

# Binocular Treatment of Amblyopia

## WORKSHOP LEARNING OBJECTIVES:

- 1) Understand the levels of sensory fusion:
  - a) Monocular
  - b) Monocular Fixation in a Binocular Field
  - c) Biocular
  - d) Binocular
- 2) Use activities in optometric vision therapy to develop each level:
  - a) Equate vision skills in each eye.
  - b) Improve monocular fixation when both eyes are open.
  - c) Awareness of simultaneous perception when the image from each eye is located in a different space.
- 3) Develop Binocular Sensory Fusion:
  - a) Simultaneous vision in the same physical space.
  - b) Perceiving a single, fused image when each eye sees different parts of the picture.
  - c) Peripheral fusion and float of images.
  - d) Central fusion and stereopsis.
- 4) Learn techniques to eliminate suppression.
- 5) Use activities that create luster.
- 6) Teach patients to appreciate float and the location of images.
- 7) Integrate eye-hand coordination and visual spatial awareness with depth perception abilities.



## **Monocular (M): Use one eye at a time**

Goal: Equalize vision skills in each eye

- Fixation
- Pursuit
- Saccades
- Focusing Abilities

### **Occlusion Types**

- Complete: solid "pirate" patch, "Band-Aid" patch, occluder, hand
- Translucent: light, but no detail
- Partial: bi-nasal or bi-temporal
- Blur: contact lens, Bangerter foil, tape
- Liquid Crystal Glasses: Amblyz, Eyetronix



### **(M) Activities**

Fixation: ability of the eye to accurately aim to one point in space.

Saccades: the ability to swiftly and smoothly jump accurately from one point to the next.

Pursuits: the ability to smoothly and accurately follow a moving object.

Accommodation: ability to focus clearly and accurately.

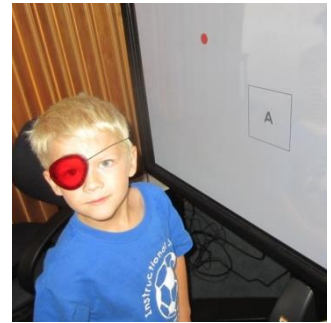
## Monocular Fixation in a Binocular Field (MFBF)

One eye sees detail and the other eye sees the background in the same space.

Goal: accurate perception of details with one eye and the perception of the background with the other eye.

### (MFBF) Activities

- Hide and Seek: pom poms on felt
- Hide and Seek: iPad games
- Red- Ink Coloring activities
- Red/Green Cards: Sherman Cards, Perceptive Cards
- Button boards: Wayne, Accuvision, Sanet Vision Integrator (SVI)



## Biocular (Bioc)

The ability to see information from both eyes, although the images are in different spaces.

Goal: to improve the ability of both eyes to alternately shift focus in an un-fused situation. This will facilitate anti-suppression and prepare the patients for simultaneous perception.

### (Bioc) Activities

- Vertical Prism dissociation with ball on string, Howell card
- Squinchel (base-in prism)
- Red/Red Rock, Sherman Cards
- Red/Green filters placed side-by-side on reading material, crossword puzzle, hidden pictures, projector, TV etc.
- Spilt Vectograms with Polaroid Glasses



## Binocular (B)

The ability of the brain to fuse information from both eyes into one image.

Degrees of Binocular:

- 1) First Degree Fusion/ Simultaneous perception
- 2) Second Degree/ Flat Fusion
- 3) Third Degree/ Stereopsis



### First Degree/Simultaneous Perception

Goal: To see images from each eye in the same space.

#### First Degree Activities

Luster-The perception of color information from both eyes simultaneously: white toys, colored backgrounds

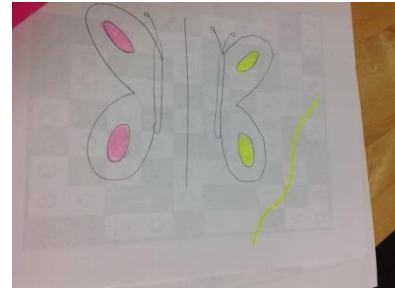
- Flashlight activities: Press Lites
  - Cheirosopic tracing, Opto App
  - Hole in Hand, Cook's Rings
  - Polarized or Red/Green bar readers with glasses
- Red Light/Red Ring
  - Bird in Cage

## Second Degree/ Flat Fusion

Goal: Use both the eyes to combine common borders and to align two images received from each eye into a single perception.

