

Detailed Outline of Concepts in Emergent Intro to Vision Therapy Videos

INTRODUCTION

What is vision therapy?

- Vision therapy is a sequence of neurosensory and neuromuscular activities individually prescribed and monitored by a doctor to develop, rehabilitate, and enhance visual skills and processing
- Conditions (and symptoms) treated by vision therapy include:
 - Binocular vision problems
 - Strabismus
 - Traumatic brain injury
 - Stroke
 - Double vision
 - Blurry vision
 - Words moving on the page
 - Poor eye tracking
- Providing treatment for these, and other, visual dysfunctions can have a profound and meaningful impact on a patient's life.

Visual Development

- Visual Development
- Why Vision Therapy works
- Different models of vision used when addressing vision problems
- Overview of evaluation process, length of therapy, patient populations
- In order to treat the visual system, we need to know how the visual system develops
 - The first (*time, not priority*) role of vision is identification
 - Merleau-Ponty: Vision is the brain's way of touching the world
 - Vision plays a key role in:
 - motor development
 - Ex: visually guided motor movements like picking up a cheerio or crawling towards a toy
 - Communication skills development
 - Ex: Body language
 - Cognitive development
 - Ex: Can see that 1 apple and another apple = 2 apples
 - Vision and motor development are very closely tied.
 - 4:45 "The intimate interdependence of the visual and action systems is nowhere more significantly displayed than in the sequences and trends of childhood development. Not one of the major fields of behavior (motor, speech/language, personal social) is normally devoid of visual content or visual controls. So interfused are the vision and action systems that the

two must be regarded as inseparable. To understand vision we must know the child; to understand the child we must know the nature of vision.” Arnold Gesell *check punctuation*

- Vision is an illusion: *get that quote*
 - Ex: yoked prism demonstration - straight box looks curved
 - Vision is very pervasive - changing their vision can change their world
- Vision is intricate, so of course things can go wrong

Different Models of Vision

- How you understand vision impacts how you identify and treat problems with vision
- Classical Model
 - Concerned with the health of the eyes
 - Typically used by ophthalmology and school screenings
 - Is the eye healthy? Can we get the patient to see 20/20? If not, why not?
 - These are important questions, but unfortunately do not address many areas of potential visual dysfunction
- Functional Model
 - Concerned with more of things we'll treat in VT - CI, loss of visual function, poor eye tracking, eye teaming
 - Uses norms - treat the patient if they fall outside of the norm
 - Goal of treatment is to get the patient into a normal range
- Behavioral Model (aka. Neurodevelopmental, Neurocognitive)
 - Concerned with the individual
 - can they reach their goals? What are their needs?
 - Treat the patient if they don't have the visual ability to accomplish their goals, even if their goal is above or below the norm
 - Ex: brain damage will prevent age-appropriate norms, but needs oculomotor training to be able to use communication device
 - Ex: pro athlete is already above the norm, but still needs help reaching goals
 - Ex: academics require visual ability to be above the norm to study all day
- Functional vs. Behavioral treatment
 - Functional: get the pt to norms can turn into doing therapy to the patient, instead of letting the patient own and direct their treatment
 - Behavioral: Bring the pt's issues to their cognitive awareness so they can identify their needs

Treatment Process

- How the process of VT works at WAVTC
- Initial evaluation: 3 steps
 - Chair exam with doctor: checking mechanics of vision, ~1hr
 - Visual perceptual exam with a trained staff member, ~1hr

- Conference with patient/parent: review the findings (comprehensive report written and distributed), make sure they understand the problem(s)
- Therapy:
 - 1 session a week, 1 hour
 - Home activities 4 days/week, 20mins/day
 - Progress evals with the doctor after every 8 session
 - Duration:
 - Skills case: usually 32 weeks
 - Strabismus: 1-1.5 years
 - TBI: can be 2 or more years
 - Young children: much shorter
- Follow-ups:
 - Continue with home activities 5min/day, 4 days/week for about 2 months
 - Exam with doctor after 2 months
 - Regression: maybe do more home activities,
 - Findings stable: no more home activities for the next 4 months
 - If no regression after 4 months without home activities - we're pretty confident they're stable

MECHANICS OF VISION

Oculomotor

- Fixation
 - Foundational skill
 - Steady gaze looking at a single gaze - just looking at something
 - Model of eye anatomy
 - Light comes into the eye through the pupil and hits the retina
 - Fovea/Macula: only part of the retina that is clear vision
 - Ex: image gets blurry just to the side of what you're looking at
 - The only way to get a clear, stable image to our brain
 - Poor fixation makes it hard to learn and to keep attention on one thing
- Pursuits
 - Following a moving object
 - About 10% of our daily eye movement
- Saccades
 - Eye jump
 - Ex: reading is jumping from word to word
 - Ex: scanning room - jumping from thing to thing
- A problem with fixation, pursuits, or saccades = oculomotor dysfunction
 - ICD 10: pursuit dysfunction, saccadic dysfunction. We use H55.89 other irregular eye movements
- What symptoms to expect from oculomotor dysfunction?
 - Slow, hesitant reading
 - Loss of place while reading

- Skipping small words when reading
- Difficulty copying information, especially from the board
- Poor handwriting, heavy pencil pressure, uneven writing
- Improving OM skills can make a huge difference in someone's life

Accommodation

- The eye's ability to focus
- Model of eye anatomy
 - Intraocular lens focuses to look close and relaxes to look far to keep world clear.
 - Lens gets rigid around age 40, so we reach for reading glasses
- Symptoms of accommodative dysfunction
 - Words blurring
 - Eye strain, fatigue
 - Poor reading comprehension (working so hard to clear words)
 - Headaches
 - Avoidant of near work
- Demonstration of changing focus - brain game cubes, instructions of how to do that yourself
- Subcategories of Accommodative Dysfunction
 - Accommodative insufficiency: insufficient ability to accommodate
 - Accommodative Excess: focusing too much
 - Accommodative infacility: trouble jumping focus from close to far, far to close
 - Accommodative Spasm: focus get stuck up close to the distance is blurry

Basic Binocularity

- Eyes have to be pointing together so we don't see double
- Phys dip demonstration with brain game cubes, instructions how to do yourself
- Something is only single when we have both eyes are pointed at it = binocular fusion
 - This is the reason for having 2 eyes
 - Depth perception comes from here
 - Poor binocularity can lead to poor performance in ball sports because of reduced depth perception
- Subcategories
 - CI
 - Convergence = ability to bring eyes inward to look up close
 - Difficulty with this = CI
 - Most common thing treated in most VT clinics
 - 5-15% of general population has this according to various studies
 - Symptoms of:
 - Headaches
 - Pulling feeling on eyes
 - Eye fatigue

- Double vision at near
- CE
 - Converge too much when looking at near
- DI
 - Divergence = pointing the eyes to look far
 - Eyes don't point far enough
- DE
 - Eyes point too far, one may turn out (see strabismus section)

Phorias and Tropias

- How Binocularity and Accommodation relate to each other
 - Near-point triad:
 - Pupillary constriction: pupil gets when we look up close
 - Accommodation: eye focuses
 - Convergence
 - These 3 work together
 - Video ex of pt focusing on target
 - Watch eye under patch to verify if patient is accommodating
- Strabismus
 - Eye is turned in or out = no binocular fusion
 - Eso = in
 - Exo = out
 - Tropia = turn
 - Brain has to chose to see double, or to suppress one eye
- Phoria
 - Panum's fusional area: Slop in the system - so even if you're not pointed exactly on the target, your brain will perceive it as single if it's within this fusional area
 - Exophoria = eyes postured behind target of regard, CI
 - Esophoria = eyes postured in front of target, CE

