

# BV & VT and Your Primary Care Practice

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*“Study the science of art. Study the art of science. Develop your senses—especially learn how to see. Realize that everything connects to everything else.”*

*— Leonardo Da Vinci*

# Disclosures

(No Financial Disclosures)

Founding VP and  
Immediate Past  
President of VTC  
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the Optometric  
Extension  
Program (OEP)

I REALLY LOVE  
VT!

# Poll #1

- ▶ Do you currently offer Vision Therapy in your office?
  1. Absolutely!
  2. I've been interested for a little while, but never jumped in. I want to learn more!
  3. Um...no. Also, you can't make me.
  4. Vision Therapy? Isn't that when you read someone's tea-leaves and tell them they have "The Grim"?

# Poll #2

- ▶ If you do NOT currently offer Vision Therapy in your office, why not?
  1. I feel that I don't have the knowledge
  2. I feel like it's too expensive to start
  3. Children: YUCK
  4. I think it's bogus
  5. Other?

Part One:  
What is Vision?  
What is Vision  
Therapy?



# What is “Vision”?

vi·sion

/'viZHən/

*noun*

noun: **vision**

the faculty or state of being able to see.

"she had defective vision"



## What is Vision?

“Vision is the deriving of meaning and direction of action as triggered by light.”

-AM Skeffington

# What is “Binocular Vision”?

- ▶ Let’s ask Google again!

bin·oc·u·lar vi·sion

*noun*

noun: **binocular vision**

vision using two eyes with overlapping fields of view, allowing good perception of depth.



- ▶ Deriving meaning and directing action to the best biological capacity of the organism, under subconscious control, with the greatest possible efficiency and the least amount of effort.

What is  
“Binocular  
Vision”?

# What Does this Tell us?

If Vision is a *constant* derivation of meaning and direction of action, then it is an active process.

If Vision is an active process, then it is something that is developed and learned through experience.

If the Visual process is something that is learned, then one can learn to do it BETTER!

# What is “Vision Therapy”?

- ▶ “Physio-therapy for the eyeballs”
- ▶ “Eye exercises”
- ▶ “Eye muscle training”
  
- ▶ Something worse...?
  - ▶ A money-grab
  - ▶ Voodoo
  - ▶ Unproven?

**NO!!**



# Convergence Insufficiency Treatment Trial (CITT)

- ▶ Patients diagnosed with Convergence Insufficiency (CI) were recruited into one of three groups:
  - ▶ Office-based Vision Therapy (OBVT)
  - ▶ Placebo OBVT
  - ▶ Pencil Push-ups
- ▶ Results: Trial “...demonstrated that vision therapy/orthoptics is effective in treating both the symptoms and signs associated with CI and that the effects of vision therapy in children cannot be explained on the basis of a placebo effect.”
- ▶ Results: “Based on the results of this pilot study, it would appear that pencil push-ups, a commonly prescribed treatment for CI, is not effective in improving the symptoms or signs of CI in children.”

# What is “Vision Therapy”?

The development of the visual process through guided exploration and discovery by means of sequential actions (activities) which are designed to provide the patient with the opportunity to have the necessary meaningful experiences to acquire vision.

Vision is our dominant and lead sense. It is our brains' way of reaching out into the world in an effort to understand, to interact, and to communicate.



In many patients, this sense is mis-calibrated and/or inefficient and causes them to need to compensate through low-level or mal-adaptations.



Vision therapy trains the brain (not the eyes!) how to use vision so that those mal-adaptations are no longer required, and the patient is able to *derive meaning and direct action in an efficient and comfortable manner, and under subconscious control.*

# Why Vision Therapy?

# Who Needs Vision Therapy?

- ▶ Strabismus
- ▶ Amblyopia
- ▶ Binocular Vision Dysfunctions
  - ▶ Convergence Insufficiency/Excess
  - ▶ Divergence Insufficiency/Excess
  - ▶ Accommodative Insufficiency/Spasm/Infacility
- ▶ Oculo-Motor Dysfunction
- ▶ Concussion/Acquired Brain Injury
  - ▶ Long COVID (?)
- ▶ Vision-Related Learning Problems
  - ▶ Visual Information Processing Deficits
  - ▶ Dyslexia...???
- ▶ Age is not a factor!

# A Note About Dyslexia



- ▶ True Dyslexia is a neurological condition
- ▶ Vision Therapy does **NOT** cure Dyslexia
- ▶ Many diagnoses of Dyslexia are incorrect because:
  - ▶ Testing assumes normal vision
  - ▶ Many patients have only had their sight tested, not their vision
- ▶ Vision Therapy treats the underlying vision problem that may be contributing to the difficulties in reading/language
- ▶ A patient may suffer from vision problems and dyslexia





OK, I'm Ready!

▶ Where do I Start?



## Part Two: Testing



# History

- ▶ Your history starts when you get the patient from the waiting room! What do you see?
  - ▶ Strabismus - These patients are typically the easiest to get into VT. They wear their vision problem on the outside!
  - ▶ Working distance to their book/device - See it in all its glory!
  - ▶ Posture and tone tell us a lot about the patient's development
  - ▶ Physical compensations such as winking, head tilts, head turns, deep blinking, etc, can give clues to poor binocular function.

# CJO RCO

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EST. 1939 VOLUME 80 NUMBER 2



#### CLINICAL RESEARCH

Review: Ocular Complications of Mosquito-Transmitted Diseases

#### CLINICAL RESEARCH

Updating the Competency  
Profile and Examination  
Blueprint for Entry-Level  
Optometry in Canada

#### PRACTICE MANAGEMENT

Top Legal Risks and  
Regulatory Trends Facing  
Canadian Optometrists

#### INNOVATIONS

The Future - Disruptive  
Optometry



## Regarding Personal Screens

[https://opto.ca/sites/default/files/resources/documents/cjo\\_vol\\_80\\_issue\\_2.pdf](https://opto.ca/sites/default/files/resources/documents/cjo_vol_80_issue_2.pdf)

## Canadian Association of Optometrists/Canadian Ophthalmological Society Joint Position Statement: Effects of Electronic Screens on Children's Vision and Recommendations for Safe Use

### **POLICY ISSUE**

The prevalence of electronic screen-related ocular symptoms in adult users is estimated to be as high as 50–90%.<sup>1,2,3</sup> While the corresponding statistic in children is not known, the use of electronic screens by children has become more commonplace (at both home and school),<sup>4</sup> begins earlier in childhood than in the past,<sup>5</sup> and can last for long periods of time.<sup>4,6,7</sup>

The prevalence of electronic-screen symptoms in adults and the resultant guidelines for safe use should not be automatically applied to children. The visual and physical systems of children are different than those of adults, and still developing. In addition, children use screens differently and for different tasks.<sup>4</sup> This policy reviews the current literature on ocular and visual symptoms related to electronic-screen use in children and provides evidence-based guidelines for safe use. The effect of screen-time on other cognitive and developmental milestones is beyond the scope of this statement.



