Why do parents decide to use OVT to treat their multiply challenged child with an eye turn?

- Eye contact
- Better social skills
- Better education
- Independence
- Sports

We need to think about more than academics and sports. We impact on more levels that we know.

Thanks Len Press and Lynn Hellerstein

What holds us back from treatment and exploring?

- Oliver Sacks - Seeing Voices
- Vilayanur S. Ramachandran - Phantoms in the Brain
- Norman Doidge - The brain that changes itself

The use of visual feedback, in particular mirror visual feedback, in restoring brain function

V. S. Ramachandran, Eric L. Altschuler

"Instead of resulting entirely from irreversible damage to specialized brain modules, some of them may arise from short-term functional shifts that are potentially reversible. If so, relatively simple therapies can be devised—of which mirror visual feedback is an example—to restore function."

http://brain.oxfordjournals.org/content/132/7/1693
Visual Goals

Single vision or absence of strabismic diplopia

- Clear vision
- Comfort
- Cosmesis

- Efficiency of visual performance
- This means stamina and fluency

Getting the information is the same

- Observation
- Educational history
- Medical History
- Surgical history
- Ocular History and Symptoms

Strabismus and/or Diplopia

- When first noted?
- Any associated signs such as dizziness, spinning weakness, tingling? Neurological referral
- Diplopia- position of images, places the patient can see single?
- Does the patient turn, tip or turn up the head?

- Better distance or near? Think A and V patterns.
- Does the double vision change during the day? Watch systemic disease, mitochondrial issues
- Has the strabismus gotten better or worse over time? Stable or progressive? Change in glasses or early presbyopia often shifts long term eye turns.
- Overall health- thyroid, HBP, diabetes, medications can impact

Are there other concerns?

1. Good ocular health evaluation is critical.
2. It is important to eliminate neurological concerns.

How do you get the patient back? I work with patients with neurological difficulties. Often these patients are lost in the medical system and no one is watching their real functional problems- another lecture. Think of the boy with glaucoma

Medical history

- Try to get a clear picture of the medical issues
  - REQUEST RECORDS
- History of accident/medical problems
  - Your role can be very different depending on the duration of the problem. Think of boy with nystagmus
- Neurological summary/Developmental Pedi
  At times I work with chronically ill children. Then the goal may be to make it easier, not fix it.
- Summary of CAT scan and MRI tests-
  - looking at extent of damage and/or specific information.
Critical problem solving for strabismus

- What will create success?
  - Think of the tools in your box: lenses, prisms, filters and optometric vision therapy
  - Today you can begin to recognize the easy cases and do great work.
- What will stop you from being successful?
  1. Poor history- strabismus patients spend years listening to eye doctors and denying their problems
  2. Anomalous Correspondence- They are all are anomalous somewhere. Where is normal correspondence?
- The tougher cases are still successful, but involve more knowledge, more commitment from you and the patient.

Binocular visual model involves motor and sensory fusion

- Motor Processing- all the processes involved in aiming and maintaining foveal fixation on targets (fixations, versions and vergences)
- Sensory fusion involves (1) image resolution, (2) image similarity, (3) image directionality and (4) image fusion

Motor Fusion

- It is the ability to align the eyes in such a manner that sensory fusion can be maintained. The stimulus for these fusional eye movements is retinal disparity outside Panum’s area and the eyes moving in opposite direction (vergence). Unlike sensory fusion, motor fusion is the exclusive function of the extrafoveal retinal periphery.

Motor Responses

- Unilateral Cover test- watch type of target/slow responses/watch EF
  - Length of room has an impact
  - Make sure focusing at near
- Alternate Cover test-
  - Watch rebound saccade- will disappear after 5-6 alternations
- Four base out test- hard to do on moving target.

Near point of Convergence

Probe using +/- flippers, red lens, yoked prism, small amount of base-in and Bangerter foils

- Remember if asymmetrical to consider yoked prism base left and base right to support the system
- Suspect if head turn and no other issues.

Cover test

- Use touch and localization to see impact
- Probe using +/- flippers, yoked prisms, binasals, Bangerter foils
Vergence testing
- Vergence testing on patient in chair
- Vergence testing on non-verbal

Exo
Patient reports eye turns out intermittently. What do you need to worry about.
Easier cases:
1. An intermittent or constant exotropia only at near acts like a CI
2. Divergence Excess—watch for the consecutive exotropias—how do you know?

