will be detrimental to long-term success.

The root of these five principles is that vision therapy is, at its core, a program of behavior modification, like weight loss or quitting smoking. The undesirable behavior is embedded in adaptations that are not healthful, but that do have some reward over the short term. These behaviors do not go away without effort. There is no quick fix.

A word about reporting is necessary. Communication is the key to a successful vision therapy practice, and a good report is the best external marketing tool you have at your disposal. A report should have these elements:

- **history** including birth, previous eye exams, and academic
- **findings** divided into categories such as eye movements, focusing, binocular coordination, and (if applicable) visual information processing, with data reported in standard scores or percentiles, so that educators and other professionals can immediately grasp the performance of the patient
- **conclusions** that are given as medical diagnoses with lay-person explanations
- **recommendations** for treatment and, more importantly, for specific classroom or workplace accommodations.

Eye Movements

Eye movement testing has benefitted from advances both in science and technology. Maples and his coworkers have greatly refined the gross testing of eye movements by observation with the NSUCO standardization. Eye movement recording has been improved by the use of goggles with LEDs and sensitive photocells that monitor eye movements while the patient reads printed material. This allows for objective testing that is well-standardized and results that are easily communicated to patients, parents, and other professionals.

Testing Eye Movements

NSUCO Pursuit & Saccade Testing

These testing standards grew out of the work done at Southern California College of Optometry in the early 1990's. Maples and coworkers found that the SCCO method for scoring eye movement performance put emphasis on the least reliable aspect of eye movement grading: the "ability" measure. Therefore, Maples created the NSUCO scoring system for gross pursuit and saccade observation. It is based on four elements: ability, accuracy, head movement, and body movement. **Ability** is defined as how long the child stays with the task. **Accuracy** is defined by saccadic intrusions and refixations for pursuits, and by over- or undershoots for saccades. **Head** and **body** movements are indications of the child's ability to control motor overflow. The test is graded as follows:

PURSUITS	**ability**	**accuracy**	**head**	**body**
level 1	no attempt	> 10 refixations	large	large
level 2	half rotation	4 to 10	moderate	moderate
level 3	1 rotation	3 or 4	constant, slight	constant, slight
level 4	2 rotations	1 or 2	intermittent	intermittent
level 5	both directions	none	none	none

SACCADES	**ability**	**accuracy**	**head**	**body**
level 1	no attempt	large misses	large	large
level 2	2 cycles	moderate	moderate	moderate
level 3	3 cycles	constant, slight	constant, slight	constant, slight
level 4	4 cycles	intermittent	intermittent	intermittent
level 5	5 cycles	none	none	none

When measuring pursuits and saccades using the NSUCO system, please keep in mind that the most valid (predicts academic performance) and reliable (two different examiners most commonly come up with the same score) category are head and body movements.

The standards (one standard deviation below average) for this grading system are as follows:

pursuits	ability M	ability F	acc M	acc F	head M	head F	body M	body F
age 5	4	5	2	3	2	3	3	4
age 6	4	5	2	3	2	3	3	4
age 7	5	5	3	3	3	3	3	4
age 8	5	5	3	3	3	3	4	4
age 9	5	5	3	4	3	3	4	4
age 10	5	5	4	4	4	4	4	5
age 11	5	5	4	4	4	4	4	5

saccades	ability M	ability F	acc M	acc F	head M	head F	body M	body F
age 5	5	5	3	3	2	2	3	4
age 6	5	5	3	3	2	3	3	4
age 7	5	5	3	3	3	3	3	4
age 8	5	5	3	3	3	3	4	4
age 9	5	5	3	3	3	3	4	4
age 10	5	5	3	3	3	4	4	4
age 11	5	5	3	3	3	4	4	5

The Developmental Eye Movement Test

The Developmental Eye Movement test (DEM) has become one of the most well-accepted methods for testing reading eye movements. This is probably because of its elegant design, low cost, and acceptable reliability and validity. Certainly, the test's face validity makes it a very appealing tool for parent education.

This test has improved on the old Illinois College of Optometry optometry student project, the King-Devick test, by creating a control for problems with automaticity of naming numbers. It consists of three test plates. The first plate (Test A) has 40 numbers

arranged in two columns, the second plate (Test B) has 40 numbers also arranged in two columns. These two plates are designed to assess the child's rapid automatic number naming (RAN) performance, without undue emphasis on eye movements. If the child makes a total of more than five errors on these two plates, then the premise that eye movements do not play a role in those two plates has been shown to be invalid, and you should not do Test C.

The third plate (Test C) consists of the same 80 numbers, in the same order, as Tests A and B. However, the numbers are now arranged in 16 rows of 5 numbers each. The idea is to allow observation of reading-type saccades without the element of decoding (reading words).

The instructions given for this test are key for its validity and reliability, so they are given here:

DEM *(Requires DEM test plates, recording form, and a stopwatch)*

1. *Place Test A in front of patient.*
2. *"This is a number-reading race. I would like you to read the numbers on this page as quickly as you possibly can. Start up here (point to the top of the first column) and read down as fast as you can. When you get to the bottom, don't stop. Go right to the top of the second column and keep reading down. Any questions? Begin."*
3. *Start the stopwatch as the child reads the first number.*
4. *Stop the stopwatch when the child reads the last number, then record the time.*
5. *Place Test B in front of the patient.*
6. *"You did a great job. Now do the same thing on this page. Remember to read the numbers as quickly as you can, and do not stop when you get to the bottom of this first column. Ready? Begin."*
7. *Start the stopwatch as the child reads the first number.*
8. *Stop the stopwatch when the child reads the last number, then record the time.*
9. *Place Test C in front of the patient.*
10. *"This page is a little different. You are going to read the numbers as fast as you can again, but this time you will read across the lines, like you are reading words in a book. Read every number in every line, but if you think you made a mistake, do* ***not*** *go back and re-read any numbers because I will have to count every number you re-read as a mistake. You cannot use your fingers or thumbs to keep your place — use only your eyes. Any questions? Begin."*
11. *Start the stopwatch as the child reads the first number.*
12. *Keep track of every error. Strike through any omitted numbers or lines of numbers, write in any added numbers, and also track any substituted or transposed numbers.*
13. *Stop the stopwatch when the child reads the last number, then record the time.*

14. *Score the patient using the norms given at the back of the test plates or using the Excel spreadsheet written by Damari (if you sign up for e-mail, you will receive a copy). There is also a new scoring program available from Bernell (see appendix).*

The child's performance on the DEM can show if there is a possible expressive language delay, based on the "vertical" score derived from the combined times of Tests A and B. It can also tell you if the patient's saccadic eye movements are deficient based on the ratio score or the error score. If **either** of those two scores is reduced relative to the patient's age group, then you may conclude that the patient has a saccadic dysfunction.