Binocular Accommodation, Part 1

- Review of Near-point triad: anytime we accommodate we also converge and have pupillary constriction
 - But for this we're just concerned with binocularity and accommodation
- When you start to working on accommodation it can affect the binocular system
 - May start to work against each other instead of together
 - This may result in suppression (because the eyes aren't working well together)
 - So we have ways to check for suppression in binocular accommodation activities
- Types of suppression checks in binocular activities
 - Phys Dip: (review of phys dip) if the patient is looking at a target through lenses you can use a near target (Finger) to make sure they don't suppress
 - This method relies on the patient's report to you and that they notice phys dip, so not great for young children

- Red/Green: red + green = black
 - red/green bar reader.
 - If you close eye behind red so you're just using green lens, all of the red bars go black. (vice versa for closing green)
 - So if you put that over reading material and pt starts to suppress, every other bar will be black which makes it tough to read
 - R/G charts (Emergent has lots available)
 - Columns, random
 - Sometimes patients get really good at alternating, so the random one is harder for them to predictively switch
 - Eye behind red lens can't see pink letters (all you see is red)
 - Green lens can't see the darker letters because the red around it looks black through green lens.
 - Ex: near-far r/g chart - near/far for accommodation, r/g for suppression
 - Polaroid:
 - Polarized lens means only light from one plane can get through
 - Use with polarized bar reader
 - If pt suppresses, every other bar goes black
 - Is R/G or Polaroid better?
 - R/G issue: red and green focus at 2 diff distances
 - Small discrepancy, so for most patients this is fine, but some people are more sensitive to this
 - But some say this extra bit of challenge is good because we want eyes to work together even if faced with small discrepancies
 - Polarized: no focal discrepancy
 - Problem: must have head perpendicular, so if the patient starts to tilt their head it might take away some of the suppression check
 - Go ask your doctor which one you should use!

Binocular Accommodation, Part 2

- Suppression is a potential problem in binocular accommodation activities
- Other potential problems:
 - Blur - working with accommodation
 - Use the same techniques you've been using: periphery, appropriate localization, maybe return to monocular activities to solidify
 - Eye strain, headaches, eye pain
 - Use grounding techniques

- 10 point-scale *SAID WE TALKED ABOUT IT - WHERE IS THIS? CHECK?*
 - Brief re-explanation of grounding
 - Keep an eye out - bino accommodation activities can be quite straining
 - Diplopia - both eyes on, but still not aligned
 - Near-point triad again
 - Ex with flipper:
 - Minus stimulates accommodation, which then stimulates convergence → too much convergence leads to diplopia, over convergence.
 - Need to relax convergence
 - Plus relaxes accommodation, which then relaxes convergence (divergence) → diplopia
 - May not be described as double
 - With bar reader might report bars floating, squishing, moving
- When do we work on bino accom?
 - After mastery of monocular accommodation
 - Start back at low accommodation load
 - Ex: with flippers was at +/-2.50 monocularly, go back to +/-0.25 when start bino
 - When you start working on bino accommodation, the binocular activity probably isn't fine tuned yet either. So if you start to encounter issues, go back to bino activities and then come back to bino accom

Intro to Strabismus and Amblyopia, Part 1

- Orthophoria = eyes pointed right at the object
- Hypertropia = eyes misaligned, one turned upward
- Hypotropia = eyes misaligned, one turned downward
- Hyperphoria = eyes postured so one points above the other
- Hypophoria = eyes postured so one points below the other
- Consequence of misalignment of the eyes
 - Amblyopia
 - Leading cause of vision loss in children
 - Childhood development: 4-6 months eyes start to work together, build binocularity, leads to depth perception
 - With strabismus, brain usually suppresses eye to avoid double vision
 - If an eye isn't being used, it isn't being developed which results in a reduction in acuity
 - Amblyopia = underdevelopment of the eye
 - Treatment options
 - Patch the developed eye
 - But when not patched, the patient returns to suppression
 - Surgery to realign eye

- Hoping the eyes will learn how to work together
- Underlying problem: the eyes don't know how to work together.
- Therapy teaches the two eyes to work together, which increases the chance of a long-term solution
 - If you develop depth perception, the brain has a reason to use the two eyes together and to develop the amblyopic eye
- Reasons for amblyopia
 - Strabismic: like we just talked about
 - Anisometropia: difference of prescription between the two eyes.
 - Brain picks the eye that is more clear and ignores the one that is more blurry
 - Typically not as severe as strabismic amblyopia
 - Deprivation: worst kind
 - The eye isn't getting input (cataract, ptosis)
 - Poor prognosis

Intro to Strabismus and Amblyopia, Part 2

- Classical Amblyopia definition: decrease in acuity of 2 lines, with no disease
 - Problem: diagnosis of exclusion
- New amblyopia definition (Ken Cuiffreda): Functional amblyopia is a unilateral or infrequently bilateral condition in which the best corrected VA is poorer than 20/20 in the absence of any obvious structural or pathologic anomalies, but with one or more of the following conditions occurring before the age of 6: significant anisometropia; constant, unilateral esotropia or exotropia; significant isoametropia [signif rx in each eye] bilateral uncorrected refractive error; significant unilateral or bilateral astigmatism; image degradation.
 - Note: pt sees anything worse than 20/20
 - No disease, AND an amblyogenic factor
 - If you don't see the reason it developed, keep looking
- Research associated with amblyopia
 - PEDIG group: 25% of pts who made gains with patching lost those gains within a year
 - Fitzgerald and Crumholt at SUNY College: *check spelling of names*
 - Optical correction: 50% maintain VA gains
 - Optical correction, occlusion: 60% maintained VA gains
 - Optical correction, occlusion, VT: 100% maintained VA gains
 - These gains matched improvements in depth perception (Stereoacuity)
 - The best retention of gains happened with patients age 10-14 years
 - Hubbel and Weisel: created deprivation amblyopia by suturing an eye in kittens - when kittens were past a certain age they didn't develop amblyopia because their vision had already developed

- This is where the idea of critical periods for amblyopia treatment originated
 - Did not look at improving acuity
 - Vision and other learning can still happen later in life, may take longer but it is possible - this includes acuity and depth perception

VISUAL PROCESSING

Types of Visual Processing, Part 1

- Optical illusion example: figure ground, cow black and white splotchy picture
 - Seeing the cow is about what your brain is doing, not where your eyes are pointed
- Top-Down processing: brain telling the eyes what to see
 - Need tools to process our complex visual world
- Bottom-up processing: eyes giving information to the brain
- Testing for visual perceptual perception
 - Beery VMI: draw different shapes
 - TVPS: identify different shapes
- Why are Visual perceptual skills important in the classroom? Reading and math are interpreting small shapes quickly and accurately
- Symptoms of visual perceptual dysfunctions:
 - Letter reversals
 - Confusing similar words/letters
 - Poor ability to recognize a word when it appears on a different page
- Letter reversals:
 - Form constancy example with phone: any way this phone is presented, it's still a phone
 - But, the letters b, d, p, q are only differentiated by their orientation so form constancy doesn't apply
 - This is a new thing to learn for kids, which is why letter reversals are so common
 - If there's also eye tracking or other visual issues, it can be harder to learn this and letter reversals can persist for longer
- Visual processing dysfunction vs. dyslexia: *says we'll get more into this later - when is that?*
 - Dyslexia: phonemic awareness, ability to form words from individual sounds, split words up into individual sounds
 - Letter reversals are a problem with laterality and directionality: things have sides to them