# Their Recommendations:

## POLICY POSITION

It is our position that the safe use of electronic screens should encompass the following:

- a) Recommended amount of screen-time for children:<sup>19,20,21</sup>
  - 0–2 years: None, with the possible exception of live video-chatting<sup>5,24</sup> (e.g., Skype, Facetime) with parental support, due to its potential for social development,<sup>25</sup> though this needs further investigation.
  - 2–5 years: No more than 1 hour per day. Programming should be age-appropriate, educational, high-quality, and co-viewed, and should be discussed with the child to provide context and help them apply what they are seeing to their 3-dimensional environment.
  - 5–18 years: Ideally no more than 2 hours per day of recreational screen-time. Parents and eyecare providers should be aware that children report total screen-time to be much higher (more than 7 hours per day in some studies).<sup>5–7</sup> This is not unrealistic considering the multitude of device screens children may be exposed to in a day, both at home and at school. Individual screen-time plans for children between the ages of 5–18 years should be considered based on their development and needs.<sup>21</sup>
- b) Breaks after no more than 60 minutes of use (after 30 minutes is encouraged).<sup>26</sup> Breaks should include whole-body physical activity. The ideal length of a break has not been identified for either children or adults.



## Regarding Posture

- ▶ Slouching, low-tone, fidgety behavior, feet wrapped around chair legs, etc can be the result of retained Primitive Reflexes.
- ▶ Primitive Reflexes are basic motor reflexes that emerge in utero or during infancy. Once the purpose of the reflex is fulfilled, PRs should be integrated into more complex, voluntary motor movements.
- ▶ If their purposes remains unfulfilled, PRs can remain and interfere with physical and visual development, as well as interfere with VT progress.



## Regarding Physical Compensations

- ▶ Winking should make you suspicious of diplopia
- ▶ Head tilts should make you suspicious of vertical deviations and/or oblique issues
- ▶ Horizontal head turns should make you suspicious of intermittent tropias and/or high-angle phorias
- ▶ Vertical head turns should make you suspicious of A/V-Pattern issues



# History Questions

- ▶ Chief complaint

- ▶ Is the patient/parent even aware of issues that you may notice?

- ▶ Birth history

- ▶ Premature? C-Section? Rapid delivery? Forceps? Peri-natal trauma? Neonatal support?

- ▶ Developmental history

- ▶ Hearing issues? Crawled (*properly*)? Walked when? Speech delay?

- ▶ Scholastic history

- ▶ Is current grade age-appropriate (skipped/repeated)? Teacher concerns? Parent concerns? IEPs? Favourite/least favourite subjects? Attention concerns?

- ▶ Motor history

- ▶ Known to be clumsy? Can they ride a bicycle? Catch a ball? Any concussions?

- ▶ Normal history questions

- ▶ Medications? Medical hx? Family hx? Etc

# Poll #3

- ▶ Which of the following do you perform on most/all of your non-presbyopic patients:
  1. Cover test, stereo, amplitude of accommodation
  2. All of the above plus: phorias and vergences
  3. All of the above plus: lag of accommodation and NRA/PRA
  4. All of the above and more! (Stop bragging)

## VA Testing

- ▶ Know your audience!
  - ▶ What to use?
- ▶ Benefits to starting with near acuity
- ▶ Continuous text: watch and listen!
- ▶ Can't do any of the above? At least do red reflex testing to r/o anisometropia (or worse)





# Cover Testing

- ▶ Distance target
  - ▶ Make it interesting, but still small in size (20/40-ish)
- ▶ Near Target
  - ▶ Ensure adequate fixation - use “the Wiggle”!
- ▶ Expected/Normal Findings
  - ▶ 0.5-1.5 PD Exophoria (orthophoria) @Distance
  - ▶ 4.0-6.0 PD Exophoria @Near

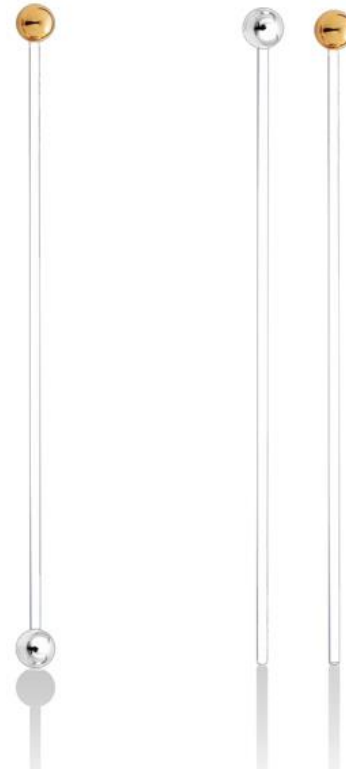
# Exo at Near - A Big Deal?

- ▶ Just as a normal Accommodative Lag is +0.50 to allow for rapid, fine, accommodative change, 4-6 PD exophoria allows for fine fluctuation of vergence demands.
- ▶ Just as a measure of plano for accommodative lag is actually considered to be a **lead** or accommodation, **ortho at near** is actually *esophoria* and requires the same intervention!



# Fixation, Pursuits & Saccades

- ▶ Accommodative target
  - ▶ Wolff Wand ideal
- ▶ Fixation
  - ▶ Can the pt hold their gaze still?
- ▶ Pursuits
  - ▶ Measure ability, accuracy and head movement
  - ▶ NSUCO or similar
- ▶ Saccades
  - ▶ Measure ability, accuracy and head movement
  - ▶ NSUCO or similar





<b>Measurement</b>	<b>Score</b>	<b>Criteria</b>	<b>Pursuits</b>		
<b>Saccades Ability</b>	1	Completes less than two roundtrips (the patient cannot go from one target to the other and back more than once).	<b>Ability</b>	1	Cannot complete 1/2 rotation in either clockwise or counter-clockwise direction.
	2	Completes two roundtrips.		2	Completes 1/2 rotation in either direction.
	3	Completes three roundtrips.		3	Completes one rotation in either direction but not two rotations.
	4	Completes four roundtrips.		4	Completes two rotations in one direction but less than two rotations in the other direction.
	5	Completes five roundtrips.		5	Completes two rotations in each direction.
<b>Accuracy</b>	1	Large over- or undershooting is noted one or more times.	<b>Accuracy</b>	1	No attempt to follow the target or requires greater than 10 fixations.
	2	Moderate over- or undershooting is noted one or more times.		2	Refixations five to 10 times.
	3	Constant slight over- or undershooting noted more than 50% of the time.		3	Refixations three to four times.
	4	Intermittent slight over- or undershooting noted less than 50% of the time.		4	Refixations two times or less.
	5	No over- or undershooting noted.		5	No refixations.
<b>Head and body movement</b>	1	Large movement of the head or body at any time.	<b>Head and body movement</b>	1	Large movement of the head or body at any time.
	2	Moderate movement of the head or body at any time.		2	Moderate movement of the head or body at any time.
	3	Slight movement of the head or body more than 50% of the time.		3	Slight movement of the head or body more than 50% of the time.
	4	Slight movement of the head or body less than 50% of the time.		4	Slight movement of the head or body less than 50% of the time.
	5	No movement of the head or body.		5	No movement of head or body.

# NSUCO Scoring

- ▶ Measurement of the nearest point of single vision
- ▶ Two measurements sometimes required
  - ▶ Wolff Wand - NOT a letter-target
  - ▶ If normal and you're still suspicious, re-measure with R/G specs.
- ▶ What is the end point? Diplopia? When the eye(s) diverge?
- ▶ What is normal? TTN?
- ▶ Don't forget to note recovery!

