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## Chapter 9 Placebo Vision Therapy (Placebo VT/Orthoptics)

### 9.1 General Principles and Guidelines for Placebo VT/Orthoptics

Placebo VT/Orthoptics requires a subject to undergo a specific therapy regimen with 12 weekly, 60 minute, in-office treatment sessions. Vision Therapists (O.D., M.D., Orthoptists, or specially trained technicians) administer the therapy in the office. Placebo VT/Orthoptic procedures are then supplemented with various home therapy procedures.

The procedures for Placebo VT/Orthoptics are designed so that they would not be expected to affect binocular vision or accommodative function. However, the procedures are designed so that they would simulate real vision therapy and give the subject the impression that the therapy was VT/Orthoptics. The placebo therapy will simulate many of the techniques that are used in VT/Orthoptics for improving convergence insufficiency. Instruments such as the Computer Orthopter and stereoscopes used for “true” VT/Orthoptics will also be used for Placebo VT/Orthoptics, but under monocular conditions. Other sample techniques include having the subject work on a visual perceptual task on a computer screen while wearing polaroid glasses, work on a computerized optical illusion and placebo accommodative therapy using lenses with no power.

1. Many of the initial procedures are monocular. The subject should be told that these are designed to equalize the processing in the right and left eyes.
2. Before starting each technique review the objective of the technique with the subject. It is important that the subject understand that the technique is trying to improve a skill related to their convergence insufficiency.
3. When doing the therapy procedures, the use of positive feedback will be provided to the subject. The therapist will reward a good effort with comments like “your eyes did a very good job.” The objective when doing Placebo VT/Orthoptics therapy is for the therapist to behave just like he or she would behave during real VT/Orthoptics therapy.
4. Subjects will be told that when using the Polaroid, red/green, red/blue, or red lens glasses that eye teaming skills are being improved. The therapist will need to emphasize that glasses are important to ensure that both eyes are being used while the subject is doing the exercises.
5. When finished with a procedure the subject will be told to rest for 1 to 2 minutes. Again emphasis will be that this is an important part of the therapy and that his/her eyes need to rest before the next procedure.

#### 9.1.1 Therapist Instructions

You will be administering vision therapy procedures that are not designed to improve vergence or accommodation. Most therapy procedures use traditional therapy techniques that have been modified to train skills other than accommodation or vergence. Each procedure will have an objective that should be communicated to the subject before starting the procedure. These are not actual objectives that we are trying to achieve with the placebo VT/Orthoptics. Rather, these are the statements we should make to the subjects assigned to this group to motivate them to seriously engage in the therapy activities. For example, Placebo HTS Eye Focusing is presented

as having the goal of improving both eye focusing and improving response time. The therapy procedures have the subject proceed through various steps or levels.

The Placebo therapy will simulate many of the techniques that are used in vision therapy/orthoptics for improving convergence insufficiency. The subject will sometimes wear red, blue, or Polaroid glasses during therapy procedures. Instruments such as the Computer Orthopter and Biopter are also used. Thus, in most cases the placebo therapy should look like real vision therapy/orthoptics.

When administering the therapy it is important to encourage the subject and give him/her positive reinforcement when doing the procedures.

### **9.1.2 Subject Instructions**

Subjects will be given a written set of instructions which describe how to perform the Placebo VT/Orthoptics procedure as outlined in section 9.6. The therapist will review the instruction sheet in detail at the first treatment and at each weekly office visit to ensure that the subject has a complete understanding of the technique. Subjects will be asked to demonstrate all home therapy techniques to the therapist before leaving. In addition, the subject will be given a CITT office-based therapy home log form and instructions for proper completion.

### **9.1.3 Weekly Office Visits**

The subjects in this group will meet weekly with the therapist. The sessions should last 60-minutes. Much of this time will be spent on in-office placebo therapy procedures and review of subjects home therapy log. The subject will be given new instructions to perform at home, 15 minutes, five times per week.

The therapist should make every attempt to emphasize compliance and question the subject about problems/issues with home or office therapy. However, the therapist should not initiate discussion about the subject's symptoms. If such issues arise, the subject can be directed to the principal investigator for further discussion. The vision therapist/orthoptist should not have access to the subject's binder specifically results from the masked examinations. During weekly meetings between the principal investigator and therapist to review subject progress, the discussion should be directed towards progress with therapy procedures and/or protocol issues.

### **9.1.4 Home Therapy Procedures**

Subjects in this group will be required to perform 15 minutes of home-based therapy five days per week. The specific home therapy procedures are listed in the Office-based Placebo VT/Orthoptics Treatment Sequence Summary Chart in Section 9.2. The last item listed for each study visit is the home therapy to be used for that week.