Types of Visual Processing, Part 2

- Visual Discrimination: the ability to differentiate similar things
 - Ex: lowercase a and o

- Important in reading
- Spot the Difference activities work on this
- Symptoms of poor visual discrimination:
 - Problems reading
 - Difficulty correcting school work
- Spatial relations: the ability to perceive the relationship of an objects position in space; the ability to recognize that one form, or part of a form, is turned in a different direction
 - In phone example, need to know that the front is different than the back presentation, even though they're both phones
- Form constancy: ability to recognize and label objects even when they are viewed from a different angle or in a different environment
 - Phone example again - has the same name in every context.
- Figure ground: ability to pick out an object within a busy background
 - Ex: highlights magazine
 - Important when trying to read
- Form closure: ability to take partial information and turn it into a full image
 - Ex: know what the dot to dot will be before you connect the lines
 - Can you make logical conclusions with partial information

Visual Memory

- Impacts a lot of areas of our life
 - Academic success relies on remembering what we've seen
 - Ex: remember where the info was located on a page
 - Ex: spelling phonetically won't be successful, so you spell it a few ways and see which one looks right - use visual memory
- Related to visualization: see a movie in your head when reading.
- Visual Sequential Memory: remembering pictures in sequence
 - Ex: that spelling example again
 - Ex: remember things in order on your to do list
- Visual Motor memory: when you write, you're using vision to guide your motor system
 - Drawing something you remember seeing is different than just identifying it

Different Pathways of Vision: Magno and Parvo

- Magnocellular Pathway
 - Nerve fibers coming from peripheral retina
 - Types of info processed here: where things are
 - Important to balance and where we are in relation to other things
- Parvocellular pathway
 - Central vision
 - Types of info processed here: "what" information
- When reading we need both: what word is it, where the book is

- Often we overemphasize what the word is and lose where the book is - which can lead to dissonance between where our eyes point and accommodate to, and where the book actually is - this causes symptoms of visual strain
- “Open your periphery” = pay attention to periphery because it helps your eyes go to the right spot
- Often need to stimulate the magnocellular pathway
 - Panacea of VT: often helps pts increase success
 - Open periphery
 - Include motion: shake the target
 - Blur the target:
 - On projector
 - Have patient wear plus lenses (ex: +10.00)
 - Magno encourages binocularity
 - Having a target to identify (like a letter) in a binocular activity can make it harder to get fusion, especially for a patient with strabismus

SILO/SOLI/Parallax

- SOLI = smaller out, larger in
 - Becomes instinctive, brain makes the adjustment to perceive space and size
 - Cars look funny in plane example
 - What we experience in normal world
- SILO = smaller in, larger out
 - Used in therapy:
 - Lenses: minus lens creates image that is closer and smaller
 - Vectograms
 - How to use virtual situation to our advantage: need a new environment where learning can happen, then can be transferred to real life
 - Gives therapist info about if patient is using visual observations or logical deductions of what “should” happen
 - SILO = vision
 - SOLI = logic
 - As patient becomes more aware of these changes, ability to recognize changes and depth perception in real world increases
- Parallax:
 - Monocular finger example: look at distant object and move side to side,
 - Looking at finger - distant object moves with you
 - Looking at distant object - finger moves opposite direction
 - Making pt more aware where things are

Lenses and Prisms

- Plus Lens: thick in middle, thin on edges
 - Makes image bigger

- Changes focal point - real image is being formed
- SILO - gets further away
- Minus lens: thin in middle, thick on edges
 - Makes image smaller
 - Makes image closer - SILO, even if the patient thinks it got further
- Prisms: image moves away from base, towards apex
 - Apex
 - Base: orientation communicated by where the base is.
 - Base in = towards the nose
 - Base out = away from the nose
- Unit of measurement: diopter for lens, prism diopter for prisms
- Lenses used to correct far- and near-sightedness
 - +1.00 = not much far-sightedness, +3.00 = moderate, +6.00 = high
 - -1.00 = small, -6.00 significant
- Prism diopters used to measure strabismus
 - How much do we have to move the image to get it to where the eye is?
 - Ex: 20^Δ exotropia - takes 20 prism diopters to move the image to where that eye is

OCULOMOTOR ACTIVITIES

CP Saccades

- Central Peripheral, not saccadic activity
- Purpose: help pt understand difference between central and peripheral vision, and to help them open up their periphery
- James' introduction
- Equipment: mainframe, patch
- Set-up:
 - Central fixation point at patient's nose-level
 - Peripheral targets (numbers, letters, shapes) spread around target
- Procedure:
 - Establish feeling of noticing periphery:
 - pt looks at central target, asked to notice what is around the target
 - Make sure patient can keep eye on the central target and it isn't jumping to other targets
 - Look hard - what does it do to peripheral targets?
 - "Made it harder to see"
 - Look soft, open periphery - what does it do to peripheral targets?
 - Localize target
 - Pt touches temple, then touches peripheral target
 - Is your finger touching the target? May need to look at it, but also hopefully can get to the point where they can tell using periphery

- Strategy: encourage pt to open periphery, snap around patient (auditory stimulation)
- Pt touches central target, then moves finger (“drive the car to”) peripheral target

Eye Stretches

- Purpose: mainly to work on fixation
 - Also to work with a patient with strabismus in the field where their eye doesn't normally look
- Equipment: patch, patient's fingers (hands together, pointer fingers up)
- Procedure
 - Patient wiggles fingers
 - Tactile feedback - like how vision develops
 - Bilateral integration
 - Patient moves hands up, down, left, right while fixating on fingers until they feel a bit of a pull
 - Therapist - watch to make sure their eye is on the fingers
 - Poor fixation demonstration
 - Fixation Loss demonstration
 - Maybe attention, maybe pursuits haven't developed well.
 - Beware that the patient does not go too far where pull is painful

Hart Chart Fixations

- Foundational OM activity
- Named after Dr. Hart
- Purpose: saccades, how well the patient tracks.
 - Important to give feedback about how they're doing
- Equipment: chart, patch
- Set-up:
 - Pt stands 4-6ft away from chart - make sure that the letters are clear
- Activity: (*video shows a few examples of pt reading, with advice to therapists, and then loading*)
 - Pt reads left to right (no metronome)
 - Good coordination needs right place at right time - so we use a metronome (we usually start at 60bpm): pt says each letter right on the beat
 - Therapist:
 - Ask the patient to self-assess before you assess them. How do you think you did?
 - Watch for head movement - encourage pt to keep head still
 - Make sure your patient understands what you've asked them to do
 - When you add a load you can have them repeat the part they already did to give them a little confidence

- If pt loses place, ask them where they think they were and have them find their place again.
 - How confident? Does pt know their letters?
 - Does the patient have a cadence?
 - Watch eye to see how well it makes saccade from letter to letter - do they under- or overshoot?
- 80/20 Rule: 80% success, 20% struggle
 - It patient is doing better than 80%, activity needs to be loaded.
- Load options:
 - Speed up metronome
 - It's ok to miss a beat, just come back in when you feel the rhythm again
 - Read outside-in
 - Read columns (outside-in version by columns)
 - Read obliques