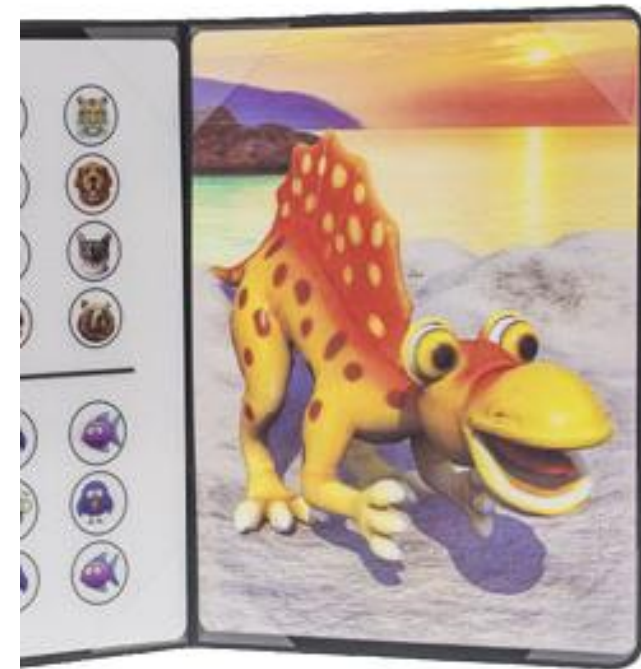


## Near Point of Convergence (NPC)



# Stereopsis

- ▶ No excuses! All of your children and young adults should have this done regularly!
- ▶ Stereopsis begins to develop approximately 3-4 months of age
- ▶ Stereo Dinosaur and Stereo Fly can offer us a cue to presence of stereopsis
  - ▶ Positive test is a reach for the character
  - ▶ Yes you can see a positive result at the 6 month exam!
- ▶ Random Dot vs Wirt Circles
- ▶ Watch the behavior!

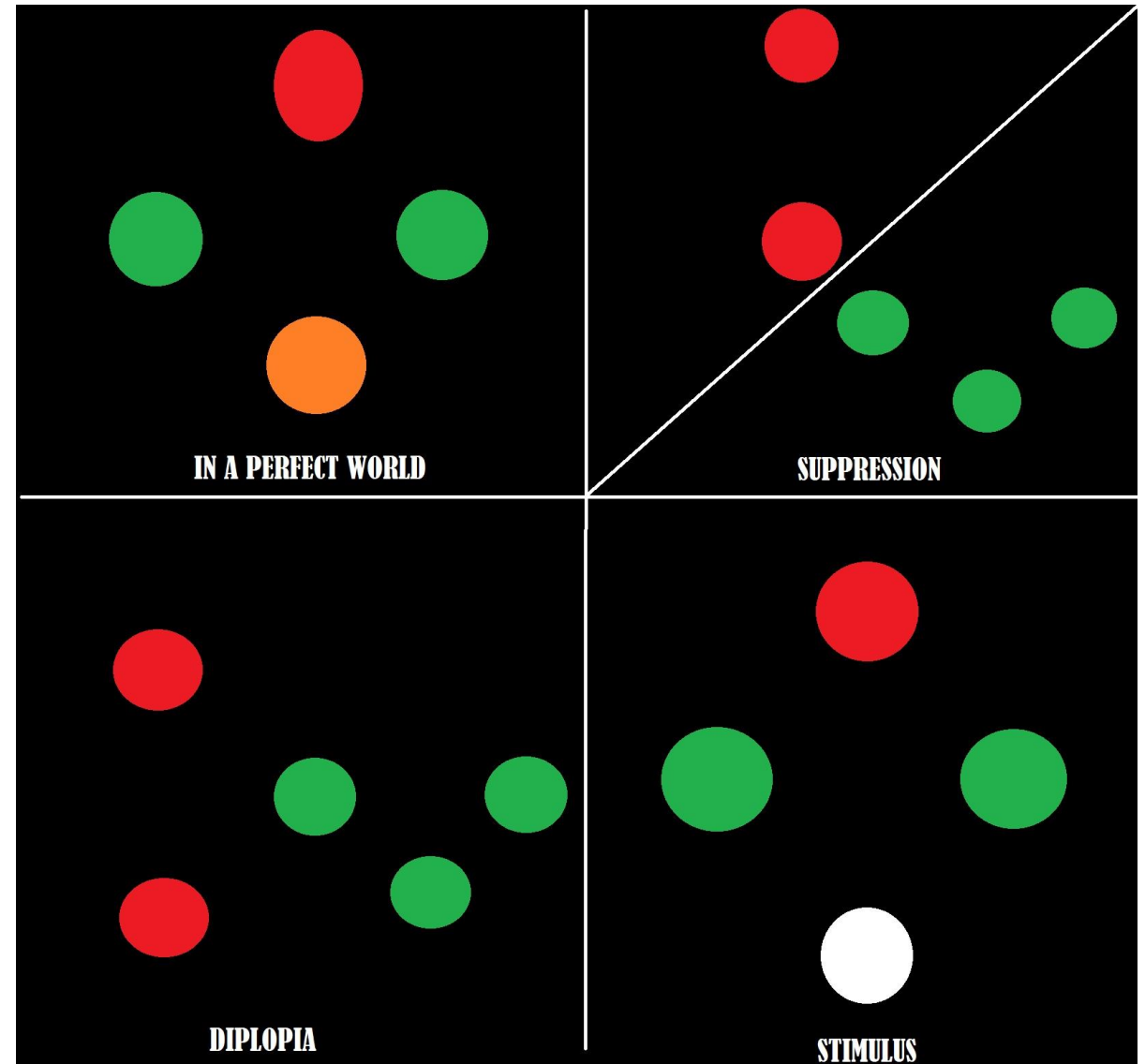


Answers printed on back cover



# Suppression and Diplopia Checks: The Worth-4-Dot

- ▶ Important test for both distance and near
- ▶ Re-measure with +/-2.00 Flipper
  - ▶ Tells you if pt can separate vergence and accommodation when needed
  - ▶ Shows you how the pt operates under visual stress
- ▶ Can also give you an indication of whether or not AP is present



# Worth-4-Dot Questions

- ▶ How many circles do you see?
- ▶ How many of each colour?
- ▶ Are the circles moving around or staying still?
- ▶ Do any colours change or do they stay the same?