DEPTH PERCEPTION

Sensory Fusion
- It is the ability to appreciate two similar images, one with each eye, and interpret them as one. Single visual image is the hallmark of retinal correspondence. For sensory fusion to occur, the images not only must be located on corresponding retinal areas, but also must be sufficiently similar in size, brightness and sharpness to permit sensory fusion. Unequal images are a severe obstacle to fusion.
- Fusion, whether sensory or motor, is always a central process (i.e. it takes place in the visual cortex).

Sensory Fusion
- Use Randot E, BABO Randot testing, Wirt Circles, Smiley Face
- Need to understand the different types of testing
- Worth4 dot- probe and see what happens
- Centration point?

Divergence Excess
- History: “I know that I see an eye turn, but when I ask him to look at me, I don’t see it.”
  - did the eye ever turn in or cross?- get pictures
  - was there any surgery?
- Examination:
  - Equal acuities
  - Randot stereopsis- good results at near better case
  - Esophoria or near or no increase in exophoria with plus

Divergence Excess - best case
- VA : 10/10 matching Lea in either eye
- PERWLA no MG
- Ocular Health screening WNL
- EOM full concomitant
- NPC TTN
- Randot E by PLT- 4 feet
- CT- D 35 diopter intermittent primarily right exotropia with 6 diopter ‘vertical’
- N orthophoria
- Static: +0.75 sph OU
- MEM +1.00 add good bright reflex
- With +0.50 sph OU with +0.75 add at near patient is still ortho at near. Randot E now 8 feet.
- RX: plano OU with +0.75 add OU set midpupil – no progressives—think of it as lens treatment
• Next step:
• Progress evaluation in 3 months
• Best case:
  1. No evidence of eye turn from parents or much less
  2. Results indicate decrease in incidence of eye turn - no eye turn in morning/ less percentage/ better depth perception in distance
  3. Less suppression in distance
• Next step:
  1. Parents report eye turn is less, but still see at end of most days
  2. Testing is mixed, but still reports lens treatment
  3. Treat using neutral density patches - put only enough to change status
• Worst case:
  1. No change - child or parents will not put the glasses on the child
  2. Consider options above
  3. Optometric Vision therapy - start where patient can do it.
  4. Wait

Why Plus on exotropia?
• JBO
  Vol 7/1996/number 3/p66
• Dr. Nathan Flax
• Dr. Jeffrey Cooper
• Think about pseudo CI

Bangerter Foils
• Here we are using it as MFBF to support a better fusion.
• Remember most powerful when least blur patient can tolerate.

Monocular Fixation in Binocular Field - not just for amblyopia
I love the Fresnel foils and other neutral density patching

• Fresnel foil bar
• Binasals are often an important option in ET or eso

3.5 year old boy with intermittent XT

• Premature birth at 34 weeks with intrauterine growth restriction
• Intensive care for his first month treated for growth and feeding issues, developmental and motor delays. There is a history of hypospadias, which was corrected and then treated again.
• No medications
• Ophthalmologist notes a blocked tear duct that has resolved, astigmatism and intermittent Exotropia. History indicates that the mother also has intermittent exotropia (eye turn out). Ocular structural health is normal.
COVD questionnaire

• He does not report any symptoms.
• Others have noticed that his eyes turn in or out and he is abnormally bothered by bright light.
• Seems visually unaware especially in busy areas, stumbles over objects or is clumsy.
• Poor motor control and ball games are difficult and not preferred. He also falls if he is running and looking at the same time.

Optometric findings

• Acuity using Lea symbols single letter presentation 20/40 each eye and both eyes, 20/80 Lea at near
• NPC 4/8 inches.
• Divergence Excess pattern to his primarily left exotropia (left eye turns out), 25-30 diopters in the distance, prefers right gaze less turn noted
• Intermittent 12 diopters at near.
• JD at near 15BO only once
• Randot E to 3 feet when 10 feet is expected and 600 seconds of arc on Randot,
• Refraction +1.50-1.00x90 OU fluctuating.
• With +1.00-1.00x90 OU, 20/20 supported by MEM

Diagnosis and Treatment

• Primarily a left intermittent Exotropia in which the left eye turns out greater amounts when he is looking in the distance, which is called a Divergence Excess pattern with Accommodative Dysfunction and Oculomotor Dysfunction.
• Plano OU with +1.00 add OU set midpupil which eliminated the exophoria at near
• RTO 2 months