Eye Movement Recording Systems

There are two major eye recording systems available: the Visagraph (not manufactured any more, but occasionally available from previous users) and the ReadAlyzer. Both offer very similar set-ups and eye movement analyses.

The ReadAlyzer comes with complete instructions and excellent technological support. The normative values should, however, be used with caution. The reading rates (words per minute) used are not those commonly accepted by the reading education community. The fixation and regression norms appear to be more valid.

Eye Movement Therapy

It is critical during eye movement therapy that the child have good feedback about what his body and head are doing while performing the task. Therefore, with rare exceptions, all eye movement therapy should be done standing up.

Saccades are counterintuitive in that larger saccades are easier. Therefore, in therapy, start with techniques that require larger eye movements and then move to techniques that require smaller, more discriminating saccades.

Wall Saccades

materials: wall saccade handout, eye patch

key points: This technique is largely for homework, so ensure that they understand the technique by teaching it in your office.

goals: The patient does not need to be able to do these quickly. It is more important that she can do it accurately and in a rhythm, especially to the beat of a metronome (see Hart Chart saccades, below).

Hart Chart Saccades

This technique is similar to wall saccades, but since the eye movements are smaller and the targets are closer to one another, it is more difficult.

materials: Hart Chart, Letter Chart Instructions handout, eye patch

key points: Again, this is largely given for homework, but it is very important that the patient understands how to do this correctly, so teach it in the office.

goals: Again, the patient does not need to be able to do these quickly. Accuracy and rhythm are much more important.

loading/unloading: Use of a metronome is an excellent way to load this technique. At home, I ask patients to do it to music if they do not have a metronome.

Pegboard Rotator

This is the first technique that requires an equipment purchase. It works on pursuits, and by extension on fixation ability. So while this technique is extremely helpful, it is not absolutely necessary to the success of a vision therapy program if you want to hold off on its purchase.

materials: pegboard rotator (Bernell or OEP), eye patch

key points: This is an in-office only technique. The key to this technique is in the following the hole around with the golf tee and, by extension, the fovea. It should be performed standing up, one eye at a time, for about 5 minutes per eye.

goals: Placement of the tee into the hole being followed without touching the top of the rotator.

procedure:

1. *Have patient stand over the pegboard with a patch on one eye.*
2. *Turn on the pegboard.*
3. *Have the patient take a tee and hold it over one of the rotating holes in the pegboard.*
4. *Tell the patient that after he follows it for two rotations, he can try to insert the tee into the hole.*
5. *If the patient does not make a clean placement of the tee into the hole, he has to follow around again for at least one more rotation.*

loading/unloading: Slower is easier on this, so to make it easier slow down the rotation and have the patient follow the holes closest to the center. Asking questions or other verbal loading techniques are excellent for this exercise.

Hart Chart Rows & Columns

This takes advantage of the more complex eye movements necessary to find the intersections of rows and columns to build a higher-level saccadic eye movement task. It can be used to create a friendly “competition” in the therapy room by having two patients with similar skills “race” to find the letter first.

materials: Hart Chart, Letter Chart Instructions handout, eye patch (optional)

key points: This technique can be practiced at home but works best when two patients are competing with each other to do the task (see instructions for the competitive version below).

goals: Quickly and accurately finding the letter at the intersection of a specified row and column on the Hart chart.

procedure:

1. *Have both patients stand about 8 feet from the Hart chart.*
2. *Teach that rows go across and columns go up and down, then ask about what letter is at the intersection of row 1, column 1, as an example. Do a few more examples to ensure that both patients understand the concept.*
3. *Explain the rules: You will call out a row and column. The first patient to accurately call out the letter that is at the intersection of that row and column gets one point. If a patient calls out an incorrect letter, he must wait as the other patient gets an untimed opportunity to call out the correct answer. But if she also calls out an incorrect answer, no one gets a point.*
4. *If one patient gets more than three points ahead of the other, he must take a full step back away from the chart.*
5. *First patient to get to 10 points wins the competition.*

loading/unloading: Doing this task solo, without competition, is easier. The closer you are to the chart, the easier it is to accurately find the letter.

Monocular Prism Jumps

This technique is designed to improve a patient's awareness of her own eye movements. This will, in turn, allow the patient to better fixate and control her eye movements.

materials: loose prisms from 10^{Δ} to 1^{Δ}, eye patch

key points: Getting the patient to appreciate smaller and smaller eye movements.

goal: Seeing and feeling the direction the eye had to move in response to you placing a 1^{Δ} prism before the eye.

procedure:

1. *The patient stands and looks at a target, preferably a small, discreet one, across the room, with a patch on one eye.*
2. *Tell the patient, "I am going to hold up a prism that will move the target up, down, left, or right. When I hold up the prism, move your eye back onto the target and tell me which way it moved."*
3. *Move a prism in front of the open eye and hold it there.*
4. *Watch the eye movement to see if it was appropriate.*
5. *If the patient gives the **correct** response, take the prism away and repeat the task with that power prism from different orientations.*

6. *If the patient gives an **incorrect** response, ask her to try again, this time as you take the prism away and watch her eye movement.*
7. *Continue the task with smaller and smaller prism powers until the responses become guesses.*
8. *Record the lowest prism power that the patient could respond correctly to.*

loading/unloading: Smaller prisms are harder. Also, this task is more difficult with there is no peripheral stimulation, so doing it in a darkened room with a small light across the room is more difficult that using an isolated letter in a fully-lit room.

Michigan (Ann Arbor) Tracking

This is a technique parents love, because it has excellent face validity.

materials: Ann Arbor letter tracking workbooks, stopwatch, patch, pencil

key points: If a patient takes more than 3 minutes to do one paragraph of letters, step back to a more basic eye movement task. If a patient gets through an entire line and circles only one or no letters on that line, he has skipped the letter before.

goal: Getting through a paragraph correctly within a few seconds of one minute.

procedure:

The patient circles letters in the paragraphs with pseudo-words, in alphabetical order.

loading/unloading: Smaller print is harder than larger print. You can have the patient do one or two paragraphs untimed to get used to the task. Having the patient draw a line under the letters until she gets to the *a*, then circle it, then continue to draw a line until the *b,* etc., is easiest. Holding the pencil back away from the page, only bringing it down to circle a letter is hardest.