### **9.1.5 Investigator Instructions**

Each therapist will be given standardized procedures to follow as outlined in section 9.6. Each procedure will have an objective that should be communicated to the subject before starting the

procedure. These are not actual objectives that are trying to be achieved with placebo VT/Orthoptics. Rather, these are statements that are made to make the subject assigned to this group motivated to seriously engage in the therapy activities.

### **9.1.6 Forms**

Forms used for Placebo Office-based VT/Orthoptics therapy include the:

1. CITT Placebo VT/Orthoptics therapist instructions
2. CITT Placebo VT/Orthoptics subject instructions
3. CITT VT/Orthoptics therapy record form
4. CITT VT/Orthoptics therapy home log form

### **9.1.7 Treatment Compliance**

Subjects will be required to keep a home log of the time for each activity/procedure they performed each day and bring the form with them to the weekly appointments.

### **9.1.8 Maintenance Treatment**

Maintenance therapy for asymptomatic Office-based Placebo VT/Orthoptics subjects will consist of 10 minutes of TV Trainer and 5 minutes of Polaroid Playing Cards. Subjects will be instructed to perform these techniques once per week from the primary outcome examination until the 6-month follow-up examination. The Vision Therapy Record form should be used to document the assigned maintenance therapy and transmitted to the DCC with the other week-12 forms. From the 6-month to 12-month follow-up there will be no maintenance treatment.

## 9.2 Office-based Placebo VT/Orthoptics Treatment Sequence (Summary Chart)

### Initial Training Visit

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Accommodation	8 minutes	Improve focusing and speed of response
Ductions	4 minutes	Equalize monocular inputs
Monocular Brock String – level one	6 minutes	Equalize monocular inputs
Visual Closure – Lines and Boxes	10 minutes	Eye teaming
<b>At Home</b>		
Monocular Brock String and TV Trainer	15 minutes	

### Week 1

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Accommodation	8 minutes	Improve focusing and speed of response
Ductions	4 minutes	Equalize monocular inputs
Monocular Brock String –level two	6 minutes	Equalize monocular inputs
Visual Closure – Lines and Boxes	10 minutes	Eye teaming
<b>At Home</b>		
Monocular Brock String and TV Trainer	15 minutes	

### Week 2

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Accommodation	8 minutes	Improve focusing and speed of response
Bailey-Lovie Acuity	4 minutes	Equalize monocular inputs
Monocular Brock String-level two	6 minutes	Equalize monocular inputs
Visual Closure – Closing on Center	10 minutes	Eye teaming
<b>At Home</b>		
Monocular Brock String and TV Trainer	15 minutes	

**Week 3**

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Accommodation	8 minutes	Improve focusing and speed of response
Bailey-Lovie Acuity	4 minutes	Equalize monocular inputs
Monocular Brock String – level three	6 minutes	Equalize monocular inputs
Visual Closure – Closing on Center	10 minutes	Eye teaming
<b>At Home</b>		
Monocular Brock String and TV Trainer	15 minutes	

**Weeks 4 & 5**

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Accommodation	8 minutes	Improve focusing and speed of response
After Image	4 minutes	Equalize monocular inputs
Red/Red Activities	6 minutes	Eye teaming
Visual Figure Ground – Hidden Characters (level 1)	10 minutes	Eye teaming
<b>At Home</b>		
HTS Vergence/Accommodation (or Red Lens Activities) and TV Trainer	15 minutes	

**Weeks 6 & 7**

Technique	Time	Goal
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo vergence	8 minutes	Improve eye teaming and speed of response
Strobismo Trainer	4 minutes	Eye teaming
Yoked Prism Flippers	6 minutes	Eye teaming
Visual Figure Ground – Figuring Words (level 2)	10 minutes	Eye teaming
<b>At Home</b>		
HTS Vergence/Accommodation (or Red Lens Activities) and Polaroid Playing Cards	15 minutes	

**Weeks 8 & 9**

<b>Technique</b>	<b>Time</b>	<b>Goal</b>
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Vergence	8 minutes	Improve eye teaming and speed of response
Modified Thorington	4 minutes	Eye teaming
Bernell-o-scope level 1	6 minutes	Eye teaming
Visual Spatial Skills	10 minutes	Eye teaming
<b>At Home</b>		
HTS Vergence/Accommodation (or Red Lens Activities) and Polaroid Playing Cards	15 minutes	

**Weeks 10 & 11**

<b>Technique</b>	<b>Time</b>	<b>Goal</b>
<b>In Office</b>		
Necker Cube	12 minutes	
HTS - Placebo Vergence	8 minutes	Improve eye teaming and speed of response
Double Maddox Rod	4 minutes	Eye teaming
Bernell-o-scope level 2	6 minutes	Eye teaming
Visual Spatial Skills	10 minutes	Eye teaming
<b>At Home</b>		
HTS Vergence/Accommodation (or Red Lens Activities) and Polaroid Playing Cards	15 minutes	