PE

• Lea symbols 20/25 either eye and both eyes single line presentation. Near lea 20/63 crowded
• NPC 1/4”
• EOM ½ cycle, head movements throughout saccadic shifts
• CT LXT only under cover, orthophoria at near
• JD 4BO/4BI distance, 12BO/12BI near
• Refraction still see astigmatism
• MEM +0.25 sph OU over RX
• Randot E at 5 feet, 100 seconds of arc at near
• Continue with RX doing well
• RTO 3 months

2nd PE

• Lea symbols 20/30 each eye and 20/25 full chart presentation with both eyes. Near single symbol 20/25
• NPC 7/9” later 2/4”
• EOM 1 cycles with head movements, loses of fixation
• CT 20XP distance, orthophoria at near
• JD distance 0BO/12BI, near 16BO/12BI
• Randot E 4 feet, 200 seconds of arc at near
• Refraction +0.50-0.50x90 OU, no improvement
• MEM no astigmatism
• Rec OVT

OVT

• Started with spinning board, angels on floor, theraball and balance board with four vertical lines, Matrix games
• HOME OVT
• Kawar protocol, Theraball and Angels full body
• Over time worked to higher levels in these activities. I included RG filters to work intermittent eye turn.
• Lots of yoke prism work with ball tossing, walking rail with GTVT charts
• Introduced eye coordination using HVT, VTS4
14th session
- He was able to do circle triangle chart on theraball with RG stripes. Body is actions are good and learning left and right
- Walking rail with 7BD OU with large GTVT and ball catching. BD moved him into contralateral walking.
- Rotator with small GTVT again with yoked prism 5 diopters in all directions, slow backwards.
- Playing visual perceptual games with 15BO
- HVT BO able to do 13X in a row (counting helps with little ones)
- NEEDS A BREAK

Recent PE now 5 year old still wearing bifocal exam at 5:30PM
Neuropsych indicates ADHD, Anxiety Nos, Weakness in motor skills. Doing well in kindergarten, but with support
- Crowded letters 20/25 either eye and both eyes, near acuity 20/20-
- NPC 6 inches, with acc target TTN
- CT 14XP, near 6 XP
- Refraction OU +0.50-0.50x90.
- MEM looks good with bifocal
- JD 4BO/4BI, near 16BO silo/12BI
- Randot E at 10 feet, near 32 seconds of arc Goodlite
- 9500 card 20/50, +/-2.00 flipper 20/50
- Piaget Left Right and bilateral integ -age appropriate,
- Suchoff alt hop- 4 year old
- Gesell- no triangle, can’t cross midline behind VM

PE mother sees no eye turn except at bedtime maybe 1X week
Without glasses the eye turn is greater
- Letters crowded 20/25 both eyes, OD 20/25, OS 20/30 single letter presentations, Near 20/125 with letters 20/32 with Lea symbols
- EOM 2 cycles with loses of fixation and head mvmt.
- NPC 3°/8°
- CT dist. Prolonged cover test 10 exo, near prolonger cover test 6 exophoria, but otherwise orthophoria
- JD dist. 4BO/4BI, near 16BO with silo/10BI
- Randot E 8 feet, 100 seconds of arc at near
- 9500 card 20/80
- Continue bifocal and RTO six months/ working with OT

The harder case
- Left consecutive exotropia
- Left mild amblyopia
- Anisometropia with significant hyperopic astigmatism OS
- Issues wearing glasses, eye straight with basketball

PE
- OD 20/20, OS 20/25 cc distance and near
- 18 diopter left exotropia in the distance and no obvious eye turn at near
- NPC 8 inches with a 12 inch recovery
- Vergence testing indicates ranges both convergence and divergence (8BO/8BI) at near, suppression distance
- Stereopsis at 1 foot only Randot E
Thanks Dr. Slotnick

Correspondence testing indicates NRC or microtropia with 20 BI
With 20BI can appreciate Randot E to 5 feet and Randot 600 seconds at near
9500 card 20/40 at near

This year!

- She worked to Rx with 14 BI for 2 years and now is 8BI and has maintained.

My typical case

- "It is difficult for patient to see the words or lines when he is reading or writing. The family wonders if it is a tracking problem or something else. His mother notes that the right eye turns out or the left eye goes up and the amount varies."
- Adopted at 12 months. He had a stroke (438.81) in the right temporal anterior lobe which was documented on an MRI. Right side weakness in his leg and ocular movement abnormalities. There were failure to thrive issues and some period of use of a feeding tube. His tonsils and adenoids were removed at 18 months, which eliminated the sleep apnea concerns.
- He has also been diagnosed with dyspraxia (315.39), a language disorder (438.1) and Attention Deficit Disorder.
- We will talk later about OVT approach.