Accommodation

Accommodation has been shown in several studies to be the major cause of symptoms in binocular vision dysfunctions. In our experience, a major cause of regression of binocular dysfunctions after therapy is accommodative issues that have not addressed in therapy. Therefore, it is critical to the success of your program to thoroughly test the patient's accommodative system and address any issues in therapy, even if the data indicate only a minor problem.

Accommodative Testing

Phoropter Testing

Accommodation is easy to test as part of your phoropter routine. The tests done in the phoropter are fairly reliable and valid, as well, provided that your instructions are clear and consistent with the normative values you are using. For example, the OEP 20 and 21 are tested by adding minus or plus lenses (respectively) until the patient can no longer read 20/25 letters. But the NRA and PRA are tested by adding plus or minus lenses (respectively) until the patient *first notices* a blur that doesn't resolve on its own. The tests are similar enough that doctors often confuse them, but the differences are critical to proper scoring.

Test	Instructions to Patient
NRA	Tell me when you first notice the letters become blurry.
PRA	Tell me when you first notice the letters become blurry, double, or too small to read.
OEP 20	Tell me when you can no longer read these letters.
OEP 21	Tell me when you can no longer read these letters.
Amplitudes	Tell me when you can no longer read these letters.

Difficulty with the tests of accommodative amplitude or PRA are usually identified as accommodative insufficiency. A low NRA or a lead of accommodation on any of the nearpoint retinoscopy techniques is diagnostic for accommodative excess. Difficulty during the ±2D flipper test is diagnostic for accommodative infacility. However, on real patients the lines between those three defined accommodative disorders are often too blurred to make a clear distinction. Also, third-party payers typically do not consider accommodative conditions to be medical in nature, and therefore do not reimburse for those diagnoses

(367.5X). Therefore, do not get hung up on one label or another for accommodative disorders — it will not garner better reimbursement nor should the label guide treatment.

Nearpoint Retinoscopy Techniques

There are several dynamic, or nearpoint, retinoscopy techniques: stress-point, book, bell, Nott, and monocular estimate method (MEM). Although all these techniques have good clinical value, the last two give a direct, objective determination of the lag of accommodation.

Nott retinoscopy

Nott retinoscopy is done in the phoropter or in free space. It has most commonly been standardized while the patient is in the phoropter, using a special card that has a hole in the middle of a cluster of words printed in a typeface that is approximately 20/50.

materials: retinoscope (preferably with a spot bulb), Nott retinoscopy card, phoropter with a nearpoint rod

key points: Looking for neutrality of the reflex.

expected: There should be 0.50D lag, ±0.25D.

procedure:

1. *The patient sits behind the phoropter with the prospective nearpoint prescription in place.*
2. *Place the Nott card at 40 cm or at the Harmon distance, in good light.*
3. *Ask the patient to read the words out loud.*
4. *Scope the right eye through the hole in the Nott card.*
5. *If you see **with** motion, move back while maintaining a view. When the motion is neutralized, note where the front of the retinoscope is relative to the nearpoint rod. Subtract the dioptric value of that position from 2.5 to quantify the lag of accommodation.*
6. *If you see **against** motion, note that the patient had a lead of accommodation.*
7. *If you see neutrality, note that the patient has neither a lag nor a lead.*
8. *Repeat the technique for the left eye.*
9. *You can repeat this technique through other lenses to see the effect of lenses on the patient response. This is especially useful in cases of suspected pseudo-convergence insufficiency, or in convergence excess when trying to determine if a nearpoint addition will be effective.*

MEM retinoscopy

MEM retinoscopy is always performed out of the phoropter. Even though MEM stands for “monocular estimate method,” it is always performed with both eyes open. Most modern retinoscopes have special cards available that can attach to the face of the retinoscope

with a clip (Heine) or a magnet (Welch-Allyn) that has a hole in the middle of a cluster of words printed in a typeface that is approximately 20/50.

materials: retinoscope (preferably with a spot bulb), MEM card set, trial lens kit

key points: Looking for neutrality of the reflex. The "probe" lens needs to be held in front of the eye very briefly, so that the patient does not have time to change accommodation.

expected: There should be 0.50D lag, ±0.25D.

procedure:

1. *The patient sits comfortably, in a well-lit space, wearing either the habitual prescription or your prospective prescription.*
2. *Hold your retinoscope, with the MEM card attached, so that its face is at the patient's Harmon distance.*
3. *Ask the patient to read the words out loud.*
4. *Scope the right eye.*
5. *If you see **with** motion, estimate the amount of motion noted, then drop the plus lens that is appropriate into your line of sight just quickly enough to see if the motion went neutral. Repeat this step until neutrality is found, then record the lag in diopters.*
6. *If you see **against** motion, note that the patient had a lead of accommodation.*
7. *If you see neutrality with no lens, note that the patient has neither a lag nor a lead.*
8. *You can repeat this technique through a prospective add to see the effect of those lenses on the patient's accommodative response. This is especially useful in cases of suspected pseudo-convergence insufficiency, or in convergence excess when trying to determine if a nearpoint addition will be effective.*

Accommodative Therapy

A patient with poor control of his accommodative response will almost always prefer a low minus lens to a low plus one, feeling that the minus lens is easier to clear. His accommodative response will also be more variable, taking several seconds to settle into a posture, if it does at all. Therefore, when doing accommodative therapy, it is important to allow the patient some time with each lens to keep the target clear. Even with a diagnosis of accommodative infacility, the goal is not rapid changes of accommodative back and forth from near to far, minus to plus. In real life, that would be called an accommodative spasm. **The goal of accommodative therapy is a rapid and accurate accommodative response to a change in stimulus, with a subsequent ability to comfortably sustain that response for as long as necessary**.

Near/Far Hart Charts

materials: Hart chart, near Hart chart, Letter Chart Instructions handout, eye patch

key points: This technique is given for homework, but it is very important that the patient understands how to do this correctly, so teach it in the office.

goals: The point of this task is not changing accommodation from near to far, back and forth, as rapidly as possible, but a solid, steady, and appropriate change of accommodation and then its sustenance across the entire line of print.