**Maintenance Therapy**

<b>Technique</b>	<b>Time</b>	<b>Goal</b>
<b>At Home</b>		
TV Trainer	10 minutes	To improve eye teaming ability by using visual and motor inputs.
Polaroid Playing Cards	5 minutes	

### **9.3 Office-based Placebo VT/Orthoptics Equipment Needed**

Eye patch  
Neutral density filter  
Red green glasses  
Red filter glasses  
Polaroid glasses  
Red blue glasses  
Red and green lanterns  
Maddox rod  
Two Maddox rod trial lenses  
Red acetate sheet  
2 pair, plano flippers  
Yoked prism flippers  
Stick prism  
Neutral density TV trainer  
Bailey-Lovie Chart or equivalent  
Playing cards  
Brock string  
Computer Aided Vision Therapy (CAVT) program  
Home Therapy System (HTS) Placebo VT/Orthoptics computer program  
Biopter and target  
After-image device  
Distance and near Muscle Imbalance Measure (MIM) Cards  
Strobismo Trainer

#### **9.4 Office-based Placebo VT/Orthoptics Vision Therapy Techniques (List)**

HTS Accommodation  
Ductions  
Monocular Brock String  
Bailey Lovie Monocular Activity  
Red Green Playing Cards  
Visual Closure  
Red Lens Activities  
Strobismo Trainer  
HTS Vergence  
Bernell-O-Scope  
Yoked Prism Flippers (Binocular)  
After-Image  
Cyclodeviation: Double Maddox Rod  
Modified Thorington  
Visual Figure Ground  
Visual Spatial  
Necker Cube Software

## **9.5 Office-based Placebo VT/Orthoptics Therapy Techniques**

### **9.5.1 HTS Accommodation**

#### **Objective**

1. To improve eye focusing skills
2. To improve ability to detect targets
3. To improve the speed of visual responses

#### **Equipment Needed**

1. HTS computer program
2. RB glasses
3. Vision Therapy – 2 flippers (one plano power on both sides, one yoked prism [2 base right/2 base left])

#### **Set up**

1. Subject is positioned 40 to 50 centimeters from the computer screen.
2. Subject is wearing the RB glasses with the red filter over the right eye.

#### **Procedure**

1. The therapist tells the subject the following; “hold the flipper with your left hand and in front of the red blue glasses. You will see four red squares. In each square there is a small black dot, which is either on the top, bottom, left or right of the two bars inside the square. It is your task to press the arrow key, as fast as you can, which matches the position of the dot. For example, if the dot is above the bars then press the “up” key. If you cannot tell the position of the dot still make your best guess.”
2. The therapist tells the subject “the computer will tell you whether you have a correct response (“beep”) or an incorrect response (“boop”).”
3. Tell the subject that the goal is to improve the speed and accuracy of his/her responses. Tell the subject that the computer will monitor your performance and make adjustments based on your responses. After two weeks you should change from the plano to the yoked prism flipper if the subject is able to perform the task with the plano flipper easily. You should inform the subject that the flipper power has been changed based on his/her progress.

#### **Endpoint**

The subject can complete 10 minutes of therapy using both plano flippers and yoked prism flippers.

## 9.5.2 Ductions

### Objective

1. To improve monocular inputs to each eye
2. Develop a kinesthetic awareness of eye movements

### Equipment needed

1. Eye patch
2. Fixation target

### Set Up

1. Place eye patch over left eye.
2. The fixation target should be 1 to 2 meters from the subject.

### Procedure

1. The therapist holds the fixation target 1 to 2 meters from the subject. The target is then slowly moved into right gaze (about 1 foot) and the subject holds fixation on the target for 10 counts. The therapist should ask the subject if their eye is straining to hold the fixation. The procedure is repeated for left, up, and down gazes.
2. The therapist then moves the target 2 to 3 feet into each field of gaze and asks the subject to hold fixation for 10 counts. Again ask if the subject feels any eyestrain.
3. The final step is to move the target 3 to 4 feet into each field of gaze and repeat the above procedure. Once completed, the patch is put on the left eye and the above procedure is repeated. The subject should rest for 1 to 2 minutes and then repeat the complete procedure 2 times.
4. The procedure should be conducted for approximately 8 minutes.

### Endpoint

The subject can look in all positions of gaze and hold fixation for 10 seconds.

