The Power of Lenses

Brenda Heinke Montecalvo, FCOVD, FAAO
Vision’s purpose is to guide actions, growth, understanding and the quality of life. The sensory component of vision is to serve as a feedback mechanism to evaluate the adequacy to our actions. Vision problems should be explained in performance terms.

John Streff, OD, DOS, FCOVD, FAAO
Objectives

• Understand optics of lenses and prisms
• Be able to evaluate vision using lenses and prism
• Be able to determine a good performance lens
• Be able to perform dynamic retinoscopy
• Use lenses and prisms in vision therapy
• Use occlusion for improving vision
What is your paradigm?
When vision works well it guides and leads, when it does not it interferes.

John Streff, OD, DOS, FACOVD, FAAO
Prescribing a lens is based on the observer’s model of vision and his/her understanding of the visual process.
Therapeutic Performance Lenses

The therapeutic performance lens’ purpose is to guide one’s action, growth, understanding and the quality of life. Arriving at such a prescription is determined when a visual movement is made that matches the perceived time of the event.
Clarifying Vision

• Meaningful vision depends upon what one does to see. It depends on how one habitually looks and controls seeing.

• Vision is the ability to learn and understand the language of light.

• Vision is understanding the communication gained through seeing.

• Vision is understanding what light tells us.
Seeing is a learned, controlled action that requires **DOING**.

It is an active process.
Examples of Different Responses

• +1.00 Hyperope rejects a +0.50 Rx
• +1.00 Hyperope accepts a +0.50 Rx

• BD prism shifts posture anterior
• BD prism shifts posture posterior

• Base is perceived compressing space
• Base is perceived expanding space
Preferred Response to Lens

The response can more easily match the expected response when there is flexibility and freedom to allow vision to direct thinking and perception.

When not flexible, the response often is in the opposite direction indicating much of the available information is ignored.
Compensatory or Corrective?

- Compensatory lenses change the response only when being used.
- Corrective lenses change the response so the benefit remains after the lenses are removed.
Compensatory or Corrective?

- Subjective Refraction
- Binocular Cross Cylinder
- MEM
- Bell Retinoscopy
- Book Retinoscopy
- Yoked Prism and Walk Rail
- Therapeutic Lens
Understanding the Importance of Visual Motor & Ambient/Focal
Visual Motor (VM) Guides
Visual Sensory (VS)
VM: (Movement), Focus, Track, Teaming
VS: Eyesight (20/20) and Sensory Fusion
Visual Motor

The Visual Motor Model recognizes that difficulties in processing visual information can occur at several levels, which may have no or minimal effect on optics but huge effects on the visual process.
Visual Motor / Visual Sensory

• Visual Motor
  – Movement
    • Extra Ocular Muscles
    • Iris
    • Ciliary Muscle
  – Guides Sensory
  – Response searching for the stimulus
  – Motor nerves develop before sensory
Constant motion of micro eye movements and accommodative shifts are critical for scanning and visual clarification.

There are also drifts and corrections (side scans) that are important to consider since they help awareness of the peripheral.
Visual Motor / Visual Sensory

- Visual Sensory
  - Eyesight
  - Acuity
  - Optic Nerve
  - Sensory fusion
Visual Motor / Visual Sensory

• Visual Motor versus Visual Sensory
  – Hand
  – Wall
    • With reduced visual motor
    • With visual motor

• What gives more information?
• Yoked 20pd BR
• Fixate dot
• Run hand up and down door frame
• Watch hand as it goes up and down
• What is the difference?
Ambient(peripheral) / Focal(central)

- A prescription can improve the ambient / focal relationship allowing the patient to be more aware of the ambient visual processing system.
- A prescription can inhibit the patients ability to expand and be aware of the ambient visual processing system.
Ambient / Focal

• Ambient
  – All vision processed as the whole
  – Anti-Gravity (Skeffington circle)
  – More magno some parvo cells
  – Ground, less conscious
  – Dominant at birth

• Focal
  – Visual information being attended to
  – Final stage of Centering
  – More parvo some magno cells
  – Figure, more conscious
Gus Forkiotis

- Place heal in front of toes
- Look at toes
- Bend at waist
- Raise back up
• Increase awareness of periphery while looking at toes
• Bend forward at waist
• Raise back up
• Note difference in balance
Workshop

• Which is best to gain most information?
• Hand: Still or moving?
• Wall with Yoked Prism: With reduced visual motor or with more visual motor
• Ambient / Focal: Decreasing or increasing peripheral awareness
Understanding Lenses
What do Lenses Really Do?