Four Charts

- Purpose: Similar to Hart Chart, but with more challenge and more opportunity to vary the types of saccades required
 - We make tiny eye movements in reading, but our lives require many different sizes of saccades
- Equipment: 4 charts (5x5 in video)
- Set-up: patch, 4 charts placed evenly from each other. Pt 4-6ft away from charts
- Procedure:
 - Pt reads 1st letter of each chart, then 2nd letter of each chart, etc. to the beat of a metronome
 - Therapist:
 - Make sure pt understands
 - Give opportunity for self-assessment
 - Watch the patient's eyes - any over- or under-shooting?
 - How is the patient's posture? Relaxed? Tense?
 - Loading Options
 - Increase speed of metronome
 - Move charts closer together/further apart
 - Stagger charts (offset, no longer set in square)
 - Tilt charts (no longer parallel to floor)
 - Clap on vowels - cognitive load that requires recognition and determination of action
 - Letter substitutions: say word instead of letter each time it appears
 - Ex: p= pizza, m = mom

Pegboard Rotator

- Purpose:
 - Om is all about being at the right place at the right time - starts to work on localization.
 - Know where eye is pointing and have motor component
 - Motor reinforces what visual system is doing, vision reinforces to motor system
- Equipment: patch, pegs, pegboard
- Set-up: pt stands arms length away from pegboard
- Procedure:
 - Pt holds peg to their temple, moves peg halfway to the hole to see in peripheral vision, back to temple, then all the way to the hole
 - Repeat with a number of pegs, switch eyes and repeat with that eye
 - You can have the patient use either hand with either eye
 - After pegs have been inserted, start rotating board
 - Pursuits
 - Localization of moving target
 - Pts holds finger right above the peg (peg you chose or patient chose) for a whole rotation, then removes peg in a smooth motion that does not disrupt rotator
 - Makes lots of saccades while looking for the next peg
 - Therapist:
 - If the patient misses or hits the plastic, have them do hole again.
 - Suggest opening periphery
 - Make sure patient doesn't stop as they insert the peg
 - Watch to see if patient's finger is above the peg
 - Make sure you're giving them tools to be more successful - it's not the activity that works, it's what we do with it
 - It may take weeks to go through different levels/steps
 - Load/unload according to 80/20 rule
 - You can move around to see the patient's eye better
 - Loading option:
 - Pegs with letters - give word for letter, remove in alphabetical order
 - Pegs of different colors - remove in a specific pattern
 - Rotator moving as patient inserts peg
 - Balance load - only if doing binocularly!

Maples Double Pursuits

- Purpose: pursuits, peripheral distraction and maintaining fixation during
- Equipment: patch, 2 targets (must be different)
- Procedure
 - Patient follows one target while it moved (therapist is moving it)
 - Therapist introduces second target as distraction and instructs patient to switch at certain intervals

- Therapist:
 - Can move the targets in any direction - up, down, sides, closer, farther
 - Watch to make sure the patient is following

ACCOMMODATION ACTIVITIES

Look Hard/Look Soft

- Purpose: patient introduced to feeling tone of accommodation
- Equipment: busy target to look at (like hart chart), patch
- Set-up: patient is about 6 inches away
- Procedure:
 - Patient focuses on target in the middle of chart, looking hard (like laser beams)
 - People often respond that target looks darker, or peripheral targets look blurry
 - Patient then looks in opposite way - really softly and relaxed
 - Done in the first few weeks of working on accommodation

Bullseye

- Introductory activity to accommodation
- Foundational activity to understanding accommodation for both therapist and patient
- Purpose: patient gets feedback of what their accommodation is doing, deeper level than look hard/look soft
- Equipment: patch, bullseye target, far target
- Set-up: patient holds bullseye card, lined up so that they can look through it to the far target (clock)
- Procedure
 - Patient looks through the bullseye at the clock and then at the bullseye card - noticing (or being prompted to notice) how each target looks when it is the target of regard and when it is not the target of regard
 - Therapist:
 - Watch the eye under the path (emergent translucent patch) to look for reflexive convergence
 - Is patient switching near to far? How accurately? How quickly?
 - Switching between targets is working on accommodative facility
 - Patients who have difficulty stimulating accommodation often naturally hold the target farther away
 - Holding it closer (6-8in from eye) makes the blur/clarity much more obvious
 - After patient has switched between and noticed blur, ask for feeling tone
 - Do you have to change something when you switch targets? How does that feel?
 - Is one distance more work than the other?

- Educate patient about accommodation - lens can only focus one distance away at a time, in this activity you're choosing the distance.
 - Bring it to their cognitive awareness
 - Remember that
- How to work on areas of difficulty - insufficiency, infacility, excess
 - Acc Insufficiency:
 - have the patient start with the bullseye at a distance that is comfortable and clear.
 - Bring closer to you until it starts to be any less clear or any more work
 - This is where their accommodative insufficiency kicks in in daily life
 - Strategies to make it more clear and/or less work:
 - "Zooming in" - or whatever feeling tone they identify as looking at the bullseye
 - "Zooming out" - or distance feeling tone
 - Touch target (use tactile feedback)
 - Notice peripheral targets
 - Look for detail in bullseye
 - Notice space between self and bullseye, behind bullseye
 - Acc Infacility - *NOT ADDRESSED*
 - Acc excess - *NOT ADDRESSED*
- Levels:
 - Have the patient look at a very far target to make sure outer ring is blurred also - fully relaxed
 - Voluntary control: with blank wall as background (no far target)
 - Make the bullseye clear, blurry, repeat
 - Strategies to get bullseye totally blurred:
 - Pretend like you're looking through (like before)
 - Use feeling tone established earlier
 - Therapist:
 - Keeping working until gets totally blurry
 - Make sure they practice stimulating and relaxing - closer to real life situations of relaxing accommodation after having stimulated it
 - Voluntary control: put a dot on the whiteboard/wall
 - Not much parvocellular stimulation here (remember, vision wants to lock onto the thing we're identifying)
 - Dot provides more feedback, get it blurry too
 - Make bullseye clear, blurry, repeat
 - Voluntary control: letter/word on the whiteboard
 - Lots of parvocellular
- Easy to manipulate, so it's a nice activity to start accommodation with

Lens Sorting

- Purpose:
 - further develop feeling of accommodation
 - Just Noticeable Difference
- Equipment: trial lenses (6-8 between +2.25 and -3.00) with number covered up (sticky tack), patch, near detailed target
- Set-up:
- Procedure:
 - Before you start, make sure the patient can identify the difference between plus and minus lenses - place a flipper in front of eye, taking on and off to let the patient notice a change. Patient should be able to identify size changes
 - Patient then sorts lenses into bigger and smaller piles
 - Therapist: don't have to worry about distance from eye here as much
 - Patient then sorts in order of strength
 - Therapist:
 - make sure to tell your patient to compare lenses at the same distance from eye to be accurate
 - If patient has difficulty keeping track of order, you can do the ordering for them
 - When all sorted, remove sticky tack
 - To work on JND:
 - Big differences are easier, can move to lenses closer together for more challenge
 - Therapist: starting with 0.75 diopter differences can be a nice place to start, adjust load from there.

Monocular Near-Far Hart Chart

- Equipment: patch, small chart (emergent), normal chart
- Set-up: pt stands about 6 ft away from the normal chart, holds small chart, lines up the charts (small one below, or superimposed upon, normal chart)
- Procedure:
 - Patient reads chart, switching charts after each line
 - Loading options:
 - Any loading from the hart chart (see video)
 - Increase distance from normal chart
 - Decrease distance from eye to small chart
 - Bring to blur point, then back up a little.