- Right exotropia, which was surgically treated at 4 ½ years of age.
- had dense amblyopia OD "recovered"
- hyperopic astigmatic prescription (OD+3.00-1.50x5, OS +2.00-0.50x180).
- alternating 6 diopter right hypoexotropia (right eye turns out and down 6 diopters in each direction) or a 6 diopter left dissociated vertical deviation up (left eye turns up) which are stable.
- bilateral epiblepharon, surgically repaired two times

- Right eye: 20/30 full chart 20/30 single letter
- Left eye: 20/30 full chart 20/30 single letter
- Both eyes: 20/30 full chart 20/25 single line, 20/20 single letter
- Near 20/63, 20/32 single letter
- Fixates less than 3 seconds so pursuit testing was not possible. Matthew resisted looking in right gaze and when encouraged the left eye appeared to cross at times
- DEM vertical only 110

- NPC 12 inches to 16 inches +2.00 flipper worse
- He has a preference for fixating in the distance with the left eye and then the right eye is approximately 10-18 diopters exotropia or turned out. This is cosmetically not as noticeable due to the epicanthal folds. When he fixates with the right eye the left eye goes up and is more noticeable. Measurements were difficult but indicated greater than 15 diopters left hypertropia. Throughout testing he often switched fixation in testing in efforts to do a visual task.
- Tests of stereopsis or depth perception as expected were negative.
Unable to do hop on either foot
Unable to do any ipsilateral patterns
Knows left and right on body and in space- can’t use during exam
On Gesell copy forms struggles with completing the circle
Recommended 6 diagnostic OVT

CM
- First OVT-used 0.4 patch on OS
- Spinning board 5X did not report dizzy but appeared dizzy
- Trampoline- open/close is asymmetrical
- Angel on floor –just arms
- Theraball 4 vertical lines of circle line working on concepts
  - Learning to bounce on the ball
- Walking rail learning to walk forward and backwards
- Perceptive MFBF
- Matrix number matching

2 months later OVT session
- Spinning 10X with fixation- better turning out OD
- Angel- full body at 50 with me
- Theraball- full circle line chart every other
- Walking rail- MFBF red on OS- Ig GTVT -alternates
- Amblyopia Inet –capture the target, skiing,

PE after 13 sessions OVT
- Right eye: 20/30 full chart
- Left eye: 20/25 full chart
- Both eyes: 20/25 full chart 20/20 single line,
- Near: 20/32 crowded
- Fixates increased from 3 to 7 seconds he resisted looking in right gaze, but can do
- DEM vertical 80, horizontal148

NPC 6 inches, 3 inches with focusable target
Small or no exotropia measured
When he fixates with the right eye see left hypertropia
Vergence testing in left gaze12BO/10BI at near
Tests of stereopsis or depth perception 400 seconds of arc in Titmus testing

Can hop on either foot but no programing
Now does ipsilateral patterns
Knows left and right on body and in space- uses in examination
See Gesell copy forms next slide
Ophthalmologist, occupational therapist, and teachers all observe positive changes
eye contact post OVT
eye contact with touching
What is success?

- Eventually registered with MCB with a dorsal CVI
- Only with OVT was I able to see the CVI

ESO

- Convergence Excess-
  - near greater than far high AC/A
  - Basic Eso
  - Divergence
  - Insufficiency- far greater than near low AC/A
- Etiology – anatomical, optical- refractive or media opacities, innervational

Esotropia: When to treat? How to set expectations?

1. True accommodative esotropia is a refraction case. Try to not over plus.

Most patients with esotropia have an accommodative component. This is your entrance into treatment if done correctly. Unless you are very lucky just any plus will not work.

Think before bifocal

- Kindergarten child
- Intermittent esotropia in the distance
- 30 diopter RET at near
- Using more with Smartphone issues