### Second Degree Activities

- Mirror Superimposition
- Rotoscope-Major Amblyoscope
- Stereoscope: Morgenstern's Visicare cards- Pre-fusion through Basic fusion, OPTO
- Computerized: VTS3 Flat fusion 1 & 2



## Third Degree Fusion/ Stereopsis

The ability to perceive float and localize a target using binocular depth perception. Accurate perception is of closer targets becoming smaller and further targets becoming larger

SILO= small-in and large-out

### Third Degree Activities

#### In-instrument Techniques:

- Stereoscope with Convergence/ Divergence Cards
- Aperture Rule
- Rotoscope, Amblyoscope, Synoptophore
- Wheatstone Cheiroscope

#### Anaglyphic or Polarized Lens Techniques

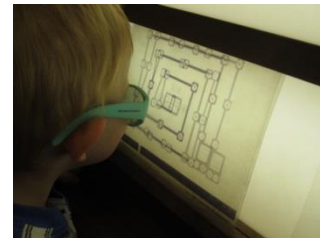
- Alphabet fusion book, Keystone Cards
- Vectograms
- Tranaglyphs

#### Free Space Fusion Techniques

- 3-Dot/Barrel card/Kay card
- Lifesaver card, Mountain card, Star cards
- String and Dowel, Yardstick and Pins
- Brock String
- Thumbs BI/BO
- Eccentric circles
- Prism flippers
- Magic Eye books

#### Computer Fusion Techniques

- Vision Therapy System: Near and projected stereopsis
- Vision Builder: Random Dot Stereopsis, Vergence, Jump Vergence
- Home Therapy System: Random Dot Stereopsis
- Vision Tap
- OPTO



## WORKSHOP ACTIVITIES:

\*\*Additional information\*\* <http://www.bouldervt.com/news-and-events/New-News-Item,852367>

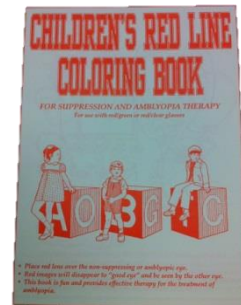
WORKSHOP ACTIVITY #1: Pom Poms and Felt (Luster, Monocular Fixation in a Binocular Field (MFBF), Tap-n-See Now, Little Bear Sees

- (BLACK BACKGROUND- use red lens on learning eye)



WORKSHOP ACTIVITY #2: Red Ink Activities (Monocular Fixation in a Binocular Field MFBF)

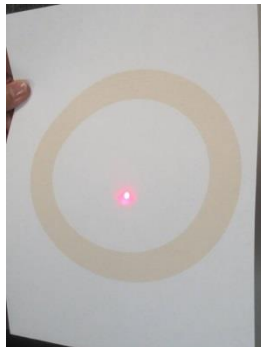
- (WHITE BACKGROUND- use green lens on learning eye)



WORKSHOP #3:  
Squinchel (Bi-ocular)



WORKSHOP #4:  
Red Light/Red Ring



WORKSHOP #5:  
Press Lights



Red/Light and Red/Ring Materials:

1. Red/green lenses
  2. Large flashlight with red filter
  3. Red ring targets (various sizes)
  4. Black electrical tape
- \*or white board, red marker, laser pointer.

<https://youtu.be/Wgdq4Jr4MjE>



### Level 1:

1. The therapist moves the red light behind the red ring target as directed by the patient until it looks like it is centered in the red ring.
2. Repeat, moving farther away from the patient each time.
3. Continue with smaller targets: decreasing ring diameter and ring width.
4. Reduce the size of the light by placing black electrical tape over the lens.