### 9.5.3 Monocular Brock String (Level 1)

#### Objective

1. Improve monocular inputs to each eye
2. Develop kinesthetic awareness of eye movements

#### Equipment Needed

1. Brock String with the beads fixed at ten and five feet (via knots in the string).
2. Eye patch
3. 2 pd base right/ 2 pd base left yoked prism

#### Setup

1. Patch the left eye.
2. Instruct the subject to tie one end of the string to a doorknob or chair and to hold the other end of the string taut and against the bridge of his/her nose.
3. Set one bead at 10 feet and one at 5 feet from the subject.

#### Procedure

1. Ask the subject to look at each bead and describe what he/she sees. He/she should report one of each bead and one string. The string should appear to enter and exit from each bead.
2. Once the subject is able to see each of the two beads single and clear, instruct him/her to hold fixation at the far bead for 10 seconds and then switch fixation to the bead at 5 feet for 10 seconds. Have the subject repeat this 10 times.
3. Repeat with the left eye.
4. The activity should be done for 8 to 10 minutes.

#### Endpoint

The subject can hold fixation on each bead with single and clear vision for 10 seconds.

### 9.5.4 Monocular Brock String (Level 2)

#### Objective

The objective of level two is to continue to develop the subject's ability to accurately fixate. In this procedure, the subject will try to fixate each bead and try to keep it clear and single in the presence of prism lenses (in order to increase the difficulty). The subject should also develop kinesthetic awareness eye movements.

#### Setup

1. The subject's left eye should be covered.
2. Have the subject fixate the far bead through one of the prisms while keeping the bead and string single and clear for 10 seconds. Next have the subject flip the prisms to the other side while maintaining single and clear vision for 10 seconds.
3. While fixating the far bead have the subject clear the bead through one prism, close his/her eyes, open them and try to still be seeing the bead clearly. Repeat with the other prism. Suggest that the subject try and get the "feeling" of looking through each prism.
4. Have the subject fixate the far bead while flipping the prism every ten seconds for 2 minutes (keeping the bead single and clear). Repeat 5 times.
5. Repeat with the bead at five feet.
6. Repeat with the left eye.
7. The activity should be done for 8 to 10 minutes.

#### Endpoint

The subject can fixate each bead through each lens with single and clear vision for 10 seconds.

### 9.5.5 Monocular Brock String (Level 3)

#### Objective

The objective of level three is to develop the subject's ability to fixate smoothly along the string.

#### Setup

1. The subject's left eye should be covered.
2. Slowly run your finger along the string from the bead at five feet to the bead at ten feet and ask the subject to follow your finger.
3. Have the subject fixate smoothly along the string while maintaining single and clear vision. Repeat 10 times.
4. Repeat with the left eye.

#### Endpoint

The subject can smoothly fixate along the string from the bead at 5 feet to the bead at 10 feet with single and clear vision.

### **9.5.6 Bailey Lovie Monocular Activity**

#### **Objective**

1. Improve monocular inputs to each eye.
2. To insure that each eye can detect low and high contrast targets as a prerequisite for improving eye teaming skills.

#### **Equipment needed**

1. Bailey-Lovie Chart or equivalent
2. Eye patch

#### **Set Up**

1. The subject is seated 10 ft. from the 100% Bailey-Lovie chart.
2. Patch the left eye.

#### **Procedure**

1. The subject starts at the top of the chart and calls out the letters. The subject is encouraged to guess at threshold levels. The same procedure is done for the left eye.
2. The procedure is repeated for the 10% chart.
3. Record results on recording form.
4. Repeat procedure if necessary.
5. Should take 8 to 10 minutes.

#### **Endpoint**

The subject can complete the reading of all lines of the Chart without loss of place.

### 9.5.7 Polaroid Playing Cards

#### Objective

To improve eye teaming skills.

#### Equipment Needed

1. (Sherman) R/G playing cards
2. Polaroid Glasses

#### Setup

1. The subject should be seated 13 to 24 inches from the playing cards with good illumination.
2. The subject is wearing Polaroid glasses.

#### Procedure

1. The subject is instructed to look at the suit and number of each card as the therapist turns them over.
2. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
3. The subject can play their favorite card game while maintaining an awareness of the number and suit on each card.
4. The subject should perform this activity for 10 to 15 minutes.

#### Endpoint

The subject can play favorite card game for 10 minutes without any suppression.