Split Pupil Rock

- Purpose: foundational to SILO with lenses
- Equipment: patch, lens (lens blank, -6.00), target (marsden ball)
- Set-up:

- Procedure:
 - Therapist: watch the eye under the patch
 - Patient looks through lens at target, removes lens - prompted to look for changes
 - Often see size change right away
 - Can wiggle lens, move farther/closer (tromboning)
 - Patient prompted to notice feeling tone of looking not through lens, through lens
 - “Split” = holding the lens so pt can see part of big and small at same time
 - In split presentation, patient prompted to note blur/clarity of targets
 - Relate to clear/blurry in bullseye (different distances)
 - What makes it clear/blurry? - make sure they know they have control over that, if not, stick at this level until they have an internal sense of control
 - If the patient has an internal sense of control - what are you doing? What does it feel like to switch?
 - Patient prompted about location of small ball (in front, next to, behind)
 - Things to help localization:
 - Movement (wiggling, trombone, sweep)
 - Periphery
 - After pt sees SILO, ask for specific localization
 - Techniques to localize
 - Patient points, but make sure to keep finger out of lens image
 - Therapist moves hand according to patient guidance
 - “Spear-fishing” - this can also help establish SILO
 - Therapist:
 - If patient reports ball got farther through lens, don’t ask about location for a while so they don’t solidify SOLI
 - Let patient pick language to differentiate real target and lens target (chose “big” and “small” in video)
 - To establish that there are differences between lens and non-lens images
 - Blur vs. clarity
 - Feeling tone
 - What is moving vs. not moving when you shake the lens or your head
 - Sweep lens across target
 - This can help set the patient up for success in localization, so you can also backup to this step
 - Asking questions with options (in front, next to, behind) can help pt know what you’re asking them to look for
 - Can just “play with lenses” for a while (even a few weeks) - delaying the time until ask about localization can help
- Under age 7 kids are still in a concrete phase and may not be able to describe or understand a virtual situation

Monocular Accommodative Rock

- Purpose:
 - Sometimes used as calisthenics - just ramp up power, inactive
 - Make sure you're being actively involved in pt's therapy
 - Understanding of accommodation is what allows them to increase power, not strength building in muscle
 - Primarily working on accommodation, but also getting some eye tracking
 - Good reinforcement activity
- Equipment: gives patient feedback of what is happening with their accommodation
- Set-up: reading material on slant board, at harmon distance
 - Patient has already been introduced to lenses
- Procedure
 - Patient reads through flipper, flipping sides after a sentence
 - What flipper? Can do a few probes until you find a flipper that's a little bit challenging
 - Review how to clear if necessary
 - By now the patient should have strategies for clearing, so use those
 - Usually do for a few minutes on each eye, often learning has happened by that time
- Working distance and slant board:
 - Getting closer to the reading material (closer than elbow distance) drastically increases accommodative demand, can increase strain
 - Slant board:
 - Can improve posture and distance
 - Harder to move the whole board than a book once you've set the right distance
- Mimics context in which patients usually struggle with blur, symptoms - good way to solidify skills learned

Wachs Mental Minus

- Purpose: pt gains full control over accommodation system
- Equipment: patch, lens blanks (big power is usually easier, -6.00), detailed near target (small hart chart)
- Procedure
 - Lots of levels, beginning looks similar to what they've done with lenses already
 - Step 1: explore lenses again, see SILO and localize
 - Varying amount of time
 - Step 2: make target clear with and without lens
 - Prompt pt to notice what they're changing
 - If it's not comfortable, use same strategies
 - Localize
 - Look soft

- Open periphery
 - Maybe change targets to something less parvo
 - Change to a less powerful lens
- Step 3: keep lens on, make the chart clear and blurry at will
 - Like harder levels of bullseye
 - Can also prompt to make the target different levels of blurry.
- Step 4: Keep accommodation at plane of chart when lens is put on (not changing accommodation, chart will be blurry)
 - Difficult because it's hard to resist the stimulus to clear up a blurry series of letters
- Step 5: Clear chart with lens on, remove lens but keep accommodation at the same place (chart will be blurry)
 - Can prompt patient to imagine a target (maybe transparent plastic) where they have to focus/localized the lens image
 - Therapist: make sure the patient is seeing blur from over-stimulating accommodation, not relaxing it. Watch the eye under the patch
 - Bring lens in to check that accommodation is at the right place - should be already clear there
- Step 6: stimulate accommodation to prep for lens, put lens on and it's already clear
 - Voluntarily stimulate accommodation to the place where they have to have accommodation to clear the lens
 - This is why it's important to localize and to do this activity with a patient who has a high level of discrimination and is honest
 - Could also do with lenses of lower power - the less power = more challenge
- Step 7: done binocularly, with suppression check
- Therapist:
 - Watch the eye under the patch
 - Ask the patient how they're doing the different steps

Near-Far Bi-ocular Hart Chart

- Similar to monocular near-far hart chart
- Equipment: near and far red/green charts, red/green glasses
- Set up: large chart about 6ft away from patient; see monocular near-far hart chart if you have questions
- Procedure:
 - Patient reads one line at near, then one line on the far chart
 - Switching both accommodation and binocularity from near to far
 - Things to be aware of:
 - Suppression:
 - Tap temples
 - Blink

- Snap near ear
- Balance, bilateral integration (marching in place)
- Open periphery
- Diplopia:
 - Open periphery
 - Bilateral integration
 - Touch far target and then back up again
- Same techniques can help both suppression and diplopia because both of these issues stem from poor binocularity and these techniques are aimed at helping eyes work together
- Blur: use the same techniques.
 - Blur is an issue of localization as well, and things that help improve binocular localization also help improve accommodation localization

Bi-ocular Near Point Accommodative Rock

- We call this “Flipper reading”
- Purpose for Bi-ocular n/f hart chart: to practice jumping focus near to far
 - Like copying from the board, or looking speedometer to road sign
- Purpose:
 - We normally use lenses to jump accommodation.
 - However, it’s trickier with this activity.
 - Remember that the binocular system is pointed at the target to read. But the plus lens requires accommodation to be out further, minus requires accommodation to be closer.
 - This created an accommodative plane that is different than the binocular plane
 - This demands flexibility between where binocularity and accommodation are postured.
 - Purpose: build flexibility between binocular and accommodation systems so that the patient can place those systems wherever they need to be to get a clear and single image.
- Setup:
 - place bar reader (r/g or polaroid) over text with the stripes placed vertically
 - If horizontally, you might not recognize suppression until they’ve already read a few lines
 - With polaroid, make sure the patient isn’t tilting head too much
 - With r/g - if the patient struggles a lot with suppression, maybe consider switching to polaroid
 - Patient wears corresponding glasses
 - Magnet is optional, but can help make sure your patient is looking through the lens and not holding it in the wrong place
- Procedure:

- Patient reads one sentence through one side of flipper, flips to other side and reads another sentence, repeat
- Solve blur, suppression, diplopia as we've already discussed.