• Bend light
• Influence or guide patient response
• Transform light
Considerations in Prescribing

Lenses and prisms are only light transformers. While it is possible to calculate the light transformation, one cannot predict an individual’s perceptual responses. The individual viewing through the lens interprets the transform within the context of her or his frame world. When there is a significant limitation of attention, the perceived response often is the opposite of the transformation. (Minus looks bigger, base-out looks bigger, plus looks smaller, etc.)

John Streff, OD, DOS
Clinical Pearls--General

• Use the smallest amount of power to create the change desired
  – With small lens powers 0.12 sph or 0.25 prism diopter can cause a large change in visual motor performance.
  – Small changes to higher power lens will have little or no effect.

• Use best optical quality material

• Match pupil distance for visual distance demand

• Use lined bifocal instead of progressive, especially with prism
Clinical Pearls--Cylinder

- Lenses as symmetrical as possible (exactly the same if possible)
  - Can lenses or spherical equivalents be the same?
- Cylinder as low as possible
- Axis as close to 180 or 90 as possible
- Axis as symmetrical as possible
- If both lenses cannot be the same, can one meridian be the same?
- Can one meridian be plano?
Clinical Pearls--Hyperopia

- Hyperopes who have never worn lenses
  - 3.00D hyperope or less:
    +0.62 or less
  - 4.00D hyperope or greater:
    +2.00 sph OR
    CL Rx with therapeutic lens over CL

- Hyperopes who already wear high Rx are difficult to change if they wear their glasses all the time
Clinical Pearls--Myopia

• 0.75 myope or less:
  Low plus with very small BI prism or BU or BD yoked prism

• Higher myope:
  Rx in Contacts (CL) with therapeutic Rx in eyeglasses worn over CL

• Myopes or Hyperopes unable to use CL:
  Use small BI, BD yoked or BU yoked
Clinical Pearls—Exo or Eso

- Exo posture (exophoria, exotropia):
  BI prism or BU yoked prism
- Eso posture (esophoria, esotropia):
  BD yoked prism
Trial Lenses to Have on Hand

- Low plus lenses in frame / holder
  +0.12, 0.25, 0.37, 0.50, 0.62, 0.75, 2.00
- Low cylinder in frame / holder
  -0.25 x 090, -0.50 x 090
- Curved prisms
  - 0.50 OU [BI, BD, BU, BO] in frame / holder
- Rotating prisms
  - 1pd, 2pd, 3pd
Optics:
Characteristics of Lenses and Prisms
Traditional Thinking Regarding Optics of the Eye

“We know that the image formed must be real, because it is projected onto the retina (which is like a screen). Any time an image is projected, it must be real.”

Karen Wu, The Optics
Optics of the Eye

Convention:

• Light rays drawn from left to right
• Light reflects off of a surface and goes toward the eye where refraction occurs so that the image is “projected” onto the retina.
Traditional Ophthalmic Optics

- Refractive conditions are viewed as a misfocusing of the optical system that is the eye due to problems with any of the optical parts including the eyeball being too long or short for the system.
- Light must then be refracted by a corrective lens in such a way as to move the focal point back in myopia and forward in hyperopia.
Consider Inverting the Optics

What happens to our thinking about the optics if we consider the person actively looking through the lens? (Rather than just considering the light coming from the object through the lens to the eye.)

Look at the ray tracings from the opposite direction!
Thin Lens Equation

\[ \frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f} \]

d_i = distance from lens to image
d_o = distance from lens to object
f = focal distance of lens
Concave Lens

• Optics: Real Object anywhere in space always creates a Virtual Image closer to the lens and smaller. (Small In)
• We can calculate the location of the virtual image if we know the lens power and the distance the object is from the lens.
Concave Lens

• Perception: Person looks through the lens at the virtual image and must put it back out in space to the distance they think the object actually physically is from them. This perceptual problem is compounded by optics in the periphery of the lens.
Convex Lens (Object between Focal Distance and Lens)

- Optics: Real Object between the focal point and the lens creates a Virtual Image farther away and larger. (Large Out)

- We can calculate the location of the virtual image if we know the lens power and the distance the object is from the lens.
Convex Lens (Object between Focal Distance and Lens)

- Perception: Again, the person looks through the lens at the virtual image.
- Don’t forget optics in the periphery of the lens. (Periphery = anywhere in lens not at the optical center.)
- We need to consider projection and perception to understand where in space the person perceives the object to be.
Convex Lens (Object between Focal Distance and Lens)

• Low power plus lenses are important to think about in this category.