**These questions are all important!  
Don't stop after the first one!**

# Lag of Accommodation

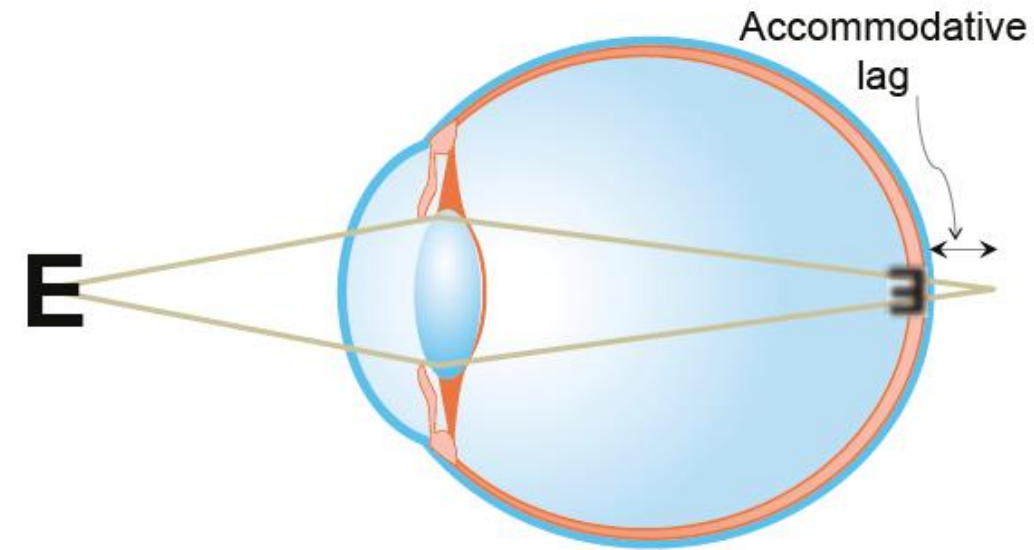
The difference, in dioptric power, between the object and the plane of accommodation

Expected: Lag of +0.50/+0.75

This corresponds to the expected amount of exophoria at near on CT

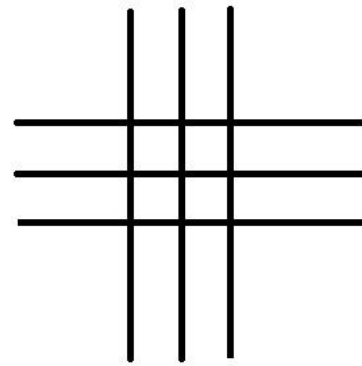
Anything less than +0.50 is considered a LEAD of accommodation

Can measure a few ways: FCC, MEM, Bell

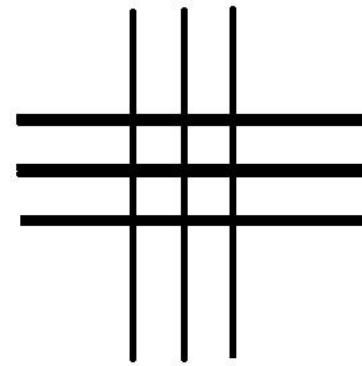


# Measuring Lag of Accommodation: Fused Cross Cylinder Testing

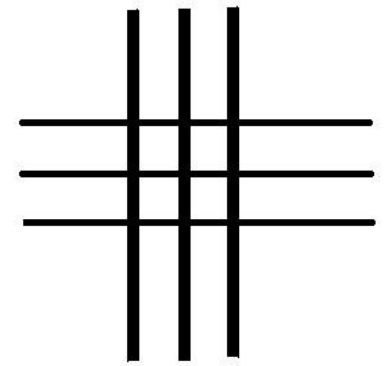
- ▶ Normal Room illumination
- ▶ Phoropter Settings:
  - ▶ Near PD
  - ▶ Set Auxillary Knob to +/- 0.50
  - ▶ Subjective or tentative Rx
  - ▶ Near Grid card set at 40 cm for adults, Harmon's Distance for children
- ▶ Question: "Which lines are bolder/darker? The vertical ('up-and-down'), or horizontal ('side-to-side')?"
- ▶ If horizontal darker, add plus. If vertical is darker, add minus
- ▶ End point is when both sets are equally bold
- ▶ Other atypical responses:
  - ▶ "It keeps changing"
  - ▶ "One set of lines is blue!"



**Stimulus**



**Horizontal Darker  
Add Plus Power**



**Vertical Darker  
Add Minus Power**

# Fusional Vergence Ranges

- ▶ This will show you how much vergence flexibility your patient has if accommodation remains stable.
- ▶ Instructions to the patient are important!
  - ▶ If you only ask about diplopia, you miss out on lots of juicy information!
  - ▶ “Can you see these letters comfortably? Tell me everything that changes as it’s changing”
- ▶ The numbers themselves are not critically important because the goal is not to train them to be as high as possible!
- ▶ Important relationships to note:
  - ▶ Base Out vs Base in
  - ▶ Near vs Distance
  - ▶ Blur vs Break



# Vergences - Step vs Smooth - Pros & Cons

## STEP

- ▶ Less likely to have “blur” reported
- ▶ Periphery remains intact
- ▶ Less intimidating for kids
- ▶ Less set-up (get in, get out!)
- ▶ Less likely to report SILO/SOLI
- ▶ Can observe patient’s eyes



## SMOOTH

- ▶ More likely to get “blur” measurement
- ▶ Periphery is cut off - may get more eso
- ▶ Phoropter can be intimidating for some
- ▶ More set-up required
- ▶ More likely to report SILO/SOLI
- ▶ Patient’s face is hidden



# Phorias

- ▶ “Watch the lower image. When does the top one line up directly above it like buttons on a shirt?”
- ▶ “Now watch the upper image. When do they line up beside each other like headlights on a car?”
- ▶ Recheck your phoria with your tentative add in place





# NRA/PRA (AKA BPA/BMA)

- ▶ I do this over the tentative final Rx
- ▶ This will show you how much flexibility the patient has in their accommodation if vergence remains stable
- ▶ Ideally should be +/-3.00D
- ▶ Be concerned if:
  - ▶ Your patient has a PRA of less than -2.00
  - ▶ There is less than a 4D range between NRA and PRA



# Cycloplegic Refraction

- ▶ Many medical-legal reasons to perform cycloplegia which vary across provinces.
- ▶ What is cycloplegia telling you?
  - ▶ The “true” prescription?
  - ▶ The “most accurate” prescription?
  - ▶ The maximum plus acceptance?
  - ▶ Diagnosis of “latent hyperopia”?
  - ▶ NO!
- ▶ It tells you how much plus is in the eye under cycloplegic conditions
- ▶ We will discuss further in the prescribing section



## Part Three: Diagnosing

# Strabismus: A Review

- ▶ These are vergence deviations on the x- and/or y-axis
- ▶ Normal during first 4-5 months of age
- ▶ Many “flavours”:
  - ▶ May be constant or intermittent
  - ▶ May be unilateral or alternating
  - ▶ May be eso/exo/hyper/hypo
- ▶ Many angles:
  - ▶ Micro-tropias
  - ▶ Mid-angle
  - ▶ Large-angle/”enormo-tropes”
  - ▶ Rule-of-thumb: the larger the angle, the earlier the strabismus developed



# Strabismus

- ▶ Onset
  - ▶ Congenital? Infantile? Juvenile? Acute?
- ▶ Symptoms
  - ▶ Double vision? Pain?

\*\*Any strabismus with onset over the age of 5, occurring with pain, resulting from trauma, presents acutely, and/or with pupil abnormalities requires medical evaluation and clearance before you think of VT\*\*



# Strabismus - Why?!

- ▶ Strabismus and/or amblyopia occur in approximately 5% of the population
  - ▶ “Nature” - genetic pre-disposition
  - ▶ “Nurture” - asymmetries in critical periods of development
- ▶ If a condition persists in a population, it must generally provide a benefit to those who possess it
  - ▶ So what’s the benefit??