BINOCULAR ACTIVITIES

Marsden Ball Part 1

- Can be used in many ways
- Great when starting to work on binocularity
- Sue Barry
 - Journey towards stereo
 - How she describes stereo
- Purpose: Begin work on binocularity, the world has space and depth
- Equipment: Emergent marsden ball (with pull-proof tab)
- Set-up: make sure the ball won't hit the patient, but does come very close to their face, therapist stands opposite of patient
- Procedure:
 - Patient watches ball swing towards and away - prompted about feeling tone
 - May flinch or move on the first few swings - remind them it's safe
 - Feeling tone is important because patient needs to know how it feels to converge/diverge in order to do it later in therapy
 - How to help pt feel space: Is there anything between you and the ball?
 - Imagine a balloon that touches the ball on one end and you on the other - what happens to the balloon when the ball swings?
 - smaller/larger
 - Air inside the balloon, occupying the space
 - Great time to talk about periphery. Also encourage to be aware of space on the side, too
 - Periphery is to sides, top, bottom, Z-axis

Pointer and Straw

- Similar to pegboard rotator
- Purpose: localize along the Z axis
- Equipment: Emergent straw and pointer
 - Different sized hole
 - You won't get stabbed when the patient misses
 - Optional: r/g glasses and r/g targets drawn on hole card
- Set-up: Therapist holds straw card, patient has pointer and is within arms reach
- Procedure
 - Pt guides pointer into the hole
 - Start large, go to smaller for load

- Strategy to improve accuracy: notice periphery
- Move card to various positions, including closer/farther
- Have patient switch hands
- Can also have them countdown to prepare themselves for movement

Brock String Part 1

- Classic VT activity, created by Dr. Brock
- Elegant in its simplicity
- Purpose: gives pt feedback on what their eyes are doing binocularly, and gives opportunity for us to help patient get eyes to work better together
- Equipment:
 - Classic version: white string, different colored beads
 - One bead size
 - Emergent:
 - Attaches to a magnet
 - Bead size options
 - White beads - so can get lustre on bead with r/g
 - Flat bead - make sure it's crossing right at the point of the bead
- Set-up: string attached to something, patient holds string to their nose with string taught
- Procedure:
 - Patient looks at bead: ask how many beads and strings they see
 - Each eye is seeing a string - they come into the bead and go out of the bead
 - Video example of what patient (should) see when looking at close, middle, far bead
 - Normal patient - strings will be pointing right where they're looking
 - Patient might not be seeing that
 - patient with CI typically points eyes behind bead
 - Tell them to look at bead, but strings cross behind bead
 - Allows patient to see where their eyes are really pointed
 - Discrepancy between where they think the bead is and where eyes are actually pointed is the cause of symptoms
 - goal= put physical and visual reality together so that visual system represents where things are in space
 - Patients with esophoria or convergence excess sees strings cross in front of the bead even though they think they're looking at the bead.
 - What if the patient doesn't have 2 strings?
 - One string may be ghostly, come in and out, look like an Y instead of X, or be totally gone
 - How to resolve:
 - Touch or rub string - proprioception
 - Motion (touching string usually makes it move)
 - Tap temple

- Then pull away and try to keep string real
 - Switch hands
- Trigger auditory system (snap)
- Balance
 - For most patients this makes it harder, but for some the increase of bilateral integration helps
 - March in place
 - Patient rocks back and forth
 - Balance board
- Use r/g: one red and one green string
 - On emergent you can get lustre on white beads
- Look at different distances (move bead)
- Make sure their posture is good (not blocking an eye)
- Slowly move head
- What if strings are crossing behind the bead (like CI)?
 - Educate patient that their eyes are pointing in the wrong spot and that we're going to work to fix it
 - Remember to talk to the patient about the importance of the activity and how it applies to everyday life
 - Ask patients what their goals are at the beginning of therapy, and relate activities to their goals. This helps the patient be active and engaged in their therapy
 - How to get strings on bead:
 - Periphery - different amounts will be helpful to different patients
- Even if strings are on bead, patient may reach in the wrong spot - motor and vision are not in agreement
 - So work on quickly tapping bead, move bead to new spot, repeat

Brock String Part 2

- Look at your patient - do they have good posture
 - Want them to have alignment in body and eyes
 - Vertical strabismus: patient may naturally tilt, you may want to allow them to do that initially
- Next level: bead jumps
 - Check in with the patient - where are strings crossing?
 - Quickly move X from one bead to another and tell me the moment it gets there
 - May be delayed
 - Can have them use a long pointer or dowel to touch far beads.
 - Goal: binocular system working dynamically - they can point eyes where they need to be and move well
 - Make sure to move beads so not just working motor memory
 - Loading:
 - Cognitive load

- Read a line of hart chart in between jumps
 - Can go near to far, read a line, far to near
- Balance

Brock String Part 3

- Next level: bug walk
 - Remember, there's a lot of things to potentially do, this is the sequence in our office
 - Goal = both eyes on and pointing to the right point in space, matching visual system to actual space
 - Patient follows the target as it slowly moves towards them from the end of the string. (bead you move, or your fingers) and then out.
 - Goal is for this to be smooth
 - Opening periphery can help
 - Then have the patient slowly converge and diverge along the string without following a target
 - Goal is to see X slowly moving closer and then farther
 - Video demonstration
 - Including jumpy and smooth examples
 - Therapist:
 - make sure you're watching the patient's eyes and that what you see matches up with their responses
 - Also watch for signs of strain
 - Keep checking in with your patient about what they see and feel
 - Also a great time to work on visual symptoms

Brock String Part 4

- Can also incorporate prisms and lenses with brock string - but check in with your doctor so that you're working in accordance with the steps and procedures they want
- Move string into other gazes while patient goes through all of the above steps
 - We need to have good binocularity in all gazes, not just primary
- Be aware of the limitations of your patients with strabismus and then use this to help them gain

Voluntary Vergences

- Purpose:
 - give feedback to patient to help gain feeling of convergence and divergence
 - Give feedback to help patient understand where their eyes are pointed (especially for patient with strabismus)
- Equipment: prism goggles (15-20^Δ) one prism BU and one BD, marsden ball
- Set-up: patient wears prism goggles and looks at marsden ball
- Procedure:
 - Patient will see two balls - top and bottom

- May be in line, offset, or very offset
 - Encourage the patient to see what they can do to move the balls
 - They will have to converge and diverge to do this
 - Can be helpful to follow a target to do this
 - Therapist:
 - Base-up eye sees lower ball, base-down eye sees upper ball
 - To double check, you can just put on the goggles and converge and see which way it moves.
 - Ask the patient to move balls repeatedly - get together, split, repeat, etc.
 - Keep talking about feeling so they can understand what is happening when they're converging and diverging

Vectograms

- Mainstay of modern VT - most clinics that do VT have these
 - Polaroid technology so each eye sees one image
 - Great way to give patients a first depth experience - awesome to be a part of
 - Just use quoits in this video, but there are other pictures as well (stay-tuned for future tutorials)
- 3-d Technology
 - Having 2 eyes gives us 3-d depth - having 2 pictures that are offset triangulates the object
 - To create the illusion of depth, 3-d movies are filmed with 2 cameras that are offset. Have to wear glasses so you can see one image with each eye
 - More disparity between images = more depth
 - This is what is used in vectograms to create illusion of depth perception
- Purpose: give opportunity to experience depth perception, build comfortable convergence and divergence
- Equipment: quoits, polaroid glasses,
- Set-up: patient is 40-50cm from vectogram, vectogram placed in slight down-gaze
 - Hanging vectogram note: gets lots of depth and space to localize BI ranges
- Procedure:
 - Video like patient isn't seeing depth well
 - Start at neutral - where does it look like it is?
 - Then slide a little bit each direction
 - Should see it moving closer and farther
 - What patients might see if they're having trouble
 - 2 circles - not fusing, but both eyes on
 - 1 circle, but moving side to side = suppression
 - "Quoits massage" - slowly bring forwards and backwards repeatedly
 - Goal = patient seeing it moving
 - If the don't, try increasing magno stimulation by