• With low plus lenses, most near objects will fall closer to the lens than the focal distance, so a virtual image farther away in space and larger is created by the optics of the lens. (Remember, we are looking through the lens.)

• This is an important reason that low power plus lenses are so useful.
Convex Lens (Object Beyond Focal Distance of Lens)

• Optics: Real Object beyond the focal distance of the lens creates a Real Image on the opposite side of the lens.

• In this case the calculated location in space of the real image ends up in the person’s eye/head or often quite a distance behind the person. Of course, now the optics of the eye would also have an effect on the final calculated distance of the image.

• Perception: The person looking through this lens has some interesting perceptual transformations to make!
Web Sites with Interactive Lens Models

These are fun to play with if you like optics and maybe can help you with understanding optics if you don’t:

- [http://www.geocities.com/capecanaveral/hall/6645/Lens/lens_e.html](http://www.geocities.com/capecanaveral/hall/6645/Lens/lens_e.html)
Optical Characteristics of Lenses and Prisms

See handout for comprehensive list of optical characteristics of different types of lenses and prisms.

- These are the optical transformations of the lens and can be determined mathematically.
- Be careful in prescribing as the individual’s perceptual response may be quite different (often opposite.)
  - The individual viewing through the lens interprets the transformation within the context of her or his frame world.
Thin lens vs. Thick lens optics

• All of ray tracings so far have been “thin lens” optics.
• Ophthalmic lenses are more complicated.
• “Power” of the lens away from the optical center (OC) is not the same as at the OC.
• Prism effects must also be considered.
Optics

• Image displacement
  1 prism diopter =
  1 cm at 1 meter

• Three dimensional perceptual effects
  – Predictable based on optics
  – See next slide
Prism Image Formation
Optics: 3D Spatial Perception (Slant!)

• Prisms not only change the direction of light:
  – They rotate spatial aspects of the visual field
    • Base: Expands space
      — as if things moved farther away
    • Apex: Constricts space
      — as if things moved closer
  – We cannot fully understand the optics of prisms if we limit our concept of changes to a flat plane.
  – Prisms produce a gradient of simultaneous magnification and minification.
Prism Distortions

“The ophthalmic optics of prisms is characterized by having a non-uniform deviation of light rays.” Ron Jones, OD, PhD

- Asymmetric magnification
- Curvature of lines perpendicular to base-apex
- Rotation of lines parallel to base-apex
- Overall magnification

Base-curve dependent!
Spatial Distortions of Prisms

1. Asymmetric magnification

Effect is equivalent to an induced slant
Only apparent with an extended surface.

R. Jones, OD, PhD
Prisms cause:

• Shift – the main optical effect of prisms
• Slant – extended surfaces may appear rotated.
• Curvature – extended surfaces may appear curved

R. Jones, OD, PhD
Effects of a Prism

Shift and Slant

Where would you have to be looking without prism to have this slant?

R. Jones, OD, PhD
Curvature with Prisms

Curvature of lines perpendicular to base-apex.

R Jones, OD, PhD

image

object

Base-in

convex

concave

Base-out
Effects of Prisms

1. Yoked prisms (left, right, up, down).
   - Cause shift and slant

2. Opposing base prisms (BO, BI)
   - Cause distortions of space, distance, size
Important Visual Spatial Perception Concepts

- SOLI vs. SILO
  - Small Out Large In (SOLI)
    - Real objects moving in real space
    - Objects appear larger when they are closer and smaller when they are farther away.
  - Small In Large Out (SILO)
    - Perceived movement of the target.
    - Target should appear smaller and closer with Base Out prism or minus, larger and farther for Base In prism or plus

- Form Constancy
- Figure-Ground
Monocular Cues to Depth

- Overlay
- Light and Shadow
- Relative Height
- Linear Perspective
- Familiar Size (Form Constancy)
- Texture Gradient, Aerial Perspective
- Motion Parallax
Misjudged Distance

• If you over estimate distance of an object separation between objects will be expanded.

• If you under estimate distance of an object separation between objects will be foreshortened.
Spectacle Correction Prismatic Effect

- **Minus lenses:**
  - directions are **less** than actual.