Monocular Accommodative Rock (MAR)

materials: reading material, eye patch, flippers (±1D, ±1.5D, ±2D)

key points: Because you are using lenses to create the changes in accommodative stimulus, this technique can be more difficult than the Hart chart rock, in which the patient can note the change in distance. This technique offers an opportunity to reinforce a child's reading skills, so if the child has any literacy at all, this should be done with reading material. If not, use a *Where's Waldo* or *I Spy* book to improve the patient's figure/ground while building the accommodative response.

goals: Quickly and accurately get the print clear, then sustain that clarity for at least four or five seconds. Minus is often easier to clear for patients who have developed an over-reliance on accommodative convergence. Therefore, work at the ±1D level until the patient notes that plus is easier to keep clear than minus, then at the next session, he will be ready for the 1.5D flipper. At a minimum, he should note that the lenses are equally easy.

procedure:

1. *The patient sits in a well-lit space with reading material that is appropriate to her reading level, and a patch on one eye.*
2. *Give her the ±1D flippers and show her the proper way to hold them before her eyes.*
3. *Ask her to get the print clear and then read the first two lines aloud.*
4. *After she has read the first two lines, she flips the flippers to read the next two lines.*
5. *She continues to read, flipping the flippers every two lines, for five minutes.*
6. *After the five minutes, ask her to describe the differences between the two lenses.*
7. *Switch the patch to the other eye and have her read another five minutes while flipping the flippers every two lines.*
8. *After that five minutes, ask the patient if she noticed any differences between the lenses, and between the two eyes.*

loading/unloading: Although it may seem appropriate intuitively, ±0.5D lenses are not easier for most patients. The change is too small for them to react

appropriately. This task is easier if the patient is allowed to read to herself. (Adults should always be allowed to read silently.) If it is still to difficult, go back to the near/far Hart chart technique.

Monocular Lens Sorting

materials: reading material, eye patch, minus lens blanks

key points: This technique is designed not to expand a patient's accommodative amplitude, but to give him a better sense of what his accommodation is doing. Many vision therapy doctors advocate doing this technique before MAR, but in truth it requires far more subtle and discriminating accommodative skill than MAR and should only be done when the patient is good at ±2D.

goals: To be able to clear lenses quickly and determine the amount of accommodative effort being used for each lens. Eventually, many patients can sort lenses that are only 0.25D different from one another.

procedure:

1. *The patient sits in a well-lit space with reading material that is appropriate to her reading level, and a patch on one eye.*
2. *Give him four to eight minus lens blanks. At first, there should be at least a one diopter difference between the lenses (for example, start with plano, –1, –2, and –3D lenses).*
3. *Ask him to get the print clear through each of the lenses, and then determine which lens requires the least focusing effort, which requires the most, and so on, until all the lenses are sorted correctly.*
4. *Ask the patient to describe how he did the task.*

loading/unloading: Smaller differences between lenses make this task more difficult. Eventually, the patient should be able to sort lenses that are only different by 0.25D.

Split Pupil Rock (Biocular Minus Lens Rock)*

materials: Hart chart (or, alternatively, a Marsden ball), eye patch, minus trial lens (see below)

key points: This technique develops an even more subtle control of accommodation than the loose lens sorting technique, and if the patient did not notice SILO in the MAR, this technique should help the patient perceive it.

goals: SILO.

procedure:

1. *The patient stands about 8 to 10 feet from the Hart chart with a patch on one eye.*
2. *Give her a –3 trial lens to hold by the tab.*
3. *Ask her to hold the lens about 12 to 16 inches from her open eye so that she can see one chart "in" the lens and one chart above the lens.*
4. *Instruct her to get the chart in the lens clear, paying attention to where the charts are relative to one another (i.e., closer or farther away, to the left or right).*
5. *When she can clear the lens and hold it consistenly clear for 30 seconds, instruct her to clear the chart outside the lens, again paying attention to differences.*
6. *Continue to alter focus back and forth for about 3 to 5 minutes.*
7. *Ask patient to describe the differences between the two charts.*
8. *Switch the patch to the other eye and have her do the same thing for the other eye for 3 to 5 minutes.*
9. *After that time, ask the patient if she noticed any differences between the lenses, and between the two eyes.*

loading/unloading: Again, the smaller power lenses are more difficult, because the key to this technique is in noticing differences. Eventually, the patient may be able to tell differences with a –0.25 lens.

* This technique can be made biocular by having the patient not wear a patch and hold the lens a few inches from one eye, switching focus back and forth from one eye to the other. This makes the technique even more difficult when the power differences are very slight.

Red Red Rock (Franzblau Rock)

materials: Correct Eye Scope with the red red rock faceplate and tiles, red/green goggles, trial lenses (±1D, ±1.5D, ±2D)

key points: This technique allows you to combine accommodative therapy with some beginning reading skills training and therapy for visualization.

goals: Quickly and accurately get the print clear on the tiles and on the red sheet (not at the same time), and complete the matching task. Eventually, the patient should be able to complete the task even when you have flipped the sheet in one direction or another, as described during the workshop.

procedure:

1. *The patient sits at the Correct Eye Scope (CES), with about a 40 cm working distance.*
2. *Insert a +1 trial lens in the red lens well of the goggles, and a –1 lens in the green well.*
3. *Insert a red sheet into the faceplate of the CES and turn on the backlight.*
4. *Give the patient the corresponding canister of tiles and ask her to pull one out.*

5. *Instruct the patient how to place the tiles correctly on the "shelves" to correspond with the sheet on the left.*
6. *She should place all the tiles correctly and then check each tile, changing focus back and forth.*
7. *Flip the goggles over and put in a new sheet. Repeat steps 4-6.*
8. *Switch the lenses so that the minus lens is in the red well and the plus lens is in the green.*
9. *Repeat steps 3-7.*

loading/unloading: For some reason, plus in green is a very difficult combination for some patients, so you should always start with plus in red. After the patient successfully completes ±1D during one session, move on to ±1.5D in the next, and then on to ±2D.

Binocular Accommodative Rock (BAR)

materials: reading material (preferably a 3D comic book), red/green goggles, flippers (±1D, ±1.5D, ±2D)

key points: The "bar reader" overlays typically used in this technique do not prevent suppression, they only encourage it. This is because they allow so little light to come through that the retinal rivalry causes suppression, even in those who would not otherwise suppress. This is the rationale for using a three-dimensional comic book. It also reinforces the one binocular skill that transfers to the real world — stereopsis.

goals: Quickly and accurately get the print clear and the frame 3D through the plus lens, then sustain that clarity for at least four or five seconds. Work at the ±1D level until the patient notes that plus is easier to keep clear than minus, then at the next session, he will be ready for the 1.5D flipper.

procedure:

1. *The patient sits in a well-lit space with the 3D comic book and red/green goggles, with the green over the* **right** *eye.*
2. *Give her the ±1D flippers and show her the proper way to hold them before her eyes.*
3. *Ask her to get the print clear and the frame to look 3D, and then read the first speech balloon or caption.*
4. *After she has read the first speech balloon or caption, she flips the flippers to read the next speech balloon or caption.*
5. *She continues to read, flipping the flippers every speech balloon or caption, for ten minutes.*
6. *After the ten minutes, ask her to describe the differences between the two lenses.*

loading/unloading: none

Anti-Suppression & Fusion

The keys to treatment of vergence problems (both convergence excess and convergence insufficiency) is to first address the twin adaptations of suppression and the overuse of accommodative vergence, and then to understand that the patient's problem in everyday life is *not* the fact that she cannot cross her eyes, but that she cannot sustain fusion at 30 to 40 cm over the course of 15 to 20 minutes, let alone during an entire school- or workday.