### 9.5.8 Visual Closure Skills

#### Objective

1. To improve eye teaming skills.
2. Develop visual processing skills.

#### Equipment Needed

1. Computer with Computer Aided Vision Therapy (CAVT) program
2. Polaroid glasses
3. CITT ND filter

#### Setup

1. Entire setup should be completed before the subject arrives.
2. Turn on the computer and place ND filter on the screen.
3. Start the CAVT program.
4. Click on Therapy Menu
5. Select Visual Closure Skills from the Therapy V.I.P.S. (Main) Menu
6. Select appropriate program from Visual Closure menu
  - i. Visits 1-2: Lines and Boxes
    1. Visit 1: Converging Lines
    2. Visit 2: Corner of the Box
  - ii. Visits 3-4: Closing on Center
    1. Visit 3: Circles
    2. Visit 4: Ellipses, Rectangle and/or Random
7. Select Display Speed (or start with default value) (A longer amount of time is easier.)
8. Select visual confusion off (you may turn this on later if your patient needs more of a challenge)
9. Select Display Speed under Autopacing (AutoPacing allows this procedure to self adjust to the patient's skill level. With autopacing on, the display speed will decrease by 0.10 second (displayed for a shorter time) for each correct answer and increase by 0.10 second (displayed for a longer time) for each incorrect answer.)

#### Procedure

1. Place the glasses on the subject.
2. Tell the subject to try to keep the target single and clear. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
3. Click Start. Click on <Next Set>. The patient should view the target and use his/her eye teaming skills to locate the "missing" point (the point where the lines converge, the corner of the box or the center of the circle, etc.). The patient should click on "clk to answer" and then click on the point where he/she thinks the "missing" point would be. The error is measured in relative screen units. The smaller the number, the better the score. This is a timed procedure, so the patient should try to work quickly.
4. The activity should be done for 10 minutes.

#### Endpoint

The subject can keep the targets on the screen clear and single.

### 9.5.9 Red Lens Activities

#### Objective

To improve eye teaming ability by using both vision and motor inputs.

#### Equipment Needed

1. Red Acetate Sheet
2. CITT Red Filter Tracking target
3. Penlight
4. Red filter glasses

#### Set Up

1. The CITT target is placed behind the red filter.
2. The subject wears the glasses with the red lens over the right eye. (**Green lens over OS should be removed.**)
3. The subject holds the penlight in the right hand.

#### Procedure

1. The subject is asked to look at number 1 and try to keep it clear and single for 10 seconds. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
2. The subject takes the penlight and moves their light behind the numbers and illuminates number 1. The subject should hold the number one clear and single for 10 counts. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
3. The subject moves onto the next number and again holds the light for 10 counts.
4. The subject should proceed through all the numbers on the page in this manner.
5. When the page is completed the filter is switched to the left eye and the procedure is repeated.
6. The procedure should be done for 8 to 10 minutes.

#### Endpoint

The subject can complete 10 minutes of therapy with the CITT Tracking target without any errors.

### 9.5.10 Strobismo Trainer

#### Objective

To improve eye teaming ability by using visual and motor inputs.

#### Equipment Needed

1. Red Laser Pointer
2. R-G glasses,
3. Strobismo Trainer.

#### Set Up

1. Subject should be 2 meters from the chart.
2. The subject holds the laser pointer.
3. The therapist holds the attached strobismo clicker/button.
4. The subject wears the red and green glasses with the red lens over the right eye.
5. Room illumination should be low.

#### Procedure

1. The therapist turns on the strobismo trainer. The subject is instructed to place the laser pointer light directly over the green strobismo light. The subject should be asked if the green or red light ever disappear. If this happens the subject should blink his/her eyes. The therapist then asks the subject to hold this position for 10 counts.
2. The therapist advances the strobismo light by pressing the clicker button once and asks the subject to again place the red laser light over the green strobismo light. Ask the subject to hold for ten counts. Again if either target disappears the subject should blink his/her eyes. The procedure is then repeated for every area of gaze including straight ahead.
3. When the subject has finished the procedure with red lens over the right eye then switch the red and green filters. The green filter is over the right eye and the red filter is over the left eye.
4. The procedure should be done for 8 to 10 minutes.

#### Endpoint

The subject can keep his laser light on the strabismo light in all positions of gaze without suppression.

### 9.5.11 HTS Vergence

#### Objective

To improve eye teaming ability.

#### Equipment Needed

1. HTS computer system for VT –2
2. RB glasses

#### Set up

1. Subject is positioned 1 to 2 meters from the computer screen.
2. Subject wears the RB glasses with the red filter over the right eye.