- **Plus lenses:**
  - directions are **greater** than actual.
Wearing Plus Spectacles

The prismatic effects of plus lenses require the eye to rotate more than the normal amount.

R Jones, OD, PhD
Wearing Minus Spectacles

The prismatic effects of **minus** lenses require the eye to rotate **less** than the normal amount.

R Jones, OD, PhD
Adaptation to Spectacle Prismatic Effects

- Myope moves eyes less than an emmetrope.
- Perceived direction in myopia is less than actual.
- To adapt, myope needs to recalibrate eye movement information

R. Jones, OD, PhD
Remember Lenses ONLY
Transform Light

The optometrist benefits by observing the patient’s response to the lens probes, not by anticipating what they think the lens is supposed to do.

This aids the optometrist in assessing two patients with assumed similar visual systems who respond differently to the same lens.
Evaluation of …

- Reach - Grasp - Manipulate - Release using dynamic near point retinoscopy
Reach-Grasp-Manipulate

• Reach
  – When beginning to look
• Grasp
  – When vision connects
• Manipulate
  – Exploration of what is being looked at
• Release
  – Let go
Observing Reach-Grasp-Manipulate-Release while performing Dynamic Near Point Retinoscopy
Dynamic Near Point Retinoscopy

- Done at near
- Visual attention and retinoscope at the same distance (no working distance lens)
- Originated by Cross to find near Rx
  - Yielded too much plus
  - “lag” developed to account for difference
- No need for working distance calculations
- No cycloplegics
- No neutralization of a reflex
Dynamic Near Point Retinoscopy

- Book
- Stress Point
- Bell

Prefer Book because also watching visual sequencing

MEM is more repeatable inter- and intra-examiner because it is a “neutralizing” type of retinoscopy. It is not dynamic.
Book Retinoscopy

- Appropriate reading material at Harmon distance
- Observe how probe lenses change reflex
- Observe changes in brightness, color, stability over time
- Takes cognitive level into account
- Allows one to see changes over time
- Lots of information can be seen in the reflex
Dynamic Book Retinoscopy

- Spot retinoscope versus streak retinoscope
- Reading Cards/Near Target
  - Gray Oral set up for Book Retinoscopy
    Richard Apell, OD
    15 Thelbridge Street
    Madison, CT 06443-3412

- Lenses
- HARMON DISTANCE (Don’t be too far away)
Book Retinoscopy Target

Use target appropriate for patient.
Important Considerations

- **Attend to change!!**
- Our training was to recognize motion and cylinder and to ignore other reflex properties.
- In optometry school we were judged on how the retinoscopy matched the subjective.
- We have been trained to ignore the most important information.
- **It is going to take time and practice! Be patient.**
- **OPEN YOUR EYES, LOOK AND SEE!**
Dynamic Near Point Retinoscopy

CHANGE WHAT YOU ARE LOOKING FOR:
THINK DISTRIBUTION AND BRIGHTNESS VARIABILITIES AND CHANGES

• Color and color change
• Brightness and relative brightness
• Central/peripheral light distribution and change
• Small fluctuations in reflex and reflex areas
Clinical Pearls

• With motion:
  – The individual is projecting relatively closer than the physical distance.
    • As projects closer, reflex farther to keep contact = increase in with motion

• Against motion:
  – The individual is projecting relative distance than physical distance.
    • As projects far as if closer = increase in against motion
Trial Lenses to Have on Hand

- Low plus lenses in frame / holder
  +0.12, 0.25, 0.37, 0.50, 0.62, 0.75, 2.00
- Low cylinder in frame / holder
  -0.25 x 090, -0.50 x 090
- Curved prisms
  - 0.50 OU [BI, BD, BU, BO] in frame / holder
- Rotating prisms
  - 1pd, 2pd, 3pd
Important Considerations

• Just observe – don’t over-analyze
• Observe
  – Color, brightness, motion
  – Central and peripheral light distribution
  – Changes over time / stability of reflex
Dynamic Near Point Retinoscopy

- HARMON’S DISTANCE!!!
- Look for Best Reflex with Best Lens
- Near Point Target: Reading Card
Take Home Message

• Be sure you understand how dynamic retinoscopy is set up
• Just Look
• Be aware of any change
Workshop