- Shaking quoits
 - +5.00 OU to blur (taking away parvo)
 - Patient moves forward and backwards, side to side
 - Incorporating vestibular input
 - Shoulder thrust
 - Loop finger like they're pulling it forward with their finger
 - Place a sticker or other central reference they can compare with (no. 9 card)
- When patient can see the beginning depth well, move it further into convergence and divergence
 - Patient can color around the rope to localize
 - Is the ring bigger or smaller?
 - Patient should be able to identify SILO and you should see that in their tracing
 - If not seeing SILO - Ask them to notice how their arm/hand is moving (feeling and watching)
 - Therapist:
 - Watch for where their depth perception collapses - where their hand stops coming closer, or they don't see it coming in any more
 - Still fusing, but not understanding where in space that is
 - Remember to check in with patient about feeling tone and what they're doing to see the depth
 - Before you do this with a patient, try it so that you know where the ring should be at different BI/BO demands
 - The distance patient stands from vectogram affects where ring looks like it is
 - Strategies to fix inaccurate localization:
 - Shake quoits
 - Open periphery
 - Put marker down, then color in again
 - Spear fishing
 - Massage the area where they struggle (ex: 15-18 if struggling at 17)
 - parallax: can use to help depth perception - have patient move side to side and observe movement
 - Suppression checks
 - R and L
 - Plus at the top - may be offset a bit
 - BI range localization tips
 - Use dowel
 - Therapist moves back until at the same distance as the ring being directed by patient

- Can use to build ranges, but being able to do that with good localization and comfort is more important than just the number
- Jump Ductions: quickly jumping from BI to BO
 - Slide quickly
 - Turn slide perpendicular to floor (unable to fuse) and then back to parallel to floor
- Stay-tuned for future tutorials

Fusion Cards

- Lots of variations
 - Shown here: Eccentric circles and Fusion fred card
- Purpose: control of convergence and divergence; localizing converged and diverged targets
- Equipment: fusion card
- Procedure:
 - How it works: Look in front of or behind the page so each circle doubles, then the doubles come together into a third set of circles
 - Middle one has depth
 - Converging
 - Can be easier to do with paper behind
 - Place finger near paper, bring closer while watching finger until they see the 3rd image
 - Can be challenging to pay attention to finger and background
 - Should see SILO - middle smaller and closer
 - Wherever eyes are converging is where target should look like it is
 - Eccentric circle: center circle looks like it's popping out more than outer circle
 - Like you're looking down at a top hat
 - Suppression check: star and circle, should still see side circles also
 - Localization help
 - Touch where it is
 - Spearfish
 - Not done with activity until they've localized accurately
 - Diverging:
 - Look through to get 3 images
 - SILO - should see larger and farther away
 - Eccentric circles - center circle is farther and outer,
 - like looking into a top hat
 - Accommodation aspect:
 - Want fused, localized, and clear

- Binocularity is not on the card, but accommodation is = flexibility between bino and accommodation
 - Artificial environment - usually we converge and accommodate to same space, but we can use this to create degrees of freedom between two systems so that the patient can move accommodation if needed to clear something
 - Opening periphery and other localization tools can help

BOP/BIM

- BOP = Base-out plus
 - BO = convergence
 - COP
- BIM = Base-in minus
 - BI = divergence
 - DIM
- Purpose: creating degrees of freedom
 - Example: like you would want to be able to have torso and head movement be able to move together or in opposing directions
- A plus lens creates an image that is further away and larger → accommodation system goes further as well. But convergence comes closer
- Set-up:
 - Traditional: base-in/base-out prism, minus/plus lenses
 - In our office: convergence/divergence activity with lenses
 - Can use magnetic flipper clip
- Procedure:
 - Fusion cards: ex: diverge fusion cards, with minus lens flipper over eyes.
 - Will likely be blurry at first
 - Brock string:
 - Have accommodative target (Emergent bead - write on bead with dry erase marker)
 - Ex: Use plus lens when looking at near bead
 - Get X, then add plus lens - X may go behind bead and the patient has to readjust
 - Same with minus lens
 - Really, you can take any binocular activity (fusion cards, vectograms, etc.) and add the plus or minus lens to that activity
 - Nice finishing activity for the binocular and accommodative mix

OTHER VISION THERAPY CONCEPTS

Intro to Programming a VT session

- Now that you know about different procedures, we're going to discuss how to modify therapy for different population groups

- Strabismus and amblyopia
- Traumatic brain injury
- Young
- Over 40, mature
- Strabismus, Amblyopia, and TBI really require a full course to get into - which will be coming, but this is just general concepts
 - Make sure you're communicating with your doctor if you are working with patients in these populations

Young Patients

- 5-6 years or younger
- Can be hard to work with, but critical to work with
- Not usually learning-related vision problem, because these usually manifest at about 7-8 years when reading to learn
- Mostly dealing with strabismus and amblyopia - so incorporate lots of gross fusion with these patients
- Likely they'll need 2 stages of therapy
 - Basic foundation of binocularity in stage 1
 - Then when they're more mature do more therapy to fine-tune
 - Remember - there is no age limit to learning
 - Fine balance between plasticity of young age, with poor awareness, and more awareness with maturity, but a little less plasticity
 - We've found that this 2 stage approach works well
- Struggles of working with this population
 - Short attention span - so you need an engaging activity
 - Keep novelty and make it fun
- Learning styles by age
 - Young patients learn through novelty
 - More mature patients learn by bringing it to conscious awareness
- Activities
 - Keep them fun and new
 - Red/Green Lustre: white objects
 - Can work with a patient as young as 1 or 2 years
 - Makes it more difficult to ignore an eye
 - White balloon: can ask what color, or can just play with
 - white feather: try to catch, can add specific instructions like catch it with one hand, let it fall on your elbow
 - Bilateral integration
 - One of the reasons the 2 eyes don't work together is that they don't understand the key part of development of I have 2 sides of my body that have to work together
 - This is learned really well in crawling
 - Crawling

- can do with games like crawling soccer (also, it's white so you can use r/g)
 - Crawl and push the ball down the hallway
 - For an infant:
 - push-pull their hands
 - Bilateral massage - increase awareness that they have 2 sides
- Basic vestibular work:
 - Balance beam (can hold their hands)
 - Stand on one foot
- Can come up with your own games using these principles
- You will be doing a lot of activities, or be rotating the same activity
 - May only have a few minutes per activity

Mature Patients

- 40 years or older
 - Significant loss of accommodation ability
 - This is gradually lost, but at around 40 is where it starts to get hard to look at a reading distance
- We can work on accommodation, but we can't work with it as much
 - Can use their bifocal at near (plus lens at the bottom)
 - Straight-top, flat-top: with a line
 - Distance and near areas
 - Computer can be difficult because it's an intermediate
 - Progressive: no line bifocal
 - Far, intermediate, near distance
 - Area of distortion on the side - beware of distortion when having patient look down and to the side, so have the patient move their head
 - Picture of each
- Gradual, noticeable accommodation declines from 40-65. Past 65 don't usually have much left
- Lots of symptoms between 40 and 50
 - Have used accommodation to compensate for binocular dysfunction, but now they're losing that ability to crank in their eyes
 - Still want to work on accommodation, but they're not going to be able to do it to the same degree
 - Ex: use -1.00 instead of -6.00 on Wachs, or hold it further (holding it further away requires less acom)
 - Remember: lower power of lenses, more distance between self and near target
- Mature patients tend to need to repeat activities more, can take longer
 - Especially when they finish therapy, they need to continue to check in an activity 5 min week - do it more often