HYPER or HYPO

- Visual skills- ability, facility, quantity, quality and stability- most only look at ability
- Maintenance of binocular efficiency or visual fitness
- Rarely see alone
MK
- 5 yo boy- SX noticed his eye turns in or out, and he turns his head versus using his eyes. He stumbles over objects or can be clumsy. These findings have been tallied and suggest visual skills issues.
- VA normal both eyes but poorer crowded than single letter
- Intermittent esotropia and right hypertropia that fits a fourth nerve palsy. There is a V pattern esotropia which indicates the turn is worse in inferior gaze.
- Right eye will turn up more in left gaze and right head tilt supporting the difficulties with the right superior oblique muscle. Either eye appears to move up in adduction, indicating the double hyper expected in an infantile esotropia and possibly the right eye moves up more.
- Previously diagnosed with fourth nerve palsy and V syndrome Esotropia leading to the history of a right eye turn up and crossed eyes. The fourth nerve palsy indicates that the right eye will turn up the most in left gaze and right head tilt. It would be expected that he would try to put his eyes in right gaze and left head tilt to reduce the impact of the eye turn. The V syndrome esotropia indicates that he will tuck his chin to reduce the crossed eyes. In both sessions there was a clear left esotropia, but the vertical was small and not clearly measured.
- Reduced or absent stereopsis, Acc Dysfunction, Oculomotor Dysfunction, poor fixation and tracking.
- Why is he so clumsy?

Pattern Strabismus: Where Does the Brain’s Role End and the Muscle’s Begin?
- Tyschen et al
  - “Concomitant esotropia in these primates cannot be ascribed to abnormalities of the extraocular muscles or orbit. These findings, combined with epidemiologic studies of human, suggest that perturbations of CNS binocular pathways in early development are the primary cause of the infantile esotropia syndrome.”
  - This is why all esotropia patient need motor work

ST-44 yo female, okay not a child
- Viral episode diagnosed by neurologist which left her with a sixth nerve palsy in the left eye and a closed left eye for weeks.
- Evaluated by many great eye doctors. They all suggested optometric vision therapy.
- RX(-1.75 sph OU) and she reads without her glasses.
- Fluoxetine, Nefazadone, BCP, and Abilify.
- Reports blurred vision distance and near. Her eyes feel tired, double vision int. in the distance and near with a head tilt at desk work. She squints, covers, closes an eye.
- Int. ET??, Red Stereopsis, Diplopia, from Post Trauma Vision Syndrome with history of left lateral rectus palsy.
Testing demonstrated esophoria, but no overt evidence of left lateral rectus palsy.
The evidence came in OVT when she struggled with yoked BR prism and turning her head into the affected field (doing activities in left gaze).

- Right eye: 20/50 single line less consistent
- Left eye: 20/40 single line
- Both eyes: 20/50 full chart 20/40 single line
- Near: 20/63 crowded with smaller print removed glasses read 20/20 print
- Fixates 3 seconds, pursuit testing with head only
- DEM unable to do

Now let’s look at how we treat a non concomitant eye turn in a difficult child
- Complains eyes itchy and hurt
- difficulties focusing and tracking even with his glasses. Removes glasses to read smaller print, his eyes cross. He is presently fourth grade
- Head tilt left, int XT
- RX OD-5.75-0.75x180, OS -8.00 sph

- NPC 7 inches OD out
- Right hyperexotropia fluctuates
- When he fixates with the right eye see left hypertropia
- Vergence testing at near 20BO, BI 0
- Tests of stereopsis or depth perception Randot E at 3 feet, Titmus 400 seconds at near, Worth 4 dot suppression OS at 18 inches

History of fourth nerve palsy.
- Previous examinations, there appeared to have been a right hyperexotropia (right eye turns up and out). In these sessions he preferred to tilt his head to the left and remove his glasses for small details, supporting the issues with Reduced Stereopsis, Accommodative Insufficiency and Oculomotor Dysfunction.
- He is resisting looking down in testing so no bifocal
- A reduced prescription (OD-4.74-0.50x180, OS-7.00 sph) still allowed him to test 20/40 with both eyes open in the distance and improved his near acuity to 20/40 through the glasses.
- He is using 0.2 filter on OS 1 hour each night
- Recommend 6 diagnostic OVT
- Educate school- non concomitant eye turn

OVT
Parents note eye contact better with new Glasses
- Office: Session 3
- Spinning- dizzy on side,
- theraball with 4 lines circles
- Walking on tape on floor with Ig GTVT MFBF OS, Perceptive 1Arrow,
- Amblyopia INet- capture the target MFBF
- Home therapy
  - Ocular vestibular
  - Theraball
  - Angels on the ground
3 months later, after 6 diagnostic OVT
- Doing better in school, increased load
- Better eye contact, tucks chin for visual details like iPad
- OD-5.00-0.50x180, OS -7.00sph
- With head tilt exophoric distance and near
- JD 4BO primary gaze, with head tilt left 20BO to 14 BO inferior gaze
- Randot E 3 feet, 400 seconds of arc randot figures
- 9500 20/80 intermittent suppression
- DEM vertical 122