- Hold retinoscope still
- Keep both eyes open
- Keep retinoscope @ plane of target
- Stay close
- Working distance is the patient’s reading distance
- Have 2 people evaluate same person and compare observations
- Observe a variety of individuals in your group
How to Determine the Therapeutic Performance Prescription
Theories / Models of Prescribing

• Refraction
  – History
  – BVA
  – Full Compensation of RE

• AC/A Ratio

• Graphical Analysis

• Von Graffe
Theories / Models of Prescribing

• OEP 21 Point Analysis
• Developmental
• Performance
• Behavioral
• Functional
G.N. Getman

• The Basic Sequence of Development
  G. N. Getman believed that development of learning followed a specific sequence in the pre-school years.
Elliot Forrest

• Elliot A. Forrest's research on functional astigmatism revealed the crucial importance of the relationship between eye movements and head movements when scanning horizontally as opposed to scanning vertically.
In 1958, Harmon (the scientist who gave his name to the standard reading distance, i.e., elbow to middle finger knuckle) noticed postural patterns in subjects with different eye disorders.
Ann Sutton Nichols

• Ann Sutton Nichols, in her studies, remarked the presence of different styles of vision in myopes and hyperopes according to a specific plane of vision.
Arnold Gesell

Growth is a process of organization. It is a unitary and an integrative process; if it were not unitary, the organism would lack wholeness; if it were not integrative, the organism would lack individuality ... This principle (motor priority) is so fundamental that virtually all behavior ontogenetically has a motor origin and aspect. Vision, for example, has a motor as well as sensory basis; likewise, speech, mental imagery, and conceptual thought. Even emotions trace to motor attitudes and tensions."
Robert Kraskin

Kraskin found that lenses could change the location in space where the patient made the shift from fight to flight. Extremely low powered plus lenses over the patients’ habitual shifted the stress point towards to patient, increased the volume of space within which the patient could remain in fight.
Behavioural Optometry is about exploring the relationship between the neurobiological and mechanical processes of seeing and the functional requirements of living and surviving in a dynamic environment - in other words about vision. Vision is the dominant component of all human behaviour, it is in part innate - we can all see at birth, but it is also learned. From the infant’s first explorations of the world about them, right through life, we are learning to see - enhancing our visual processes.
“Near work causes changes in the oculomotor characteristics of susceptible individuals which begin even before the development of refractive error. This series of changes in oculomotor function apparently results in optical defocus, which has the potential to induce ocular compensatory changes resulting in myopia.”
Ciuffreda (1999)

Confirms the differing responses to near work seen, with one group showing rapid recovery from close work, and no apparent long term changes. A second group showed a near point stress response with rapid recovery after cessation of the task, whilst a third group showed a very long recovery time after removal of the near task. This same paper also advocates the use of plus lenses as a means of breaking the cycle of stress, and reports on positive long term responses to this approach.
Studies

• Pirman and Lamb (1982) & Caden (1984) have both shown improved performance on pattern copying tasks with the use of lenses prescribed on the basis of accommodative lag determination.

• Pierce and Greenspan have often been quoted in support of low plus, but they show a clear and unequivocal link between the application of low powers of lenses and improvements in visual performance.
Applications for Lenses

• Therapeutic
• Performance
• Developmental
• Comfort
• Functional
• Behavioral
Possible Goals for a Prescription

• Influence visual thinking
• Influence visual motor to guide visual sensory
• Influence symmetrical posture
• Guide projection to equal perception
• Improve visual grasp, release and manipulation
• Speech and language
• Efficient visual processing
• Increase reading speed
Possible Goals for a Prescription

• Gain awareness
• Improve comprehension
• Improve insight
• Improve understanding of the world
• Disrupt warped visual system
• Guide visual development
• Balance visual system at near
Possible Goals for a Prescription

- Make performance easier
- Sustain performance
- Increase ease and comfort
- Allow more efficient productive performance
- Heighten discernment over a larger viewing field
- Change behavior
- Improve function
Specific Optometric Lens Applications

- Strabismus
- Amblyopia
- Anisometropia
- Vertical Deviations
- Asymmetrical Cylinder
- Centering Shift
- Myopia Control
- Hyperopia
- Visual Field Disorders
- Vision Therapy
Handouts

• Characteristics of Lenses
• Guides for Prescribing Cylinder (Streff)
• Guidelines for Prescribing Therapeutic Performance Lenses and Prisms (Montecalvo)
Prescription Considerations

• Characteristics of lenses and prisms
  – Small amounts of plus
  – Small amounts of prism

• Lens materials & coatings

• Color of lens

• Occlusion type

• Pupil Distance related to working distance
Trial Lenses

- Low plus lenses in frame
  - 0.12, 0.25, 0.37, 0.50, 0.62, 2.00
- Low cylinder
  - -0.25x090, -0.50x090
- Curved prisms
  - 0.25, 0.50 (BI, BD, BU, BO) in frame/holder
- Rotating prisms
  - 1pd, 2pd, 3pd
Lenses and Prisms
What lens should I try?