### Level 2:

1. Start with the flashlight positioned so that the red light appears to be in the center of the ring. The light is then moved laterally so that it appears to be touching the inside edge of the ring.
2. Patient then attempts to move his eyes and change the position of the light so that it is re-centered in the ring. Do this several times in both horizontal directions.
3. Now move the light just outside the ring, and the patient attempts to see the light inside the ring by moving the eyes. Try to feel the difference in the posture of the eyes.

### Level 3:

1. The therapist keeps the light physically within the ring target. Patient is to always keep the light visually within the ring target.
2. Patient should attempt to re-center the light by actually moving his or her eyes.
3. Feel the movement of the eyes as you re-center the light from the left or from the right. Try to feel the difference in the posturing of the eyes and how the eyes feel when moving from the left compared to moving from the right.
4. Goal: See the red ring target and the red flashlight simultaneously at all times.
5. Attempt to perform with the smallest possible light and smallest possible ring size.
6. Be able to perform task at greater distances.

### WORKSHOP ACTIVITY #6: Mirror Super-imposition (Luster, Level 1, Level 2, Level 3)

- Face one chart while holding a hand mirror at a 45 degree angle on the side of your nose reflecting the other chart.
- Try to keep seeing the combined image by viewing both charts simultaneously





**WORKSHOP ACTIVITY #7: Stereoscope (Biocular and Binocular Level 1, Level 2, Level 3)**

<http://gerull-labs.com/stereoscope-exercises>

**Left Hand Tracing - Fruit**

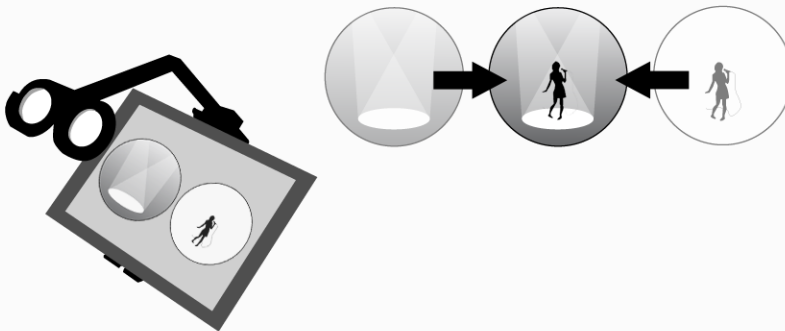
Start with a stylus in your left hand. Look into your stereoscope and trace the image you see with your stylus.

When you are finished, tap  then select a new level or tap "End".



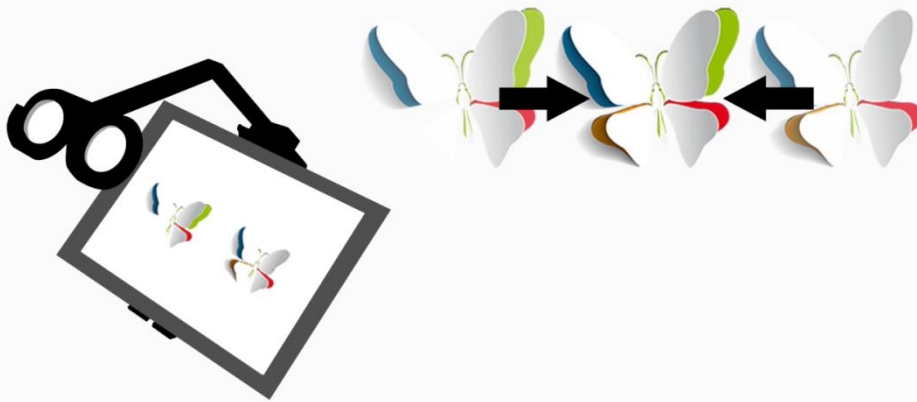
**Fusion Level 1 - Stereoscope**

Look through your stereoscope to see one clear picture. If only one eye is working, part of the picture will be missing.