Therefore, as you follow along with the therapy program outlined in this workshop, you will find that the program does not train "ranges." And yet, rest assured that if your patient successfully completes this program, he will appreciate stereopsis and fusion in a way that, when you test ranges again in the phoropter, they will be normal.

Fusion Testing

When testing vergences in the phoropter, it is important to give the patient permission to report SILO (small in, large out). SILO is the only response possible for patients with balanced accommodation, normal binocularity, and size constancy perception. Therefore, if you are performing vergences and a patient does not report SILO, especially at what you believe to be the conclusion of a program of vision therapy, there are probably subtle problems with fusion and accommodation that remain.

To "give permission" for a patient to report SILO, you should ask the patient to tell you about any changes in the target that he notices, including blur, double vision, changes in size, or movement. The added benefit to this instruction set is that, if the patient is suppressing one eye, he will be much more likely to report that the target is moving to the left or the right.

When the patient is experiencing SILO, he will report that the target is moving farther away (or "back") and getting bigger during the BI test, and moving in and getting smaller for BO.

Anti-Suppression Therapy

MIT Box with Alternate Flash

This technique is designed to reduce suppressions in those patients whose suppressions are fairly deep. It is particularly effective in patients with amblyopia, strabismus (especially esotropia), or both.

materials: macular integrity tester box, red/green goggles, polaroid goggles

key points: The MIT box creates a Haidinger brush entopic phenomenon by rotating a Polaroid filter. This technique uses that rotation to create an alternating flash, which helps break down a suppression. It does not require that the patient perceives the Haidinger brush.

goal: The patient can see one light that flashes back and forth from red to green from across the room.

procedure:

1. *The patient sits on a rolling stool, wearing both the red/green **and** the polaroid goggles, with her eyes about 5 inches from the MIT box (or closer if the patient is an esotrope with a centration point closer than 12 cm). It is ideal for this to be done in a dimly lit room, but it works almost as well in a room with normal lighting.*
2. *Turn on the MIT box so that the light is on and the motor is rotating the polaroid.*
3. *Ask the patient what she sees. She should see one big light that is flashing red and green.*
4. *Tell the patient to slowly move back away from the MIT box, watching it the entire time. The patient should report to you when she either sees one red or green light that flashes on and off (suppressing the other eye), or sees two lights, one red and one green (misalignment).*
5. *When there is either suppression or misalignment, have the patient move back in toward the MIT box until she regains fusion.*
6. *Have the patient repeat this process for five to ten minutes.*
7. *Record the maximum distance at which fusion is accomplished.*

loading/unloading: none

Hand Mirror and Whiteboard Target

This technique works on the principle that suppressions are phenomena of parvocellular, central vision. Therefore, as a target becomes smaller, more colorful, and more stationary, it becomes more likely to trigger a suppression under conditions of retinal rivalry.

materials: hand mirror, Hart chart (or a window), dry erase board

key points: The patient should look at the Hart chart with the eye he is more likely to suppress.

goal: Keeping the image of the Hart chart surrounded by rings drawn on the dry erase board in the shape of a bulls-eye target.

procedure:

1. *The patient is seated or stands facing the Hart chart, with the dry erase board off to one side.*
2. *The patient holds the hand mirror so that the edge of the mirror is resting on the bridge, and is angled so that he can see the dry erase board in the mirror.*
3. *Ask the patient if he can see the Hart chart and the dry erase board at the same time. Ideally, it should appear that the Hart chart is on the board.*
4. *Draw a very large diameter circle on the board with a colored dry erase marker.*

5. *Ask the patient to move the mirror slightly so that the Hart charted is centered within the circle you just drew.*
6. *When the patient has centered the chart in the circle, ask if anything has disappeared.*
7. *If the patient can see the chart within the circle, draw a second, slightly smaller concentric circle inside the first one.*
8. *Again ask the patient to center the chart in the circles and report if anything has disappeared.*
9. *Repeat this process with smaller and smaller concentric circles until suppression of the Hart chart is noted.*

loading/unloading: none

Stereoscope Cards with Russell Rings

This technique works on the same principle as the mirror technique outlined above, but is slightly more difficult because it is in an instrument, allowing for less peripheral input, and because the targets are smaller.

materials: Correct Eye Scope or Keystone telebinocular; pipe cleaner or paper clip fashioned into a Russell ring

key points: Getting the patient to continually challenge and break down his suppression by tromboning the ring.

goal: Keeping the image on the stereoscope target while moving the ring all the way back to the card.

procedure:

1. *The patient takes the Russell ring into the hand opposite that of the target to be ringed.*
2. *The patient looks into the stereoscope and fixates on the target as directed.*
3. *The patient holds the Russell ring up so that it is positioned to look like it is around the fixated target. The Russell ring should be held at a position that is closer to the optics of the instrument than it is to the card the target is printed on.*
4. *Ask the patient to move the Russell ring back toward the card, keeping it centered on the fixated target.*
5. *If the target disappears, the patient moves the Russell ring back toward her eye.*
6. *When the target reappears, the patient moves the ring back toward the card. Continue for about 20 seconds per target. The entire technique should last about 4 minutes per eye.*

loading/unloading: Larger diameter Russell rings make the task easier. The smaller the ring diameter, the more likely the technique is to trigger a suppression of the eye that is viewing the fixated target.

Stereoscope Cards with Two Pointers

materials: Correct Eye Scope or Keystone telebinocular; pick-up sticks

key points: Getting the patient to continually challenge and break down his suppression by holding both pointers, one for each eye, up to the target viewed on the stereoscope card.

goal: Keeping the image of both pointers, even when they are held very still. If the patient predominately suppresses one eye, you should work to get the suppression to alternate first, then to completely eliminate all suppression.

procedure:

1. *The patient takes one pointer into each hand, holding each one halfway down in the same type of grip used to hold a pencil.*
2. *The patient looks into the stereoscope and fixates on the target as directed.*
3. *The patient brings the pointers up to the card, rests the heels of both hands on the edges of the card, and points to the target, leaving just enough room between the pointer tips to see the target.*
4. *Ask the patient if either pointer tip appears to be disappearing. You should be able to tell if one is being suppressed, because the patient will move that pointer toward the center of the card so that the tip covers the actual target (drifting **eso**).*
5. *If a pointer tip disappears, ask the patient to tap it to bring it back.*
6. *Have the patient hold the pointers steadily around the target for 10 seconds, with no suppression, then move on to the next target on that card.*
7. *The patient should do this technique for at least 10 minutes, taking frequent breaks.*

loading/unloading: The smaller the fixated target, the more likely it is to trigger suppression of the pointers.