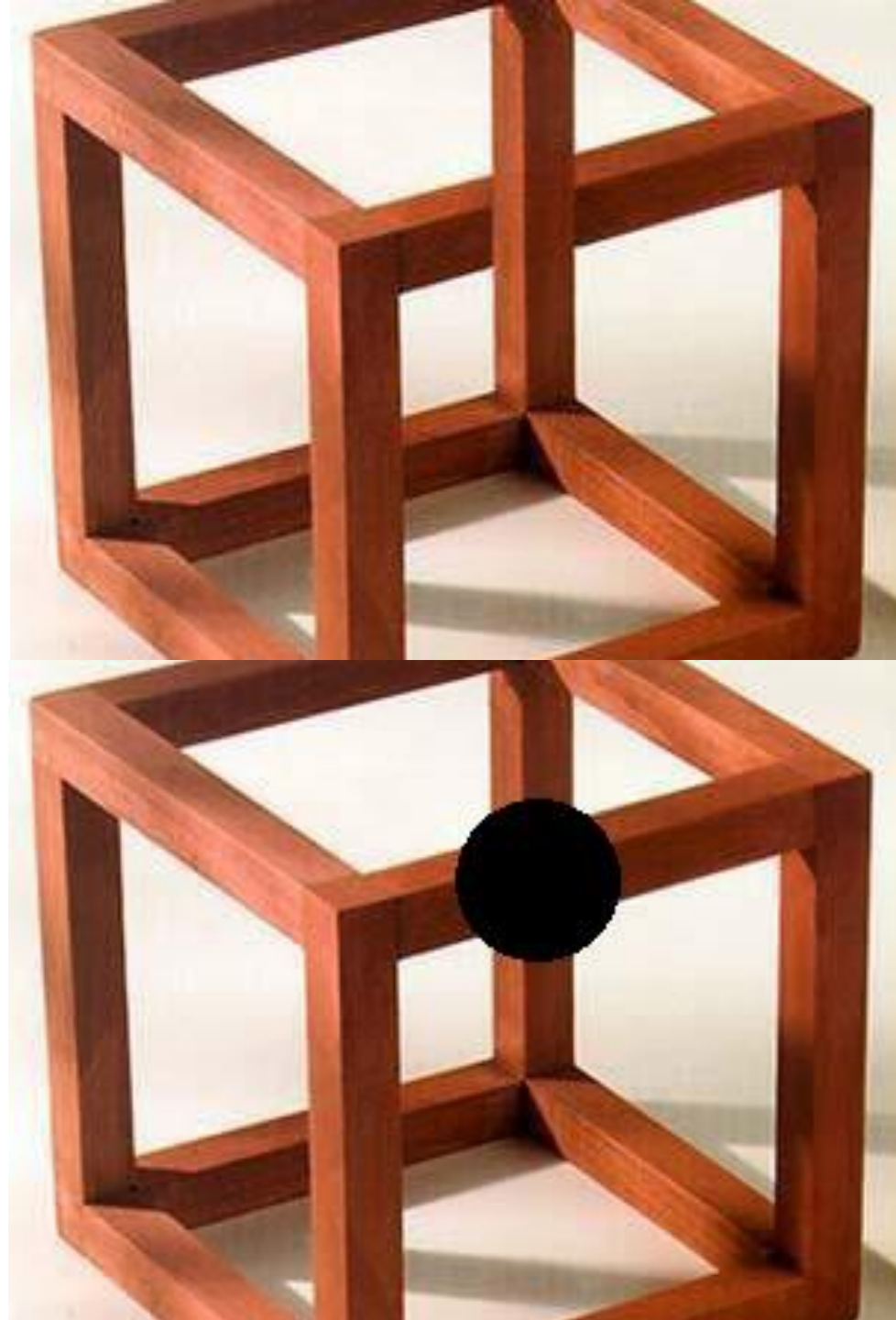
- ▶ If binocularity is poor, there is intermittent sensory conflict between the two channels
- ▶ The desire for conflict-resolution causes the drive for active suppression of one channel
- ▶ When this suppression is repeated often enough, it becomes habitual...but at what cost??

## Strabismus – Why?!



# Benefits of Strabismus

- ▶ If a patient is unable to resolve sensory conflict, active suppression is used
- ▶ This costs a great deal of energy! Too hard to manage for long periods. A long-term solution is needed.
- ▶ Better solution: occlude one tiny area of the field and continue to use the rest!
  
- ▶ **Strabismus is developed to *preserve* binocularity, not destroy it!**



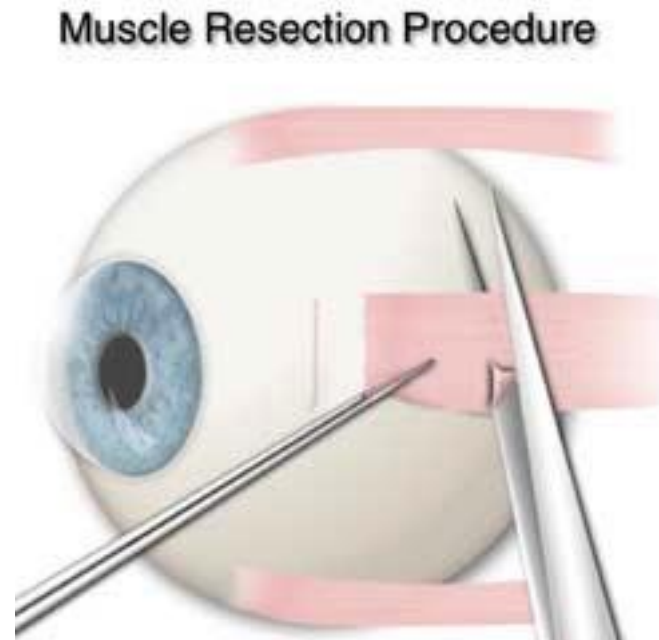


## Anomalous Projection (AP) (Don't be Scared!)

- ▶ No longer referred to as ARC
- ▶ Quick check with Worth-4-Dot + Cover Test
  - ▶ Reports of 4 dots while unilateral CT shows strabismus
- ▶ Old thinking was presence of AP means the patient is not a candidate for VT or surgery - NOT TRUE
- ▶ I think of this as a POSITIVE prognostic indicator
  - ▶ The patient *knows* the diplopia is incorrect and “fixes” it

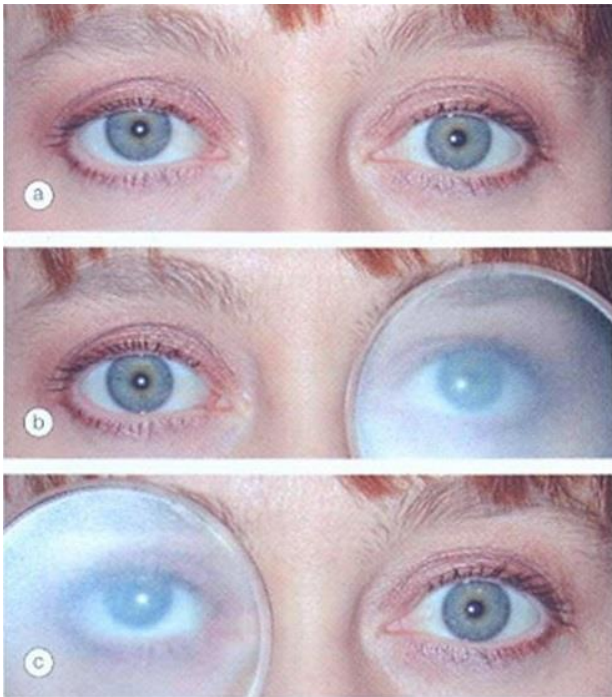
# Strabismus Surgery: What Happens When We Cut?