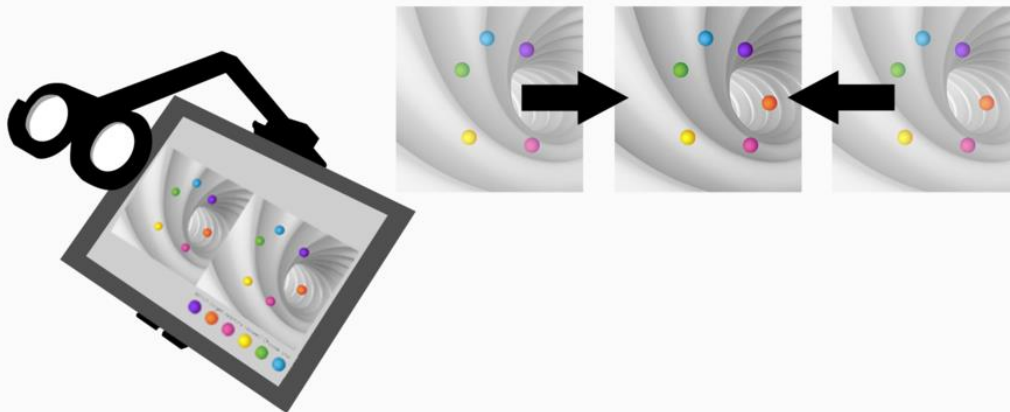
### Flat Fusion

Look into your scope to see one clear picture. If you are looking with only one eye, part of the picture will be missing.



### Convergence - Base Out Interactive Mode

Look in your scope to see one clear picture. You should see the balls pop out in 3D. Choose the button matching the ball that pops out the most. Tap the buttons in order of what appears closest to farthest away.



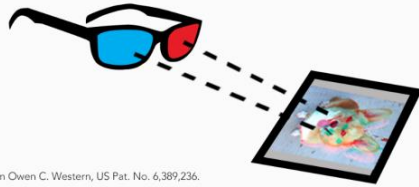
WORKSHOP ACTIVITY #8: Anaglyphic Training (MFBF, Binocular Level 3: Global Stereopsis, Contour Stereopsis, Free Space Fusion)

<http://gerull-labs.com/red-cyan>



### 3D Pets - Dogs by Phantom 3D®

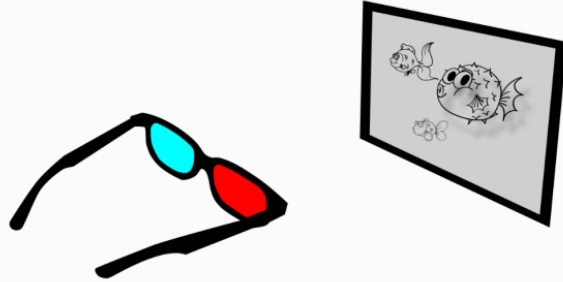
Put on your Red/Cyan glasses to see the picture in 3D.  
For best results, try placing your iPad on a flat surface and looking down at the image.  
When you are ready, tap → to try the next picture.



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### Anaglyph Basic Mode

Put on your Red/Cyan glasses to see the picture in 3D.  
When you are ready, tap → to try the next picture.



### Fusion Circles - Red/Cyan Basic Mode

Put on anaglyph glasses. The red lens should be over your left eye.

Choose one set of fusion circles and cross your eyes until the two circles merge into one. You will see three circles. The center circle should be a mixture of the red and green colors and float slightly in 3D. All the letters should be clear.

If you are using only one eye, some of the letters may be missing.



**Tip for cross-eyed viewing:** Try focusing on a point in space between your eyes and the screen to bring the two circles together.



**References** Available on Request to [bouldervt@yahoo.com](mailto:bouldervt@yahoo.com) and posted on website page: <http://www.bouldervt.com/news-and-events/New-News-Item,852367>

Press Lites: [http://www.oepf.org/sites/default/files/OVP1-2\\_article\\_Press\\_web.pdf](http://www.oepf.org/sites/default/files/OVP1-2_article_Press_web.pdf)  
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