15 OVT sessions PE over two sessions
- Continues to do better but worried about fatigue
- OD-5.00-0.50x180, OS -7.00sph
- Acuity 20/40 each eye, 20/30 full chart, near 20/40
- Intermittent? Right hyper exophoria
- NPC 3-6 inches
- Worked with vertical prism 2BU OS
- JD near 20BO/10BI primary gaze no head tilt
- Randot E 5 feet, 240 seconds of arc randot figures
- 9500 20/50 +/-2.00 20/80
- Prescribed prism 2BU OS

After 9 months resisting many techniques in OVT-
- Walking rail with VTE chart to 7 feet Rotator small GTVT
- Pointer in straw OS crosses great amounts
- Flippers bino +/-1.00 with low amounts of prisms
- Headline word searches
- Perceptive with +/-2.00 flippers 8 circle
- HVT spaceship- he has to get 20 correct to finish
- VT54 21BO/14BI JD reports headaches at times like alligator
  - Home program Loves spinning
  - Will to reading with red green stripes and red green glasses red on right eye worked to +/-1.00 combo with prism in treatment

Steps for infantile ET but could be any strabismus
- Mild increase in his myopic prescription (OD -5.00-0.50x180, OS -7.75 sph with 2BU). It improves his distance and near acuity, and improves his distance stereopsis. Near objective tests of focusing both eyes together indicate an increase in his ability to use his eyes together.
- Educated school about eye turn and suggested that he may need single vision readers in the future.
- Differential diagnosis
- Optical correction of ametropia
- Added lens power
- Prism
- Occlusion
- Active home therapy
- Surgery
- Post surgical care
Differential diagnosis of infantile ET

- Primary or essential infantile ET
- Non accommodative, accommodative and partially accommodative
- Esotropia secondary to underlying disease
- Active pathology or pathological conditions that have stabilized and don’t represent a health threat to the child
- Esotropia secondary to congenital syndromes
- Esotropia associated with neurological or multiple handicapping conditions
- In my practice most patients have an eye turn
- Pseudo esotropia

Infantile esotropia

- Angle of deviation between 30-60 PD
- Alternation common
- Equal distance and near measurements
- Inferior oblique over action
- Dissociated vertical deviation
- Latent nystagmus
- Accommodative component may be present
- Absence of underlying disease

Eye Movement Assessment

- Oculomotor motility
  - Prefer penlight, even red lens, to carefully monitor eye position
  - Use a fun target such as a puppet or light up toy.
- Pursuit testing
  - Watch for differences between the eyes and in different fields of gaze.
- Saccadic testing
  - Again need to look at subtle difference between the eyes. Remember to ask about ocular vestibular symptoms. Watch jaw and head.
- Developmental Eye Movement test (DEM) is used on all strabismic patients if possible. Part C can be done several times to see the impact of lens, prism and occlusion impact. It is usually done later in the examination. It can be done monocularly to see differences, after regular testing.

Concomitancy testing

- Direct observation
- Version Testing
  - Ocular from Congenital Torticollis
  - Underacting- paresis due to trauma, mechanical issues such as faulty muscle insertions, ligament or tendon abnormalities, innervational deficiencies due to impairment of cranial nerves, III, IV or VI.
- Duction testing-move the mono eye into affected DAF

The Parks - Bielschowsky Three Step Test

- Attempts to determine the paretic muscle by performing alternate cover testing in different head positions. This test only works in cases of a single paretic muscle. Since the superior oblique is the vertical muscle most commonly affected by itself, this is basically a test for dysfunction of the superior oblique.
Refraction testing

- Fixation is often poor—there is no exact answer and it can change
- Near retinoscopy often gives more information
- Look for improvements with any glasses in
  - Fixation and eye contact
  - Posture—look for reductions in head tilts, differences on performance testing
- **Consider a partial prescription**
- Consider a trial period with the prescription—I compare it to a trial period with a medication

KG

- Long standing partially accommodative non-concomitant A pattern Right Esotropia, which means that his right eye crosses greater with focusing and greater in superior gaze.
- The first step in optometric intervention is binasals of approximately 10 mm on each glass at the bridge using neutral density filters. This immediately increased his visual comfort. It also decreased the size of the eye turn fifty percent in all positions of gaze. Now there was no measurable turn in inferior gaze, 8 diopters in primary and 12 diopters in superior gaze.