- ▶ Relieve yourself of the concept that strabismus is an “eye muscle problem”; it is a visual adaptation to binocular confusion.
- ▶ Cutting the muscle for manual re-alignment is a *temporary* correction only; the patient will *re-form* their adaptation.
- ▶ When we cut the muscle, we sever proprioceptive communication between the brain and the eye.\*
- ▶ **77% of strabismus surgeries fail within 3.5 years.\*\***



# Post-Surgical Strabismus: A Special Kind of Crazy

DVD - Double Vertical Dev.



Consecutive Exotropia



Before Surgery

After Surgery



# Amblyopia

- ▶ Diagnosed when a patient has a monocular best-corrected acuity worse than 20/30, *in the absence of pathology*
- ▶ The result of:
  - ▶ Anisometropia (most common)
  - ▶ Strabismus
  - ▶ Deprivation
    - ▶ Cataract
    - ▶ Ptosis
- ▶ Think of this as a z-axis strabismus!



# Case Study: HH, 5 Years Old, Second Opinion

## ▶ History:

- ▶ Born FT, no complications
- ▶ Typical crawl, all milestones on time.
- ▶ Previous eye exam 1 month ago. Was told should patch one eye at a time for 2 hours each and was given glasses which HH won't wear (didn't bring to the appt).
- ▶ HH was seen once previously at our office at age 2 by another OD
  - ▶ “Uncooperative”, but OU VA testing 20/30 with Allen pic.
  - ▶ Static Ret: OD +2.00-1.00x180, OS +2.25-1.00x030

# Case: HH, 5 Years Old, Second Opinion

- ▶ My exam:
  - ▶ UVA OD 20/50, OS 20/40
  - ▶ Cover Test: n/s ortho @D, n/s 6XP @N
  - ▶ Stereo: OD Suppression
  - ▶ W4D: OD Suppression
  - ▶ **Static Ret: OD +2.25-0.50x180 20/30, OS +3.75-0.25x020 20/20**
  - ▶ Ant Seg, Post Seg, Colour Vision, Pupils normal
  
- ▶ Apparent OD Amblyopia without typical amblyogenic factors!
  - ▶ Doesn't pass the "Sniff Test", refer to GP for medical consult.
  - ▶ Mom advised not to patch or wear specs if he's not comfortable in them.
  - ▶ Return to me when cleared by GP.



# Case: HH, 5 Years Old, Second Opinion

- ▶ Returned 5 mo later:
  - ▶ No neuro concerns
  - ▶ GP referred to ENT due to fluid present in right ear w/o infection: failed hearing test.
    - ▶ Chronic right tonsil enlargement had encroached into the right middle ear.
    - ▶ Tonsils removed 6 weeks ago
  - ▶ Diagnosis: Right Amblyaudia
    - ▶ He is 2 weeks into auditory rehabilitation therapy

# Non-Strabismic Binocular Vision Disorders

- ▶ Many different abnormalities have been identified with different diagnostic criteria.
  - ▶ Not every patient will fit every criterion! Don't get stuck on this!
  - ▶ Treat the patient, not the “syndrome”!
- ▶ These include disorders of:
  - ▶ Fixation
  - ▶ Vergence
  - ▶ Accommodation
  - ▶ Any combination of the above



# Fixation - A Basic Visual Skill

- ▶ The ability to choose an “it” and LOOK at “it”!
- ▶ Don’t assume inattention
  - ▶ If constant verbal reinforcement doesn’t help, it’s likely a fixation issue
  - ▶ Watch the eyes!
- ▶ Often mis-labeled as:
  - ▶ Distractible
  - ▶ Bored
  - ▶ Poor listener
  - ▶ Rude

# Vergence Problems

## ▶ Convergence Insufficiency

- ▶ Reduced NPC
- ▶ High exophoria
- ▶ Reduced BO Break
- ▶ Often occurs with accommodative excess

## ▶ Vergence Excesses

- ▶ Convergence Excess
  - ▶ Reduced BI Break
  - ▶ Esophoria OR ORTHO
  - ▶ Often occurs with accommodative insufficiency
- ▶ Divergence Excess
  - ▶ Exophoria larger @D
  - ▶ Often occurs with Intermittent XT
  - ▶ Often results in high myopia

## ▶ Vergence Infacility

- ▶ Diagnosed by vergence flipper facility testing
- ▶ If *more* difficulty with BO, can likely expect some accommodative excess and/or CI
- ▶ If *more* difficulty with BI, can likely expect some accommodative insufficiency and/or CE

\*\*Symptoms of all: HAs, asthenopia, reduced efficiency, blurred vision, near aversion, etc

# Accommodative Problems

## ▶ Accom. Insufficiency

- ▶ Low amplitudes
- ▶ High Lag
- ▶ Difficulty with (-) on facility testing
- ▶ Often occurs with CE

## ▶ Symptoms include:

- ▶ HAs
- ▶ Blur @N (or Distance)
- ▶ Poor attention
- ▶ Poor near endurance
- ▶ Near avoidance

## ▶ Accom. Excesses

- ▶ Low or minus lag
- ▶ Difficulty with (+) on facility testing
- ▶ Often occurs with CI

## ▶ Symptoms include:

- ▶ HAs
- ▶ Blur @D (or near)

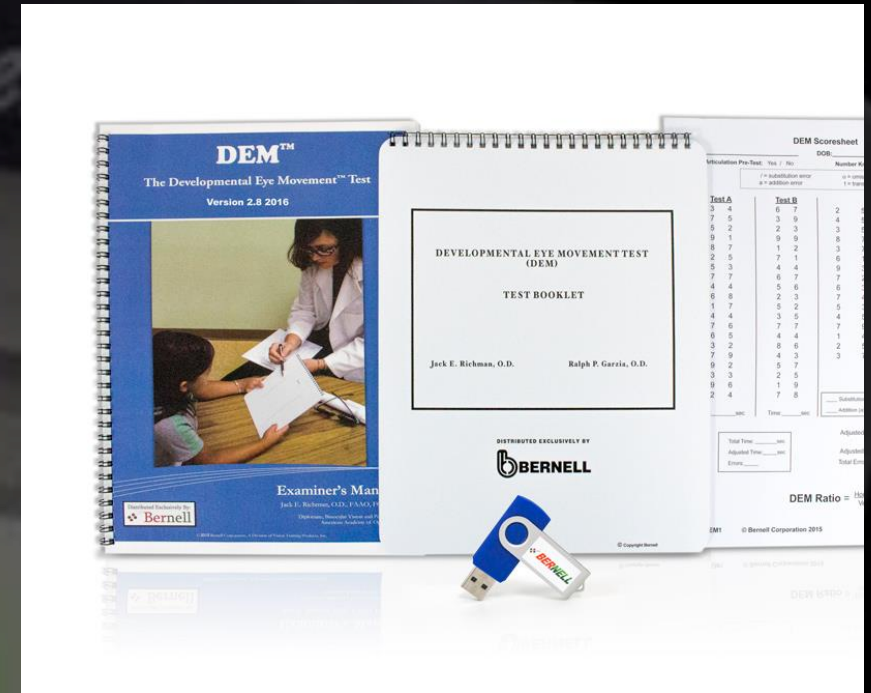
## ▶ Accom. Infacility

- ▶ Diagnosed by +/-2.00D facility testing
- ▶ Slow (+) and (-)