- Goal/reason for prescribing
- Characteristics of lenses and prisms
- Prescribing guides (Streff & Montecalvo)
- There may be more than one lens that works
- Think smaller first, then increase power if needed
Performance Testing Helps Determine Best Prescription

The opportunity to trial the prescription determined from the data collected during the analytical and near retinoscopy and observe how the lenses impact performance.
Tests to Determine Best Prescription

- Visual Motor Performance Tests
  - Dynamic Retinoscopy
  - Streff Ball and Cap
  - NPC
  - Pursuits
  - Reading
Streff Ball and Cap

• Patient fixates ball (Wolff Wand)
• Holds cap at waist level in preferred hand
• Put cap on ball quickly
• Do not look back and forth between cap and ball
Streff Ball and Cap Test

• Equipment needed
  – Wand gold or silver
    • Some people use a pen or other object
  – Cap
    • Highlighter cap
    • Eye drop bottle cap
    • Finger
Performance Testing

• Observe changes in:
  – Visual Motor abilities
  – Reading
  – Walking
  – Paper and pencil tasks
  – VO Star
Performance Testing

• Reading
  – Fluency
  – Speed
  – Accuracy
  – Working distance

• Clinical Pearl – make up different lenses in a variety of low plus powers in adult and child frames
Reading Cards

• Grey Oral - Dr. Apell
• Lighthouse Card
Performance Testing

• Visual Motor: Look for change
  – Saccades
  – Pursuits
  – Convergence
    • “pseudo-convergence insufficiency”
Performance Testing

• Paper and Pencil Tasks
  – Accuracy
  – Posture
  – Pressure on paper
  – Handwriting (Wold test)
  – Spacing
Performance Testing

• Walking
  – Balance
  – Stride length
  – Speed
  – Ability to handle steps
• Watch head and exit sign.
• See gait
• Note head, shoulder and hip position
• Observe
• See position to walls
• Apply yoked prism
• Observe change
Bi-Nasal Occlusion
Bi-Nasal Occlusion: Not Just For Esotropia
Bi-Nasal Occluders
Uses for Bi-Nasal Occluders

- Convergence Insufficiency
- Reduce Asthenopia
- Eso or Exo Posture
- Disequilibrium
- Centering Shift
Uses for Bi-Nasal Occluders

- Accommodative Problems
- Improve Orientation
- Spatial Organization Problems
- Amblyopia
Uses for Bi-Nasal Occlusion

- Diplopia
- Vertigo
- Headache
- Photophobia
Bi-Nasal Occlusion

• Appears to change how one judges center.
• Give minimum amount needed to regain accurate centering
• Streff Wedge measurements can be used by optician to place bi-nasal on lenses
• Helps with orientation
• Improves ability to reduced veering to one side.
Understanding The Process

• Phylogentic Development
• Less Spatial Information
• Temporal Retina
  – More reactive
• Uncrossed Fibers
• Eliminates near
  – Physiological diplopia
Tools To Use

- Streff Wedge
- Wand/Marker Cap
- Reading Card
- Spot Retinoscope
Streff Wedge
Demonstration

• Disruptive Blurred Double Lenses
  – 30pd BO with +6.00 not a test or training technique just demo to better understand process
• Apply Streff Wedge
• Notice Change
Demonstrating Streff Wedge

• NPC
• Donders
• Center Shift Test
• Dynamic Retinoscopy
Bi-Nasal Application

- Nail Polish
- 1 mm Nasal to Limbus
- 7-8 degree angle
- Back surface of lenses
Applying Bi-Nasal Occluders

- Tape over area not applying occlusion to
- Place tape on inside lens
Applying Bi-Nasal Occluders

- Poor quality nail polish
- Brush on inside lens
Removing Bi-Nasal Occluders

- Scotch tape
- Solvent for poly
- Solvent for non-poly
- Trivex OK
Bi-Nasal can be applied to a variety of cases:

- **HH**: Headache
- **BH**: Photophobia
- **SS**: Convergence Insufficiency
- **JJ**: Suppression
- **AS**: Hemianopsia with Midline Shift
- **VG**: IV CN Palsy
- **ED**: Constant Diplopia
Workshop

• Bi-nasal occlusion
• Compare visual motor performance tests
Vision Therapy
Yoked Prism and Walk Rail

- **Materials:** 12pd rotating curved prism Rx, Walk Rail
Yoked Prism and Walk Rail

- Step 1: With the prisms placed Base up the patient looks down to get on the walk rail then shift the focus to a distance target beyond the end of the walk rail.
- Step 2: The patient walks along the rail until the end then looks down to step off. Repeat 3 times.
- Step 3: Change prisms to base down and repeat.
- Step 4: Change prisms to Base Up and repeat.
- Step 5: Change prisms to Base Down and repeat.
Yoked Prism and Walk Rail

• **What to ask:**
  – What do you notice? What does it feel like?
  – How far are the walls from you?

• **What to watch for:**
  – Balance.
  – Recognize the curve of rail.
  – Notice change in shift, size.
  – Is breath held?
  – Hard to relax.
  – Postural rotations, head, upper torso, hips.
Pursuits and Double Prisms

- **Materials**: 5pd rotating curved prism Rx, Walk Rail, Fixation wands (one shiny gold and one silver ball)

- RE: 5pd BU  LE: 5pd BD
- RE: 5pd BD  LE: 5pd BU
Pursuits and Double Prisms

- Have patient sit or lie down with doubling prism glasses on.
- Hold the wand in primary gaze about 16 inches from the patient.
- Ask the patient to fixate the wand. Have patient explain what they see. Encourage peripheral awareness.
- Ask the patient to try to line the targets above each other.
- Move the wand in all 9 directions of gaze and closer and further out. Ultimately the patient should try to keep the targets in alignment while they are moved.
Pursuits and Double Prisms

• Ask patient which one is real.
• Have patient touch the wand and ask which one he or she can feel.
• The goal is to understand that both wands viewed are real and not real and to be able to feel both at the same time while touching the wand that is seen as double.
Pursuits and Double Prisms

• What to ask:
  – What do you notice?
  – What does it feel like?
  – Probing questions can be included: Are they the same? How are they different? How are they positioned to each other?

• What to watch for:
  – How they orient the position of the 2 wands to each other.
  – Can they change how the targets are seen?
  – Holds breath.
  – Cannot relax.
  – Posture rotations, head, upper torso, hips.
Saccades and Double Prism

Materials: 5pd rotating curved prism Rx, Walk Rail, Fixation wands (one shiny gold and one silver ball)

- RE: 5pd BU    LE: 5pd BD
- RE: 5pd BD    LE: 5pd BU
Saccades and Double Prism

Have patient sit or lie down with double prism glasses on.

Ask the patient to fixate one of the wands while it is held in primary gaze.

Have patient explain what they see.

Ask the patient to try to line the targets above each other.

Ask patient to shift fixation to the other wand held in on of the 9 secondary positions.
Saccades and Double Prism

- While patient fixates the second wand the therapist moves the other wand (the one the patient is not fixating on) to another position.
- The patient is then asked to shift fixation to the wand just moved.
- The therapist calls out “gold” or “silver to direct the patient to shift fixation.
- Each time the patient performs a saccade the other wand is moved.
Saccades and Double Prism

What to ask:
• What do you notice?
• What does it feel like?
• Probing questions might include: Are they the same? How are they different? How are they positioned to each other?

What to watch for:
• How they orient the position of the 2 wands to each other.
• Can they change how the targets are seen?
• Holds breath.
• Can not relax.
• Posture rotations, head, upper torso, hips.
Double Prism and Sticks

**Materials:** 5pd rotating curved prism set, 2 Dowel sticks about 3 feet long

- Right Eye: 5pd BU  Left Eye: 5pd BD
- Right Eye: 5pd BD  Left Eye: 5pd BU
Double Prism and Sticks

• Procedure: Place the prism glasses on the patient with RE: 5pd BU LE: 5pd BD
Double Prism and Sticks

• Have patient hold a dowel stick in each hand with the pointer finger pointing toward the end of the stick.
• Rest hands with sticks at side. Bring them up to a point patient is fixating at the same time and have the tips of the double sticks touch.
• Repeat 5 times. Look in all 9 directions of gaze.
• Repeat with RE: 5pd BD LE: 5pd BU
Double Prism and Sticks

• **What to ask:**
  – What do you notice?
  – What does it feel like?
  – Probing questions might include: How can you look differently to help them touch?