Fusion Therapy

After you have broken down the patient's suppression, then you can begin working to build up stereopsis. The major advantage for being binocular is stereopsis, and improving a patient's appreciation of stereo will help that patient retain the gains made in vision therapy for the rest of his life. The best technique to begin this process is...

Quoits Vectogram

Vectograms are far costlier than anaglyphs (sometimes called tranaglyphs when used for therapy), but they are worth every extra dollar. Anaglyphs have the inherent problem that they are printed with red ink for one eye and green for the other. This means that not only is cancellation more of a problem, but red and green focus differently, causing a small but significant difference in the accommodative demand between the two eyes. People who

are already having difficulty with fusion do not need you to create more obstacles in the therapy room, at least not at this stage.

materials: quoits vectogram, backlit vectogram holder, Polaroid goggles, pick-up stick

key points: The patient must interact with the target on all vectogram techniques. If you use the vectogram targets as another way to keep testing ranges, making the patient watch as you move the vectogram BO and BI until she sees double, you are teaching the test.

goal: SILO with excellent localization of the target in space.

procedure:

1. *Place the quoits vectogram in the holder, turn on the backlight, and have the patient view the quoits from about 40 cm.*
2. *Place the quoits at setting 2.*
3. *Ask the patient if she sees the rope on the plastic, in front of it, or behind it. She should notice that it is out in front by about one half inch.*
4. *Tell the patient to pretend the pointer is a paint brush, and to slowly "paint" every strand of the rope all the way around.*
5. *The patient should look like they are painting about one half inch in front of the plastic.*
6. *Show the patient how to change the setting of the vectogram and have her put the quoits on setting 3. Ask her to paint the rope again. This time, it should look like the pointer is about one inch in front of the plastic.*
7. *Tell the patient to continue painting the entire rope on each setting from 4 through 6.*
8. *Ask the patient what changes she noticed in the rope. She should say that it came closer and got smaller. If she cannot report that, make her do the entire sequence again and ask her to pay closer attention to how the rope is changing.*
9. *Once the patient has successfully experienced SILO through the base-out settings, tell the patient to put the quoits on setting A.*
10. *Ask the patient where it appears the rope is now. She should note that it is behind the plastic.*
11. *Tell the patient to paint the rope now. She needs to figure out for herself that she must reach around the plastic to paint it where it appears.*
12. *Tell the patient to repeat the painting for settings B through D.*
13. *Ask the patient what changes she noticed from A to D. She should note that the rope moved farther away and got larger.*

loading/unloading: It is sometimes beneficial to have the patient move back and forth or left and right to experience parallax, which often enhances the stereo appreciation.

Clown Vectogram

The clown is more difficult because it has much more detail and, therefore, more accommodative demand than the quoits.

materials: clown vectogram, backlit vectogram holder, Polaroid goggles, pick-up stick

key points: This target has much more detail and accommodative demand than the quoits, which makes it ideal as the next step in the vectogram sequence.

goal: SILO with excellent localization of the target in space.

procedure:

1. *Place the clown vectogram in the holder, turn on the backlight, and have the patient view the quoits from about 40 cm.*
2. *Place the clown at setting 2.*
3. *Ask the patient which is closer to him, the clown's head or the ball. (There are no monocular cues, so true stereopsis is needed, without suppression, to give the correct answer.) He should respond that it is the clown's head that is closer.*
4. *Give him a pointer and ask him to find the letter **A**. If he has difficulty, he is probably only looking at the large letters. There are **A**'s in the words "indian" and "cake."*
5. *Instruct the patient to point to the letter **A**, right in space where it appears to be, from underneath with the pointer and hold it for five seconds.*
6. *Instruct the patient to continue through the entire alphabet, in alphabetical order, finding the two missing letters (**P** and **Q**).*
7. *After the patient goes through the entire alphabet, successfully noting that **P** and **Q** are missing, have him change the vectogram to setting C and repeat.*
8. *Repeat again at setting 5.*

loading/unloading: This target places a premium on accommodative accuracy, so it really lends itself to loading by giving the patient plus lenses to do base-out settings and minus to do base-in when making the task more difficult. Giving the opposite lenses makes the task easier.

Spirangle Vectogram

The spirangle is more difficult than the clown or quoits because of the range of depth required.

materials: spirangle (spy'-wrangle) vectogram, backlit vectogram holder, Polaroid goggles, pick-up stick

key points: This target has less accommodative demand than the clown, but a much greater demand on fusion skills because of the huge range of depth.

goal: Excellent localization of the target in space.

procedure:

1. *Place the spirangle vectogram in the holder, turn on the backlight, and have the patient view the quoits from about 40 cm.*
2. *Place the spirangle at setting 0 (zero).*
3. *Ask the patient to look at the "acuity chart" in the center and slowly move her eyes around the spiral, keeping each letter single, until she gets out to the outermost "acuity chart," then move back in. Repeat a couple of times until the target is all clear and very three-dimensional. It should look to her like she is looking down a hallway.*
4. *Give her a pointer and ask her to find the letter **A**.*
5. *Instruct the patient to point to the letter **A**, right in space where it appears to be, from underneath with the pointer and hold it for five seconds.*
6. *Instruct the patient to continue through the entire alphabet, in alphabetical order. There are no missing letters on this target, although the **L**, **R**, and **X** are floating in the middle.*
7. *After the patient goes through the entire alphabet successfully, have her change the vectogram to setting C and repeat.*

loading/unloading: This target requires sustained accuracy of vergence, so it also lends itself to loading by giving the patient plus lenses to do base-out settings and minus to do base-in when making the task more difficult. Giving the opposite lenses makes the task easier.

Brock String

This should only be taught in the office, and used almost exclusively at home. It is elegant in the sense that computer programmers use that term — simple yet highly effective.

materials: Brock string

key points: The string raises suppression awareness and allows for feedback about the accuracy of the vergence response, the bead is the target.

goal: convergence within 3 cm of the nearest bead, divergence out to the end of the string.

procedure: see "String & Beads" handout

loading/unloading: You can use plus and minus lenses in the same way as you do in the vectogram techniques to load or unload the Brock string.