## ▶ Symptoms include:

- ▶ Has
- ▶ Blur @D&N
- ▶ Poor attention
- ▶ Near avoidance
- ▶ Poor near endurance

- ▶ Be suspicious if NSUCO scores are lower than expected for age or the patient is unable to fixate.
- ▶ Need a Developmental Eye Movement Test (DEM), RightEye or Readalyser for formal diagnosis.
- ▶ Refer if you're suspicious to one of your colleagues with one or more of these tests.



# Oculo-Motor Dysfunction (OMD)



## Part Four: Prescribing and Treatment





## **BV Treatment in a Primary Care Setting (Know When to Hold 'Em, Know When to Fold'Em)**

## Poll #4:

- ▶ Which of the following diagnoses do you feel comfortable managing in your office if they were to walk in TODAY?
  - ▶ Convergence Insufficiency
  - ▶ Convergence Excess
  - ▶ Accommodative Insufficiency
  - ▶ Accommodative Spasm
  - ▶ Oculo-Motor Dysfunction
  - ▶ \*Put your fingers in your ears and loudly sing, Twinkle, Twinkle Little Star\*

# “That” Patient

- ▶ “My distance vision is blurry”, said the patient who just finished reading the 20/20 line of letters with ease.
- ▶ Are they faking it? Trying to ruin your day?
- ▶ What are they really telling you? Do the tests!! Betchya this patient needs an ADD!
- ▶ YOU CAN DO THIS ONE!

# What to Prescribe and How to Prescribe it



- ▶ TRIVEX not Polycarb
  - ▶ Still safety-rated without the distortions and blur of poly
- ▶ FLAT TOP not progressive or dynamic
  - ▶ Kids DO NOT KNOW where the add is!
  - ▶ Induced prism
  - ▶ We are trying to teach them to move their eyes, not their head
  - ▶ I DON'T CARE ABOUT COSMESIS HERE
  - ▶ \*\*Split the pupil for Grade 2 and below

# Preferences in Prescribing

Closest to plano

Least amount of cyl

Equal/complementary axes

Equal amounts of cyl

Least amount of anisometropia

Axes sum to 180

# What About the Add Power?

- ▶ Bifocal is better than single vision
- ▶ BIGGER IS NOT BETTER!!
- ▶ Best add to prescribe is the result of Stress Retinoscopy
  - ▶ Near retinoscopy measurement
  - ▶ Requires a SPOT retinoscope
- ▶ Good rule-of-thumb: **prescribe the lag of accommodation measurement as a maximum plus power**
  - ▶ This assumes that the lag is (+)
- ▶ EXAMPLE:
  - ▶ CC: “Blurred vision @D”
    - ▶ Unaided VA: 20/25+2 OU
    - ▶ Subjective Rx -0.25OU
    - ▶ FCC +0.75
    - ▶ Final Rx: pl/ +0.50 OU, recheck 3-4 months
  - ▶ Why??

# Myopia Progression Risk

**WARNING**

- ▶ Esophoria at near on Cover Test
  - ▶ Close habitual working distance noted
  - ▶ Low PRA (ex: -1.00)
  - ▶ “Minus hog”
- 
- ▶ Get an add on this patient!



# Sample Case: 12yo. LEE 1 yr ago. Teacher has noticed squinting @D

- ▶ UVA: 20/25 OD and OS, OU 20/20-2
- ▶ Stereo: 40"
- ▶ Cover Test: Ortho @D, Ortho @N
- ▶ NSUCO Pursuits: 4/3/3 (normal accuracy, some refixations needed, mild-moderate head movement)
- ▶ Ret @D: OD pl-0.25x090 (20/20+2), OS -0.25 sph (20/20+2)
- ▶ Subjective: OD -0.50sph (20/15), OS -0.75 (20/15)
- ▶ Trial Frame: OU -0.25 sph 20/20 OD, OS, OU
- ▶ NRA/PRA (control plano): +2.00/-1.50
- ▶ FCC (control plano): +0.75

# Key findings and Analysis

- ▶ Ortho @N: This patient is becoming eso and has lost the normal exo “buffer”
- ▶ Low PRA and less than 4D between NRA and PRA
- ▶ “Minus hog”
- ▶ Education to parents/patient:
  - ▶ Child has near point strain and it is starting to alter the distance vision. Specs are needed
    - ▶ If distance vision is a concern, do a bifocal
    - ▶ If distance is minimally bothered (“I can sit closer to the board for now”), you can use reading-only specs
  - ▶ Educate on visual hygiene (review CAO guidelines for screen reco’s)
  - ▶ Prescribe either: OU +0.50 reading specs OR OU -0.25/+0.75 Flat-top bifocal, trivex and recheck 3-4 months.
    - ▶ Upon return, if UVA is back to 20/20, can switch to reading only (recheck FCC to ensure Rx is still good) OR can stay in current BF
    - ▶ If UVA is no better, ensure pt has been wearing the specs and be prepared to finger-wag and continue current specs
    - ▶ If UVA is WORSE, refer to a VT colleague or a myopia control colleague

## Principles of Prescribing - Amblyopia







- ▶ PATCHES ARE FOR PIRATES!

It makes little sense to try to develop an integrated use of visual information through the two eyes by depriving one eye of light.

- ▶ This patient needs VISION THERAPY and specialized prescribing



## Important outcomes identified in this “paper”...

Statements from the paper “Patching and Suppression in Amblyopia: One Mechanism or Two?”  [Yiya Chen](#)<sup>1†</sup>,  [Zhifen He](#)<sup>1†</sup>,  [Yu Mao](#)<sup>1\*</sup>,  [Hao Chen](#)<sup>1\*</sup>,  [Jiawei Zhou](#)<sup>1\*</sup> and  Robert F. Hess<sup>£</sup>

**First**, occlusion is only effective in children up to the age of 17, but it is ineffective in adults ([Epelbaum et al., 1993](#)). Binocular training has been shown to be effective in adults ([Hess et al., 2010a, b, 2011](#); [To et al., 2011](#); [Li et al., 2013](#); [Spiegel et al., 2013](#)) and children ([Knox et al., 2012](#); [Li et al., 2014](#); [Birch et al., 2015](#)) with similar effectiveness.

**Second**, a better binocular outcome has been achieved through binocular training than occlusion ([Knox et al., 2012](#)).

**Third**, the treatment duration is of the order of 20–40 h for binocular training and over 120 h for occlusion ([Stewart et al., 2004](#); [Hess et al., 2010b](#)).

**Fourth**, the recurrence rate is high with occlusion [24–27% ([Holmes et al., 2004](#); [Bhola et al., 2006](#))] and low with binocular training ([Birch et al., 2015](#)).