- Young kids don't usually need to do that
- Mature patients need a way to check for regression, because they are more likely to regress

Strabismus and Amblyopia

- General theme: Gross to fine: big to small
 - Review: with patients with a skills case we start with a lot of monocular work
 - But with pts with strabismus we use "pathway 2"
 - Developed by Dr. Sanet and Dr. Cook
 - The issue with suppression is that the turned eye is being suppressed, so if you turn it on, you have diplopia - intractable diplopia = double vision you can't get rid of.
 - Text: Intractable diplopia is very rare, even when using the traditional approach
 - At the beginning: no monocular work
 - A lot of these patients have some ability to use the eyes together, anomalous correspondence - we'll get into that in a later segment
 - People typically see double when both maculas are on - when it's distinct and small (like a little letter), so when we start big and broad (magno) there's little chance of diplopia
 - Activities
 - Ex: vectograms on overhead projector
 - Ex: Red/Green lustre no detail, just putting colors together
 - If the red is on the eye that turns off, we want them to see some red
 - As they start to develop more ability to use eyes together, eyes straighten slowly as they can look at finer targets
 - Ex: Polarmirror (go to)
 - If patient sees double, don't make a big deal of it, just go to another activity
 - Slowly make targets smaller, then brock string, then fusion cards
 - Amblyopia: treatment is better with binocular approach, so also go gross to fine
 - As you go to finer binocular ability, the amblyopic eye is required to get better VA and stereo
 - Patching: patch strong eye to get weaker eye to work
 - Lots of different ways
 - These will be addressed later
 - This will get you through the simple cases of strabismus
 - When we know the patient has good, fine binocularity, we know we can do some more monocular work because we know if the eye turns on they'll be able to put them together.

Traumatic Brain Injury

- In our office we use this term to include: brain trauma, post-concussion syndrome, and acquired brain injury (Stroke)
- Typically very symptomatic - to the point that it can be hard to believe that they are sincere (maybe they're just dramatic or not being honest) - but they are real
 - "Mild" because they can walk and talk, not that it only has a mild impact
 - Take them at their word
 - Move the patient into an area that is a little uncomfortable, find a way to make it comfortable, and keep working in that way
 - Use the 0-10 scale
 - Stop at 4 or 5, work on grounding techniques to get back to a comfortable range
 - You're not gonna make progress if they're in 6-7 range - no learning can happen at that point because they're in emergency mode
 - They may want to push, but don't let them
 - Pushing too hard can lead to maladaptations
 - Keep in mind - could be fine during the activity, but the symptoms come later and can be quite severe
- Keys:
 - Go slow
 - Unload the activity to keep them out of emergency load
 - Ex: Maples double pursuit - a few inches of movement in the target can be too much
 - Sometimes using their own finger helps, or using a larger target
- Now let's talk about grounding techniques

Near-Far Bi-ocular Hart Chart (red/green)

- Purpose: to ensure the patient can direct accommodation between near and far targets in a binocular situation
 - Much closer to copying from the board/looking from speedometer to road signs because the patient is binocular
- Equipment: r/g glasses, r/g small chart, r/g large chart
- Set-up: patient stands 6+ft from far chart, holds near chart
- Procedure
 - Patient reads charts, alternating charts at each line
 - Tips to resolve suppression:
 - *You've discussed some of these before with Brock string, but I think it's a good reminder to give a bunch*
 - Periphery
 - Bilateral integration
 - Tapping on temples
 - Auditory stimulus

- Touch
 - Looking hard/soft
 - At this point in therapy, your patient has probably worked on resolving suppression, so encourage them to think of strategies to try
- Tips to resolve diplopia:
 - Encourage the patient to either converge or diverge
 - Periphery
 - Touch
 - Looking soft/hard
- The reason these strategies are used to solve multiple problems is because both suppression and diplopia are symptoms of poor binocularity, so can be solved by teaching accurate binocularity

Bi-ocular Near-point Accommodative Rock

- Purpose: to build flexibility between the binocular and accommodative systems
- Equipment: reading material, red/green glasses and red/green bar reader, OR polaroid glasses and polaroid bar reader
 - Again, show emergent versions
 - Maybe highlight the pros and cons of each:
 - r/g: easy to tell which eye is suppressing
 - Polaroid: some patient find this to be less symptom-inducing because only the polaroid target is affected
 - Note: because the bar reader is smooth, sometimes glare gets in the way, so you can also try adjusting the angle of the slant board by placing it on top of something
- Set-up: appropriate reading distance, bars placed vertically on page
 - Make sure bars are vertical so the patient (and therapist) will know about suppression in a timely manner. If the bars are horizontal, you can potentially read for a number of lines before knowing you suppressed.
- Procedure:
 - Patient reads a sentence through one side of the flipper, then flips and reads another sentence. Repeat
 - Gradually increase flipper power.
 - We usually start with just the bar reader to check for suppression, then add +/-0.25 and continue over a number of weeks (or months) until the patient can do with +/-2.00 to +/-2.50
 - Tips to resolve suppression:
 - *You've discussed some of these before with Brock string, but I think it's a good reminder to give a bunch*
 - Periphery
 - Bilateral integration
 - Tapping on temples

- Auditory stimulus
 - Touch or tap on the bars
 - Looking hard/soft
 - At this point in therapy, your patient has probably worked on resolving suppression, so encourage them to think of strategies to try
- Tips to resolve diplopia:
 - Encourage the patient to either converge or diverge
 - It's fairly common to experience over-convergence on the minus-side, and asking the patient to look through the page can sometimes help.
 - Periphery
 - Touch or tap on the bars
 - Looking soft/hard
- The reason these strategies are used to solve multiple problems is because both suppression and diplopia are symptoms of poor binocularity, so can be solved by teaching accurate binocularity
- This is quite a demanding activity because you're asking the patient to keep their binocular posture in one place, while dramatically changing their accommodation posture *and* completing a demanding cognitive task (reading)
 - It is common for progress to be slower than in other areas, or for the patient to experience some regression as you continue to negotiate the relationship between accommodation and binocularity
 - Even a patient who has not suppressed in other contexts may experience suppression here (same for diplopia)
 - Let your patient (and parents) know that this is a very demanding activity, and that they may notice more difficulties here than in other activities

BOP/BIM

- BOP = base-out plus, converge and relax accommodation
- BIM = base-in minus, diverge and stimulate accommodation
- Both refer to the binocular and accommodative demands of an activity and can be used a final level of any binocular activity - brock string, vectograms, fusion cards - after the patient has demonstrated proficiency
- Purpose: to build flexibility and control between the binocular and accommodation systems; great as a finishing phase activity to make sure the skills are really solid
- Equipment: binocular activity, flipper
- Set-up: whatever appropriate set up of the binocular activity is
- Procedure:
 - Have the patient look through a flipper as they do a binocular activity - goal is to localize accurately and see the target clearly

- Watch for blur, strain, diplopia (loss of fusion), suppression (make sure you know the suppression checks of each activity - go back to those videos if you have questions), or loss of depth perception on vectograms and fusion cards
- Demand can be changed in 2 ways
 - Binocular (move vectogram slides farther apart, next lifesaver card)
 - accommodation(change flipper)
- Use same techniques for suppression, loss of fusion, poor depth perception, etc. as have already been discussed in each procedure video