#### Procedure

1. The subject is asked to look at the large red-blue box. The subject is told that if both eyes are working together then they will see a smaller box, which is popping out of the screen. The longer they look the better they will be able to see the depth effect. Once they see the box, ask the subject to close an eye and see if the box disappears. Tell the subject that they have to use both eyes together to see the smaller box popping out. If the box disappears then the brain is turning off one of the images and the eyes are not being coordinated properly.
2. The therapist then tells the subject that the inner box, the one that is popping out of the screen, will be located at the top, bottom, left, or right of the larger box. It is the subject's task to touch the arrow key, which matches the position of the box. For example, if the box is up then press the up arrow key. The computer will tell the subject whether he/she has a correct response ("beep") or an incorrect response ("boop").
3. The goal is to improve the speed and accuracy of your responses. The computer will monitor the performance of the subject and make adjustments based on his/her performance.
4. The procedure should be done for 8 to 10 minutes.

#### Endpoint

The subject can complete 10 minutes of therapy using the HTS program with at least 100 responses

### 9.5.12 Bernell-O-Scope (Level 1)

#### Objective

To improve eye teaming ability by using both vision and motor inputs.

#### Equipment Needed

1. Bernell-o-Scope and standard target
2. Pointer
3. Chierscope targets (cut-out fun animals or moveable objects)

#### Set up

1. Set up the Bernell-o-scope for distance viewing.
2. Place one target in front of the **right** eye at the zero demand setting.

#### Procedure

1. Subject is asked to view the VT-2 target for 20 seconds and try to keep it clear and single. The subject is then given a pointer in their **right** hand and asked to slowly trace the target with the pointer. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
2. When the subject is done put a single target in front of the **left** eye and the subject holds the pointer in their **left** hand.
3. The above procedure is repeated. Increase the target complexity as the subject's ability allows. This activity should be done for 8 to 10 minutes.

#### Endpoint

The subject can accurately touch all of the targets on the stereogram without suppression.

### 9.5.13 Bernell-O-Scope (Level 2)

#### Objective

To improve eye teaming ability by using both vision and motor inputs.

#### Set up

1. Set Bernell-o-Scope for distance or zero setting.
2. Place CITT dot – to – dot target in front of the **right** eye.

#### Procedure

1. Subject is asked to view the CITT target for 20 seconds. The subject is given a pointer in his/her **right** hand and told to follow the arrows and touch each dot on the target. The subject should try to visualize the completed figure. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
2. The target and the pointer are moved to the **left** eye and **left** hand, respectively and the above procedure is repeated. The activity should be done for 8 to 10 minutes.

#### Endpoint

The subject can accurately touch all of the targets on the stereogram without suppression.

### **9.5.14 Yoked Prism Flippers (Binocular)**

#### **Objective**

To improve eye teaming skills.

#### **Equipment Needed**

1. 2 pd base right/ 2 pd base left yoked prism flippers
2. Snellen or projector chart

#### **Setup**

Have the subject fixate a 20/60 letter or other target at 1 to 2 meters.

#### **Procedure**

1. Ask the subject if the target is clear and single as they look through each of the flipper prisms.
2. Ask the subject whether one prism makes the target appear larger/smaller.
3. Ask the subject whether one prism makes the target appear farther or closer.
4. Ask the subject whether one prism is easier to keep the target single and clear.
5. After the subject is successful at the above procedure, have the subject try to increase the speed with which the prisms can be cleared. The goal is approximately 20 cycles/minute.
6. The activity should be done for 8 to 10 minutes.

#### **Endpoint**

The subject is able to clear and fuse the binocular target with each flipper lens.

### 9.5.15 After-Image Transfer

#### Objective

1. To improve monocular input to each eye.
2. To improve eye teaming skills.

#### Equipment needed

1. After- image device
2. Fixation point

#### Set-up

Have the subject stand 1m away from a small fixation target.

#### Procedure

Have the subject occlude his left eye.

1. Place an A-I on the fovea of the right eye.
2. Next have the subject cover the right eye and fixate the target with the left eye.
3. Ask the subject the location of the after-image relative to the fixation point. If the subject is having difficulty seeing the after-image, turn down the room lights or have the subject blink his eyes.
4. Have the subject try to keep after image centered on the fixation point and hold for ten counts. Now occlude the right eye and ask the subject if he/she can still see the after-image indicating that both eyes are working as a team. Have the subject try to keep after-image centered on the fixation point and hold for ten counts.
5. Repeat the above procedure with the left eye receiving the after image.
6. The activity should be done for 8 to 10 minutes.

#### Endpoint

The subject is able to keep the after image centered on the fixation target with the lights on or off.

### 9.5.16 Double Maddox Rod

#### Objective

To improve eye teaming skills.

#### Equipment Needed

1. Two Maddox rod trial lenses (one red and one white)
2. A small vertical prism
3. Fixation light

#### Setup

1. Place a vertically oriented red Maddox rod trial lens at 70 degrees before one eye and a vertically oriented white Maddox rod trial lens at 100 degrees before the other eye in the front cells of a trial frame.
2. The subject's spherical equivalent should be placed in the rear cell.
3. Place a small vertical prism in front of one eye to help dissociate the images.