• **What to watch for:**
  – How patient orients the position of the 2 sticks to each other. Note all axis, X, Y and Z.
  – Can patient changes how the targets are seen so they touch with ease?
  – Holds breath.
  – Can not relax.
  – Posture rotations, head, upper torso, hips.
Double Prism and Rings

**Materials:** 5pd rotating curved prism set, 2
1 set of rings with 2 pegs

- Right Eye: 5pd BU  Left Eye: 5pd BD
- Right Eye: 5pd BD  Left Eye: 5pd BU
Double Prism and Rings

- Procedure: Place the prism glasses on the patient with RE: 5pd BU LE: 5pd BD
Double Prism and Rings

• Have patient hold a dowel stick in each hand with the pointer finger pointing toward the end of the stick.

• Rest hands with sticks at side. Bring sticks up to grasp one ring on the peg and transfer it to the other ring.

• Repeat with all rings.

• Repeat with RE: 5pd BD LE: 5pd BU
Double Prism and Rings

• What to ask:
  – What do you notice?
  – What does it feel like?
  – Probing questions might include: How can you look differently to help them touch?

• What to watch for:
  – Can patient changes how the targets are seen so they touch with ease?
  – Holds breath.
  – Can not relax.
  – Posture rotations, head, upper torso, hips.
Window Rock

**Materials:** +2.00 Rx, loose lenses –4.00, -6.00, -8.00, Near point Snellen acuity card, Distance large sign with varied letter sizes
Window Rock

• +2.00 glasses for viewing distance
• Look out beyond 6M
• Be aware of what you see
• Shift to near looking through -2.00
• Attempt to read near VA chart
• Once no progression shift to distance
• Do not try to make it clear, just describe and see what you can see
Window Rock

- Patient stands in front of near acuity card set at about 20 inches while wearing the +2.00 lenses.
- The patient reads the acuity chart beginning at the big E.
- As soon as patient reads the smallest letters possible, fixation is shifted to distance while the –4.00 lenses are placed in front of the +2.00 lenses.
- The patient reads as much of the distance sign as possible.
- Repeat looking near and far reading as much information as possible. Increase the minus used as each is achieved.
Window Rock

- **What to ask:**
  - What do you notice as you change focus?
  - Can you change the focus response?
  - What does it feel like?

- **What to watch for:**
  - Trying too hard.
  - Not looking soft.
  - Holds breath.
  - Cannot relax.
  - Posture rotations, head, upper torso, hips.
Clinical Pearl to Treat Amblyopia

Montecalvo Barely Blur Blur Technique
Determining Barely Blur Occlusion for Amblyopia

- Subjective Refraction in Phoroptor
- Double Full Line of Best Visual Acuity (BVA) of Amblyopic Eye (AE)
- Patient must see 2 lines
- Blur Non-Amblyopic Eye (NAE) to one line worse than AE
Determining Barely Blur Occlusion for Amblyopia

- Do a Forced Choice on AE
- Present one VA line better and determine if AE can read smaller letters
- Re-blur NAE to one line worse than newly determined BVA of AE
- Present a double single letter
- Try to reduce letter size until no longer visible by AE
Determining Barely Blur Occlusion for Amblyopia

- Always keep the NAE barely blurred to one line worse than BVA of AE
- Fit patient with 3 CL if BVA of AE is 20/50 or worse (2-daily use 1-blur of AE for 2 hrs./day)
- Use only 2 CL if BVA of AE is 20/40 or better
Assessing Barely Blur

- Check every 3 days at first
- NAE will build plus
- Change Barely Blur as needed
- Move from 2 hours/day to full time once BVA is better than 20/40
Activities During Barely Blur

• Pennies in Bank
• Balloon Toss
• Ball Catch
• Gross Motor / Eye Activities
Notes for Barely Blur

- Keep posture straight
- Breathing
- Turn head to encourage viewing through AE if cannot see double
- When CL are not possible use 2 pair of glasses
Other Prescribing Opportunities for Treating Amblyopia

- Monocular Bifocal
- Micro prism