- Entered OVT as described later
- Now wearing a partial prescription of -4.75 sph 6BO OU—reduced distance VA 20/40 at first, but quickly improved to 20/25 in two weeks.
- 20 seconds of arc on BABO targets at near. Randot E to 4 feet with this RX

Refraction—

- Make sure eye is fixating. Recognize the eccentric fixating eye changes the refraction. Accommodation fluctuates as noted above.
- Remember looking at it from several gazes to support your diagnosis.

Lenses

1. Keratometry—what is structurally there?
   - Remember EF affects
2. Static refraction
3. Near retinoscopy
4. Cycloplegic retinoscopy
5. Autorefraction
6. Subjective refraction

Think about partial prescriptions.

Bifocals—careful too much is not better
Paul Lederer’s fixation disparity testing.  
Instructional set

- Is the “E” clear?
- Are the two arrows pointing up and down the same color?
- If they connected in the center would they connect position 1, 2, or 3 in which I demonstrated eso, ortho and exo.

Yoked prism during examination

- Consider trying BL and BR when you see convergence issues.
- In young children with XT, CI issues, 3-5 even 10 for short term use has really helped pull in the midline skills and build peripheral awareness

Strabismus treatment

- Proper refraction
- Proper near add if needed
- Binasals
- Yoked prism impact
- Prism impact- sensory fusion not just motor

Optometric vision therapy

- Optometric vision therapy using a lens prescription only
- Any lens combination can be used in conjunction with other therapies
- In office optometric vision therapy

In office optometric vision therapy

- Prism and lenses are used to effect change in the therapy
- Consider position to make the process easier
- Use large simple targets at first
- Remember that even verbal instruction can be overloading
- Movement, balance, auditory input and cognitive demand are used to increase load
Active Vision therapy

- Fixation
- Pursuits/Saccades
- Visual motor integration
- Ocular vestibular integration
- Think about CORE strength
- Primitive reflex/motor patterns
- Directionality
- Midline integration

Why I use this approach

- My goal is to have a structure in which careful observation is possible.
- This comes from an approach that you do regularly on everyone.
- I try to use activities that will work on several issues at the same time.
- The load in these activities can be adjusted up or down

Working with infants with strabismus

Refraction and bifocals

Binasals

Use of Fresnel prism, not necessarily to neutralize but to shift.

Working with infants with strabismus

1. Ocular movement

- It is my experience with the under 3 year old set that I don’t do the same length of time on techniques, but switch up continually.

WC Maples calls it “slapping the sockets” treatment. I have worked with a number of children that look like the muscle is restricted, even post surgery, but we were able to effect change with lots of activities, working the child into the affected gaze. Some of my parents make all eating activities a chance to work on this. I am assuming that the child does not have eating issues or a G tube.

Use a toys, mirror, OKN stripes to push the child’s fixation out with less and less support over time.

2. Ocular vestibular work

- Ocular vestibular work like the Kawar approach to use the nystagmus movements to help the patient move into this gaze. All patients with esotropia, until proven otherwise, have significant ocular vestibular difficulties.

- Most common reported change is decrease in motion sickness complaints

Very important in esotropic patients esp. babies

Now test impact of BD prism in treatment
3. Gross Motor Work

- The child needs to be in a program which helps learn appropriate gross motor patterns.
- Harry Wach’s approaches
- Linda Sanet book on activities
- Christine Nelson and Raquel Benabib work with Bill Padula
- Primitive Reflex work- Carol Marusich, Caroline Hurst, Svetlana Masgutova
- Occupational Therapists
- Physical Therapists
- Approaches to visually impaired children

In office optometric vision therapy

- Prism and lenses are used to effect change in the therapy
- Consider position to make the process easier
- Use large simple targets at first
- Remember that even verbal instruction can be overloading
- Movement, balance, auditory input and cognitive demand are used to increase load

Why I use this approach

- My goal is to have a structure in which careful observation is possible.
- This comes from an approach that you do regularly on everyone.
- I try to use activities that will work on several issues at the same time.
- The load in these activities can be adjusted up or down

Hierarchy

- Fixation/body/directionality/tracking/focusing/visual thinking/standard OVT
- Remember JND in focusing and prism

I use lots of mono and bino prism to change the space. Is the response appropriate to the prism?

Bilateral Integration and Directionality

- Here we can add activities to lead with the non dominant or amblyopic eye

Using the SUNY Motor Series
How do we load? What is the impact on the strabismus?

- Can the patient do it?
- Can they do more lines?
- Can they verbalize-left/right, middle?
- Add the arms
- pdbq chart
- Do it as a visual memory task as I call out the directions?