Single Aperture Rule

The aperture rule is the first of two techniques you will do with patients in which you ask the patient to give up fusion on a real target and take up fusion on a virtual target, albeit

one that gives the illusion of depth. These two techniques (this and the lifesaver card) should never be introduced until the patient is excellent at fusion on the vectograms.

The presence of the aperture slider makes this techniques easier for the patient than the lifesavers card, which is why you do this first, then introduce the lifesaver card for home supportive therapy.

materials: aperture rule with the single aperture slider

key points: BO, with the single aperture, is easier for almost every patient, even those with CI, than BI with the double aperture. This is because humans do not have experience looking through solid objects. The cards are numbered sequentially, but the numbers actually represent the centimeters of separation for the two targets the patient must fuse.

goal: Fusion of the targets with stereo appreciation of the circles and clarity through card 12.

procedure: The instructions that come with the aperture rule are sufficient. However, the patient should fuse each card for 20 seconds, then look out a window or across the room for 10 seconds, then regain fusion and clarity on the target for another 20 seconds. He may then go to the next card

loading/unloading: This is easiest when sitting down and looking slightly down. It is hardest to fuse when looking up, or looking through plus lenses.

Double Aperture Rule

This is much more difficult than the single aperture because you are asking the patient to look through a solid object.

materials: aperture rule with the double aperture slider

key points: Patience is the key with this, and any other, BI technique. The harder the patient tries to get the targets single, the farther apart they will get. As described above, the targets are separated by the amount of centimeters of the number on the card. Therefore, unless the patient has an interpupillary distance of 120 mm, he should not be able to get past 6 or 7.

goal: Fusion of the targets with stereo appreciation of the circles and clarity through card 6 or 7.

procedure: The instructions that come with the aperture rule are sufficient. However, the patient should fuse each card for 20 seconds, then look at the center of the aperture slider for 10 seconds, then regain fusion and clarity on the target for another 20 seconds. She may then go to the next card.

loading/unloading: This is easiest when standing up, holding the aperture rule, and looking straight out. It is hardest to fuse when sitting down and looking down, and when looking through minus lenses.

Lifesaver Card

This is another technique that should only be taught in the office, but it is excellent as homework at the final stage of therapy.

materials: lifesaver card, pickup stick

key points: BO is easiest with the opaque card, BI with the clear card. Of course, you can modify the clear cards to make them easier for BO simply by holding paper behind it. However, the clear cards are *much* more expensive.

goal: Fusion of the targets with clarity and stereo appreciation of the lifesavers. Also, ability to move the lifesaver card in and out (tromboning) or around in circles and maintain fusion.

procedure: The instructions on the back of the lifesaver card are pathetic. They ask the patient to fuse the card, then give up fusion by following the pointer. This is setting the patient up for failure. A more successful way to teach the lifesaver is as follows:

1. *Have the patient hold the lifesaver card at 30 to 40 cm, approximately at Harmon distance.*
2. *Give the patient the pickup stick, instruct him to hold that pointer about 3 inches from the tip of his nose, and to look at the pointer tip.*
3. *Ask him to notice how many cards he sees in the background while looking at the pointer. He should see two cards.*
4. *Ask how many lifesavers there are on the bottom row when looking at the pointer. He should see four.*
5. *Instruct the patient to slowly move the pointer back toward the space visible between the two cards until he sees some number of lifesavers on the bottom row other than four.*
6. *The patient should stop at a point about 12-15 cm from the card and report three lifesavers. Often the patient does not stop until the pointer is at the card and then he reports that there are two lifesavers. You should ask the patient if there is some number between four and two, and to find the place where there are that many lifesavers.*
7. *Once the patient has fused on that third, virtual lifesaver, ask him to keep the lifesaver fused but move the pointer out of the way.*
8. *Once the patient can keep the third lifesaver fused without the pointer, ask him to let the letters on the lifesaver become clear.*
9. *Once the third lifesaver is fused and clear, ask what is three-dimensional about that lifesaver. The word “letters” should be popping up.*

10. *Have the patient hold it for 20 seconds, look out a window or across the room for 10 seconds, then regain fusion and hold it for another 20 seconds.*
11. *He should then try to fuse the second lifesaver from the bottom in the same fashion.*

Computer Orthoptics

The Computer Orthoptic program is the only exception to my rule not to train ranges, because that was the way the program was designed by Dr. Jeffrey Cooper. Despite that problem, the program still has great value. My preferred technique in this program is the Multiple Choice Vergence option with the RDS (random dot stereogram) target. This forces the patient to align both foveae and actually see depth in order to make a correct response. I start the first week with the largest target (top row, left-most choice) and then each week make the patient use smaller and smaller targets. The goal is to get to the mid-40's on BO and the low 20's on BI.

List of Equipment

The first section of this list will get you started on all the techniques included in this workbook. The next section is a list of equipment that costs significantly more and is not essential when you start vision therapy in your practice, but you will want to purchase as soon as you know that the VT in your practice will pay for each instrument within a month or two.

The Essentials

equipment	vendor	approximate price*
black eye patches (dozen)	Bernell	$14.00
pegboard rotator	Bernell	$93.00
Developmental Eye Movement test	Bernell	$46.00
Ann Arbor letter tracking workbooks	Academic Therapy	$22.00
pickup sticks	toy store or dollar store	$1.00-5.00
stopwatch	discount store	$3.00
flippers (±1D, ±1.5D, ±2D)	Bernell, Gulden Ophthalmics	$130.00
Correct Eye Scope with Red Red Rock	Keystone View	$1400.00
3D comic books	multiple	$15.00
cards for anti-suppression	in house	$10.00
vectogram set (Quoits, Clown, Spirangle)	Bernell	$400.00
polachrome vectogram holder	Bernell	$145.00
Brock strings (dozen)	Bernell	$22.00
aperture rules (2)	Bernell	$75.00
lifesavers (opaque, 50)	Bernell	$41.00
lifesavers (clear, 5)	Bernell	$28.00

Optional Equipment

equipment	vendor	approximate price*
ReadAlyzer	OEP	contact OEP
Visagraph	Ebay or similar	used
Keystone Telebinocular	Keystone View	$1045.00
Saccadic Fixator	Wayne Engineering	$2700.00
Computer Orthoptics	Bernell	contact Bernell
LCD projector	various	$900 to 1500
Vision Builder	OEP	$125.00
overhead projector	multiple	$100.00
polarized screen materials		$200.00

Appendix

Various documents for your use that can also be sent to you if you add your e-mail address to the list.