#### Procedure

1. Position the subject's head in the erect position and instruct him/her to fixate a light at distance.
2. Ask the subject if he/she sees two horizontal lines. If the subject reports that the lines are not parallel, and then instruct the subject to turn the control knob until the two linear images are parallel to each other and the horizon. Ask the subject how their eyes feel when the lines are parallel.
3. Repeat the above procedure with the red Maddox lens in front of the opposite eye.
4. Procedure should take 8 to 10 minutes.

#### Endpoint

The subject is able to align the lines and feel his/her eyes converging.

### 9.5.17 Modified Thorington

#### Objective

To improve eye teaming skills.

#### Equipment Needed

1. Distance and near Muscle Imbalance Measure (MIM) Cards
2. Maddox rod
3. penlight
4.  $-0.50$  D lenses

#### Setup

Subject's best corrected acuity should be in place.

#### Procedure

1. Have the subject hold the Maddox rod before the right eye with the striations oriented horizontally.
2. Hold the distance Muscle Imbalance Measure (MIM) Card at 3 meters. Hold a penlight against the back of the card and shine its light through the hole in the center of the card.
3. Ask the subject which point on the card is intersected by the red vertical line.
4. If the red line does not intersect the center (zero), ask the subject whether the red line is to the right (esophoria) or to the left (exophoria) of the center.
5. Record the number of prism diopters and the direction.
6. Repeat with  $-0.50$  D over the best corrected acuity. Encourage the subject to keep the target clear.
7. Repeat the test at near with the near MIM test card held at 2 meters and 1 meter.
8. Do the procedure for 8 to 10 minutes.

#### Endpoint

The subject is able to accurately report the relationship of the vertical line to the chart with different lenses in place at both 1 meter and 2 meters.

### 9.5.18 Visual Figure Ground (Level 1)

#### Objective

1. To improve eye teaming skills.
2. Develop visual processing skills.

#### Equipment Needed

1. Computer with Computer Aided Vision Therapy (CAVT) program
2. Polaroid glasses
3. CITT ND filter

#### Setup

1. Go to start, all programs and select the CAVT program.
2. Click on Therapy Menu
3. Select Visual Figure Ground Skills from the Therapy V.I.P.S. (Main) Menu
4. Select Hidden Characters from Visual Figure Ground menu
5. Use default (30) font size
6. Select how many different letters or numbers will be hidden in the background (“Different Characters”)
7. Select how many of each character you would like presented (“How Many Each”)
8. Select Target Character (Numbers, Upper Case, Random)
9. Click Autopacing OFF

#### Procedure

1. Place the glasses on the subject.
2. When the Therapy Screen is displayed, click the <Start> button to begin. Click on <Next Set>. Click on <Add Some Dots> to begin adding dots to the background around the hidden characters.
3. Tell the subject to try to keep the targets single and clear. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
4. Ask the patient to try to quickly find which characters are hidden in the background of dots. When he/she sees a number or character, he/she should press the appropriate key on the computer key board. If the response is incorrect, a message is displayed informing the patient that the character was wrong. If the response was correct, the character is listed in the label box at the bottom right corner of the Therapy Screen. The patient should try to identify all of the characters before the background is 100% completed.
5. The activity should be done for 10 minutes.

#### Endpoint

1. The subject can keep the targets on the screen clear and single.
2. The subject can accurately complete the task.

### 9.5.19 Visual Figure Ground (Level 2)

#### Objective

1. To improve eye teaming skills.
2. Develop visual processing skills.

#### Set up

1. Start the CAVT program.
2. Click on Therapy Menu
3. Select Visual Figure Ground Skills from the Therapy V.I.P.S. (Main) Menu
4. Select Figuring Words from Visual Figure Ground menu
5. Use default (40) font size
6. Select Grade Level
7. Click Autopacing OFF

#### Procedure

1. Place the glasses on the subject.
2. When the Therapy Screen is displayed, click the <Start> button to begin. Click on <Next Set>. Click on <Add Some Dots> to begin adding dots to the background around the hidden words.
3. Tell the subject to try to keep the letters single and clear. The subject should be sure to blink his/her eyes normally to make sure that each eye is getting correct information and can work as a team.
4. Ask the patient to try to look carefully at the pattern of dots and try to visualize the completed word. When the patient thinks he/she knows the word, type it in and press <ENTER>. The patient should try to identify the word before the background is 100% completed.
5. The score is based on the percent of the word completed and the average response time to determine the correct answer. If the word is mistyped, the patient can use the <BACK SPACE> key to erase and start over. The answer is not checked until <ENTER> is pressed.
6. The activity should be done for 10 minutes.