**Fifth**, studies on children using the binocular approach have primarily examined children who failed to improve from occlusion therapy or who reached their best recovery after occlusion therapy ([Knox et al., 2012](#); [Li et al., 2014](#); [Birch et al., 2015](#)).

Yet, the binocular approach has been shown to achieve additional benefit in visual acuity ([Knox et al., 2012](#); [Li et al., 2014](#); [Birch et al., 2015](#)).



## But I Thought I was Supposed to Cyclo, Plus and Patch!

- ▶ What is the value of measuring how much plus is “available” in the system?
- ▶ Example:
  - ▶ UVA: 20/20 OD, 20/80 OS
  - ▶ Static Ret: +0.50 20/20, +3.50 20/40
    - ▶ If you know nothing else about this patient, what do you Rx?
  - ▶ Wet Ret: +1.00 20/20-2, +6.00 20/40-2
    - ▶ What do you Rx now? Add a patch for good measure?
    - ▶ Does anyone ever have the patient back the next day to measure VA with the +6.00?
- ▶ What have you gained by giving the higher plus? Is this natural for the patient? What are the chances those lenses will be rejected? What is it going to be like for the parents to get the child to wear these specs?

# Case: JG, Age 5, First Exam

- ▶ History: No cc, brought because older brother had exam today
  - ▶ Born FT, (-) complications. Passed newborn hearing screen, skipped crawling
- ▶ UVA: OD 20/20, OS 20/80
- ▶ Retinoscopy: OD +0.50 20/20, OS +4.00, 20/70+2
- ▶ Subjective: OD pl 20/20, OS +2.75 20/50+
- ▶ Extra measurement: OD Trial Frame +0.75 20/25, +1.00 20/40+2
- ▶ Stereo: None (OS suppression)
- ▶ Wet Ret: OD +1.00-0.50x120 20/25, OS +4.75-0.50x055 20/60-
  
- ▶ **WHAT DO YOU PRESCRIBE?**

# Poll #5:

► What do you prescribe?

1. The Wet Ret + Patch 2 hrs/day
2. The Dry Ret + Patch 2 hrs/day
3. The Wet Ret and cut by \_\_\_\_\_ (insert your preference here) + Patch 2 hrs/day
4. Refer to Ophthalmology (haha, suckers!)
5. Other





## Final Rx:

- ▶ OD +0.75, OS +2.50, Trivex, FT wear, recheck 3-4 mo
- ▶ Mom and dad educated on amblyopia. Start Vision Therapy.

# Why Trivex?

- ▶ It is just as safe as polycarbonate
- ▶ It offers MUCH better clarity and fewer aberrations than polycarbonate
- ▶ Lighter weight than polycarbonate



Lens comparison viewed through an illuminated polarized lens

# OD +0.75, OS +2.50 - WHY?!

## ▶ Left Eye Analysis

- ▶ Notice the OS acuity on the dry and wet retinoscopy: **both ~20/60!**
- ▶ There is no need to increase the amount of anisometropia or plus power when there is no benefit in acuity
- ▶ +2.75 gave the patient the best acuity possible

## ▶ Right Eye Analysis

- ▶ 20/20 acuity is achieved with anywhere from plano to +0.50
- ▶ +0.75 gives 20/25-
- ▶ +1.00 gives 20/40

## ▶ Giving the patient the lens which provides BCVA with the **lowest** possible power in the amblyopic eye and the lens which provides 20/30-ish acuity in the non-amblyopic eye puts the patient into a position where the brain can begin re-balance

- ▶ The brain can attempt use of the amblyopic eye at distance since the non-amblyopic eye is put into a slightly submissive position
- ▶ The patient is still able to use the non-amblyopic eye for close work (school)
- ▶ **MUCH** less anisometropia for the patient to deal with!

# Same Pt...Went for a 2<sup>nd</sup> Opinion

- ▶ Turned off by the expense of VT and went for 2<sup>nd</sup> opinion at another office
  - ▶ Got Rx: OD +0.25, OS +6.00, Polycarb, FT wear
- ▶ JG wouldn't wear these specs...but he would wear mine!!
- ▶ He returned for f/u 6 mo later (instead of 3). Parents do NOT want VT.
  
- ▶ AVA: OD 20/20-, OS 20/40-
- ▶ New Subjective: OD +1.00 20/25 (+1.25 20/30), OS +2.50 20/40-
  
- ▶ **New Rx: OD +1.00, OS +2.25, FT Trivex, recheck 4 mo**

## JG - End Result

- ▶ 1.5 years later, 4 glasses-changes
- ▶ AVA: OD 20/20, OS 20/20-2 (read slower)
- ▶ Stereo: 50"
- ▶ **Wearing: OU +1.50**
- ▶ Wet Ret: OD +1.75, OS +2.75
  
- ▶ Needs to continue to wear specs FT to prevent re-development of amblyopia
  
- ▶ **This will work as long as the patient is compliant with FULL TIME wear!!**

# What is Done During a Vision Therapy Session?

- ▶ Sessions are performed through *in-office VT*.
- ▶ Sessions are 60 minutes in length and occur weekly
- ▶ At-home activities are prescribed (approximately 15 min, 3-5 times/week)
- ▶ Sessions are done 1-on-1 between the patient and Vision Therapist, but some practices use group therapy sessions
- ▶ Number of sessions is determined by the number and severity of diagnoses
  - ▶ Simple BV issues typically 20 sessions
  - ▶ Strabismus, ABI, Amblyopia can be from 40 weeks, but can go a year or beyond



# Yes, but Does it Really Work?? (1)

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6. Flax N. Management of Divergence Excess Intermittent Exotropia. *Journal of Behavioral Optometry*. 1996; Vol 7(3): 66-73
7. Sherman A. Clinical Management of the Myopic Patient. *Journal of Behavioral Optometry*. 1993; Vol 4(1): 16-22



# Yes, but Does it Really Work?? (2)

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10. Harris H, Gormley L. Changes in Scores on the COVD Quality of Life Assessment Before & After Vision Therapy - A Multi-Office Study. Journal of Behavioral Optometry. 2007: Vol 18(2)43-47
11. Cohen A. The Efficacy of Optometric Vision Therapy. Journal of the American Optometric Association. 1992 Feb. Vol 59(2)95-105
12. <https://www.visiontherapycanada.com/vision-therapy/resources/>

# Poll #6

## ► Today I learned...

1. ... to be more confident in my prescribing for accommodative dysfunctions
2. ... to be more confident in my prescribing for amblyopia
3. ... that I am interested in learning more about providing vision therapy
4. ... that I don't do enough testing and referring of my patients for diagnoses I may have been missing
5. ... that I was right to hate BV and VT. I will keep my fingers in my ears. I was just getting to the second verse of "Twinkle, twinkle little star" and I'm channeling my inner J. Lo!



## Educational Opportunities

- ▶ PVTAP
- ▶ The Art & Science of Optometric Care: a Behavioral Perspective
- ▶ VT101

“The brain and the eye may have a contractual relationship in which the brain has agreed to believe what the eye sees, but in return the eye has agreed to look for what the brain wants”

Daniel Gilbert, “Stumbling on Happiness”

**THANK YOU!**