Letter Chart Techniques

Jumping Eye Movements

Stand about 5 feet away from the chart, which should be taped at eye level on the wall. Place the patch over one eye. Read the first and last letters of the first row, then the first and last letters of the second row, and so on all the way down the chart. Be sure to keep the head and body still, only move the eyes. Then switch the patch to the other eye and repeat. You want to read with a good rhythm, not necessarily very quickly. There should be no long pauses.

If you do well with the first and last letters, then try the second and second to last letters. If that is good, next are the third and third from last letters and so on.

Near-Far Letter Charts

Sit at least 8 feet away from the wall chart. Place the patch over one eye and hold the little card as close to the open eye as possible with the letters clear. Read the first row off the wall chart, then the top row off the little card, then the second row off the wall chart, etc., until the chart has been completed. Then switch the patch and repeat. Again, you should read the letters with good rhythm, not necessarily with speed. Be sure to keep the letters clear as you are reading across the row.

You will unquestionably have the chart memorized within a few days, so read down one day, backwards the next, up from the bottom the next, etc. to avoid memorization.

Rows and Columns

Stand about 5 feet from the wall chart. Read across the entire first row. Then read down the entire first column. Now call out the letter that is in both the first row and the first column (at the intersection). Do the same with the second row and the second column. Now have your parent pick a row and a column at random and read the row, then the column, the call out the letter that is at the intersection of that row and column.

Once you have mastered knowing how to find the row and the column, ask your parent to pick a random row and column and you will just call out the letter that is at the intersection. We will play a game using this skill in your next vision therapy session.

Try to do the assigned technique every day and, most importantly, **have fun!** If you are struggling, please make the task easier so that you can experience good success.

W J P X H O T V B S
N C I G R E L M P K
T Y U D F H W I J Q
Z E N S Y N C H R O
J N O R I T Z P G V
U F H L E X M O T X
O K R P N C I S H L
D Z A E M S A T R I
Y P E O U A I F M W
H R T L E K S G N B

Brock String Techniques

Convergence
Tie the string to something that is about chin level. A refrigerator handle or a banister sometimes works well. Give yourself three feet of strong with all the beads back against the knot. Pull the string taut and place against your nose so that the string goes straight away from you to the beads. Stand straight with your feet shoulder-width apart. Posture is very important in this technique!

Look at the first bead. It should be single. Now notice the strings. Are there two apparent strings? The left eye sees the right string and the right eye sees the left. Do they meet right at the bead? Does one string disappear just before it reaches the bead? Make sure you have a steady, solid picture of a **V** of the strings going right into the bead. If it crosses too soon, or not at all, what can you do to get it into the bead?

Once you have a good picture at three feet and can hold it steadily for about ten seconds, shorten the string by an inch (or move the beads up the string one inch closer to you) and repeat the task at this new distance. Hold for another ten seconds and then shorten the string again by an inch. Continue this process until:

- You cannot get both strings to meet at the bead, *or*
- You begin to see two beads, *or*
- One string disappears and you cannot get it back for more than a second at a time.

Measure how far the end point is from the bead and mark it in your journal. See if you can get closer the next day.

Divergence
Start the same way you did for the first technique, but this time start at three inches. Now when you get a good picture and can hold it for ten seconds, move back an inch. See how far back you can go, one inch at a time, until you reach the end point (see above). Measure the distance and mark it in your journal.

Jump Vergence
Start in the position as you were for the first technique. Pull the first bead to just within arm's length, leaving the other two beads back at the know. Look at the close bead and make sure that you have both strings crossing right at the bead, so that they have the appearance of an **X**. Hold it for 5 seconds. Then look at the far bead. Get the old picture of the strings as a **V**, with the strings meeting right at the far bead. Hold that for 5 seconds. Then back at the near bead. Repeat this until you have looked at each bead 5 times. Then move the near bead one inch closer. Keep inching the near bead closer until you cannot get the correct picture with **either** the near or the far bead. When you reach this end point, measure the distance from your nose to the near bead and record this distance in your journal.

Amblyopia Therapy at Home

These first four techniques build better eye-hand coordination, which helps your child better use the best part of his or her vision. Your child should always wear his or her patch on the normally-seeing (better) eye *and practice using the amblyopic eye. These techniques can be used in any combination for a total of at least one hour each day.*

Fill in the O's: Using headlines from newspapers or magazines, have your child fill in the O's and other hollow letters with a pencil or pen. As your child improves at this, move to smaller headlines and then to smaller print.

Raisin Stab: This also builds better eye-hand coordination. Spread some raisins out on a clean white sheet of paper. Give your child a toothpick. He or she must move the toothpick straight down at a raisin and attempt to stab it with the toothpick. If your child is successful, he or she can eat that raisin. Continue this until all the raisins have been successfully stabbed.

Cheerio Stab: Similar to Raisin Stab, but easier because Cheerios are bigger. Do this one if your child is having difficulty hitting the raisins on Raisin Stab.

Eating Dinner: Nothing fancy here, just have your child eat dinner with the patch on the *normal eye*. If your child has trouble at dinnertime normally, you may want to skip the patch.

Other good tasks to do with the patch on are coloring books, Hidden Pictures, word searches, jigsaw puzzles, etc. You get the idea. Just remember that these tasks are going to be even harder with the patch on the normal eye, so please do not frustrate your child by giving him or her too difficult a task to do.

The next several techniques build better depth perception, which forces your child to use the two eyes together as a team. Therefore, no *patch should be worn for these techniques. Practice these at least fifteen minutes every day.*

Balloon Catch: Blow up a round balloon and tie it off. Your child does *not* wear his or her patch for this technique. Have your child stand facing you. Hold the balloon high above him or her and drop the balloon. He or she must try to catch it before it hits the ground.

Bubble Catch: Same principle as Balloon Catch, but because the bubbles are smaller, the task is more difficult. As you blow bubbles, your child must spot the biggest one and catch it on the palm of his or her hand. As your child improves at this, have him or her catch the bubbles on the fingertip (not stabbing but catching). It is best not to do this technique outside on a windy day.

Ball Rolling: Your child stands about ten feet away from you, facing you with his or her legs apart. You roll a playground ball towards your child and he or she must pick it up before it gets past him or her. As your child improves, use smaller balls. Then, to make the task more difficult, begin playing catch with the balls, first with the bigger playground ball, then with the smaller ones.

Most importantly, make sure your child is having fun with these tasks.