#### Endpoint

1. The subject can keep the targets on the screen clear and single.
2. The subject can accurately complete the task.

### 9.5.20 Visual Spatial Skills

#### Objective

1. To improve eye teaming skills.
2. Develop visual processing skills.

#### Equipment Needed

1. Computer with Computer Aided Vision Therapy (CAVT) program
2. Polaroid glasses
3. CITT ND filter

#### Setup

1. Entire setup should be completed before the subject arrives.
2. Start the CAVT program.
3. Click on Therapy Menu
4. Select Visual Spatial Skills from the Therapy V.I.P.S. (Main) Menu
5. Select appropriate program from Visual Spatial Skills menu
  - i. Visits 9-10: Spatial Patterns
  - ii. Visits 11-12: Rotating Patterns
6. Select Maximum Squares (Number of squares to be filled to create the pattern.)
7. Use default values (you may click on autopacing later to control the display speed if you need to make the procedure more challenging).

#### Procedure

1. Place the glasses on the subject.
2. Tell the subject to try to keep the target single and clear and to blink his/her eyes if the target figure ever disappears.
3. When the Therapy Screen is displayed, click <Start> and then <Next Set>.
4. Spatial Patterns: Four patterns will be presented. If one of the patterns is different from the other 3, click on the number of the one that is different from the others. If all 4 patterns are the same, click on the <#5> button. This module is timed.
5. Rotating Patterns: Four 5x5 grids are presented. The first grid on the left will contain a pattern. This pattern will be rotated or flipped in the other 3 grids. A question will be presented below the grids. (e.g. Which pattern is flipped?) Ask the patient to find the pattern described by the question (i.e. which meets the stated criteria).

#### Endpoint

1. The subject can keep the targets on the screen clear and single.
2. The subject can accurately complete the rotating patterns task.

### 9.5.21 Necker Cube Software

#### Objective

To improve eye teaming skills.

#### Equipment Needed

1. Computer
2. Necker Cube Software
3. Firefox Internet Browser
4. Flash Player Free Software
5. Polaroid Glasses

#### Setup

1. Turn on the computer and have subject wear Polaroid glasses.
2. Click on the Necker Cube Icon.
3. Select with practice session.

#### Procedure (Practice)

1. Show the subject a sample Necker Cube Illusion on paper. Explain the illusion and ask the subject to try and achieve reversal of the cube. Once the subject can do the sample Necker Cube illusion you can begin the computer program.
2. Now start the program and select "Practice".
3. Explain that the target moving through the cube will help to reverse the position of the cube.
4. Once the subject feels comfortable with the concept of reversing the cube proceed to the actual therapy.

#### Procedure (Therapy – Level 1)

1. Select "Therapy" and set the time for 4 minutes, and select the Black Target.
2. Hit the right button for "rotation". The cube should appear to be rotating clockwise.
3. Explain that the subject is to try and get the cube to reverse as often as possible, and emphasize that a sign of improving eye muscle coordination is the ability to achieve more rapid and frequent reversal of the cube.
4. Also explain that when the cube reverses he/she will see the rotation of the cube to switch from clockwise to counter-clockwise.
5. The subject should hit the spacebar every time he/she sees the rotation switch from clockwise to counter clockwise or vice-versa.
6. Record the number of reversals per 4 minutes.
7. Now select the up button for rotation and select 4 minutes of therapy.
8. The subject now must reverse the vertical rotation.
9. For the last 4 minutes select the left button for rotation and again the subject must reverse the rotation as often as possible.

#### Procedure (Therapy –Level 2)

1. Select "Therapy" and set the time for 4 minutes, and select the Black Target.
2. Hit the right button for "rotation". The cube should appear to be rotating clockwise.
3. Also hit the orbit button twice and increase the speed to by hitting the speed button once.

4. Explain that the subject is to try and get the cube to reverse as often as possible, and emphasize that the sign of improving eye muscle coordination is the ability to achieve more rapid and frequent reversal of the cube.
5. Also explain that when the cube reverses he/she will see the rotation of the cube to switch from clockwise to counter clockwise.
6. The subject should hit the spacebar every time he/she sees the rotation switch from clockwise to counter clockwise or vice versa.
7. Record the number of reversals per 4 minutes.

**Procedure (Therapy Level 3)**

1. At this level, the therapist can freely change various parameters such as: rotation, direction, orbit size, orbit speed, and color of the target. The goal is to create the impression for the subject that you are gradually increasing the demand of the task as his/her eye muscle coordination improves.
2. Record the number of reversals per 4 minutes.

**Endpoint**

The subject can quickly and voluntarily change the rotation of the Necker Cube.