Love techniques with MFBF, or bino using red green or red blue. Check carefully for cancellation

Rotator works on many wonderful levels

- Can the child use left/right concepts in a different place?
- Think about loading the patient- verbal, red green lenses, yokes.

loading with acc rock
Incorporate in my work - where start?

- Accommodation
- Binocularity
- Fine visual motor work
- Visual Form Thinking
- Visual logic thinking

geoboard beginning

Near work

No sensory fusion responses in exam

- Constant eye turn
- Must monitor sensory fusion
- Wears prism in Fresnel form or glasses over/ بيناسال when not wearing prism
- Start with large Quoit, projected Quoits, large VTS4 targets under Stereopsis 2 in vergences
- Used to use VTS3 projected

- Use reaching and touch to see if child is getting sense of depth

Creating Sensory Fusion

Techniques that are not really possible in the populations of children with multiple issues. We must keep it in mind and work peripheral until assured by findings that sensory fusion is present.

If there is normal sensory fusion anywhere, start there

- Always monitor sensory versus motor fusion. Best explored through localization techniques
- quoits working on localization

Quoits

- Patient needs to work close to the target.
- Don’t worry about blur here, you are working on peripheral fusion, a feeling of float
- Set up several Quoits so they can move from one to another feeling the difference
- As they build confidence, see if they notice SILO, parallax
- Begin to talk about clarity, work with plus
VTS4
- The latest form allows me to flash the less dominant eye and rotate the target.
- This helps my patients really see the float both in and out. All is really large.
- Favorite targets are the stereopsis 2 targets.
- Start vergences with the Building made very large on the screen.
- Patient works with pointer, constantly exploring the sense of float.

Exploring 3D
With a constant strabismic, why will one of these techniques not work?

Using computer programs
- These programs make it more exciting to come to the office.
- They are no longer making 3D TVs! I loved using this as a technique.

David Cook’s claw and mirror techniques
- Patient does these techniques using prism for sensory fusion.
- The claw of the hand coming toward the face is very powerful for patients.
- The feeling of distance using their hand or a pointer helps patients “feel” the space further out.
- Children love mirrors!

Brock String work
Watch position and distance at which trouble develops. Patients love and hate this.

Built fusion with prism and then had surgery.
DE antisuppression work
Thank you Alan Cohen and Arnie Sherman

- Again not very possible in this population. Lens treatment becomes critical.
- Even without multiple issues.
- Some patients are very difficult to shift.
- They report drifting when tired or fatigued.
- They need to work on flat fusion antisuppression work at greater and greater distance. Think worth 4 dot versus Randot E
- TV trainer- place red-green sheets on the TV
- Make vertically diplopic and have them line up letters at greater and greater distances. Both letters must be clear. This is hard. Try it.

Vision therapy
Started with program as described. Constantly monitored sensory fusion.
Started with 30BI worked to 14 BI when vertical appeared.
Did a great deal of monocular work
She loved the Eyeport
Worked Quoits to Spiral no SILO with Clown

Success!

- 17 yo post surgical primary left 12 hyper 30 exotropia (DVD)
- Infantile ET
- Patched 5-9 months 4-6 hours each day
- OD+0.50-1.25x180, OS +0.50-1.25x180
- Wants better cosmesis
- Reduce motion sickness

With new Rx
- No movement on Cover test
- Her nearpoint of convergence improves from 8 inches to 4 inches with the prism.
- Near testing indicates peripheral vergences of 20/10BO and 10BI over her glasses with the prism.
- Smiley Face peripheral Randot Stereopsis test at 60-120 seconds of arc. She does not appreciate the other Randot figures.

After 24 sessions of OVT
- Wearing progressives –OD+0.50-1.25x180, OS +0.50-1.25x180 with +1.00 add OU
- Using binasals and/or Fresnel prism for best sensory and motor fusion
- In OVT exploring fusion needed 4BI and 4BU OD, 4BI and 3BD OS without vertical reported “Venn diagram”
- Evaluated over two sessions- sensory fusion explored using fixation disparity card at near. OD3BI and 3BU, OS 3BD and 3 BU

Summary of care
- Make sure you are meeting patient goals
- Lens treatment, prisms, yoked prisms and partial occlusion can do a great deal of the work for you.
- Monocular skills are very important
- So are ocular vestibular and gross motor experiences
- Work to find normal sensory motor experiences and work from there
- Make sure that you are doing PE often enough to monitor change for you and the patient