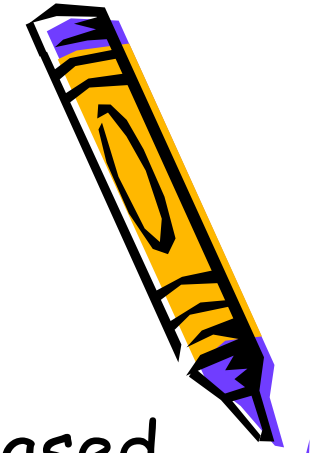
THE PEDIATRIC EYE EXAMINATION

Nicholas J. Silvestros, O.D.
Kara L. Tison, O.D.
UofL Department of Ophthalmology

What's the Difference Between these Patients

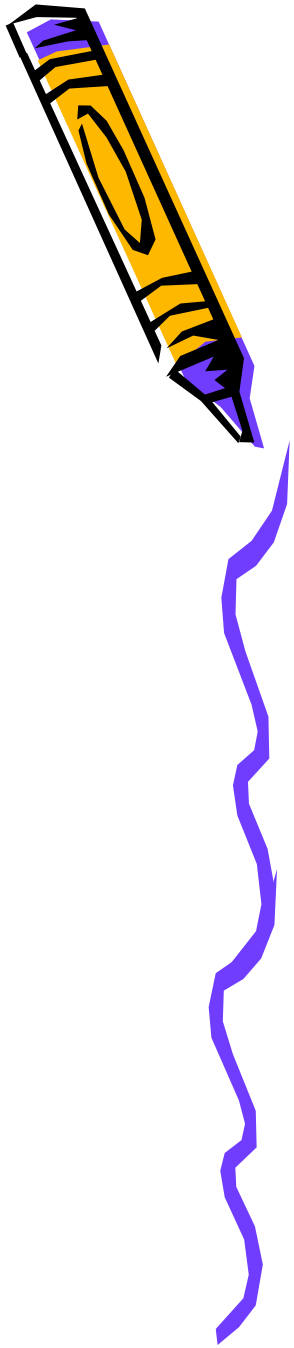
Testing Vision in Children



- Choose appropriate method of testing based on level of cooperation and on development rather than chronological age

- Goal of vision testing is not necessarily to demonstrate that the child can see 20/20 but rather to determine equality of vision

Testing Vision in Children



Visual Acuity:

- Blink to light
- Fixation Preference
  - Induced tropia test (ITT)
  - Cover test (CT)
- Preferential Looking
- Allen Figures
- Lea Symbols
- HOTV
- Snellen

Testing Vision in Children

General Age Guidelines

- Newborn: Birth-2 months
- Infants: 3 months-3 years
- 3 years-5 years
- 6 years and up

Testing Vision in Newborn

Blink to light:

- "eye popping" reflex
- Might fix on light
- Might fix on face (usually after 2 months)
- Usually will not follow

- How to document:
  - +BTL, -BTL, Fix on face, Fix on light

Testing Vision in Infants

Visual Assessment (Fixation Preference):

- Definitions:
  - Fix or central (**monocular**) – refers to the patients ability to look directly at the target of interest
  - Follow or steady (**monocular**) – refers to the patients ability to hold their fixation on target
  - Maintained (**binocular**) – refers to the patients ability to hold fixation by the eye when the other eye is uncovered

Testing Vision in Infants

Fixation Preference:

- Monocular Testing
  - Occlusion of one eye and present fixation target
    - "Fixation" or "no-fixation"
  - Move fixation target in field of vision
    - "Follows" target or "no follow"
  - Repeat for the other eye

Testing Vision in Infants

Fixation Preference:

- Binocular Testing:
  - Induced Tropia Test (non-strabismic)
  - Cover Test (CT) (strabismic)

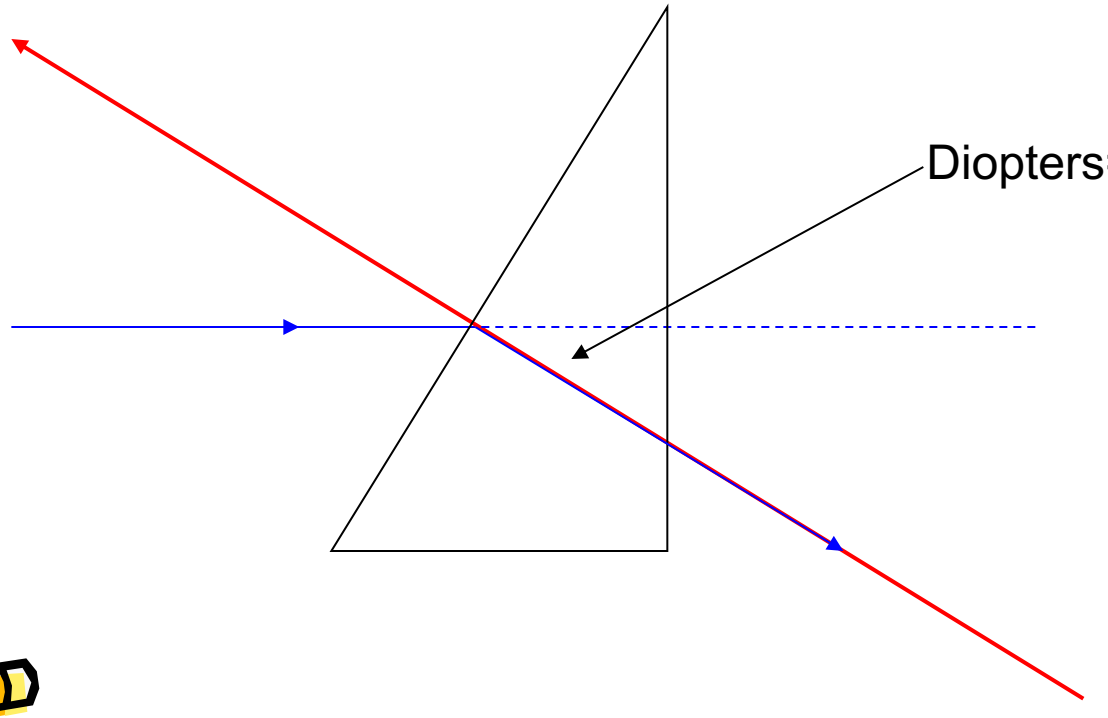
Testing Vision in Infants

Fixation Preference:

- Induced Tropia Test
  - Give the child two different images: one for each eye
  - See if they choose a preferred eye to view the image
  - Use prism to induce diplopia in normals

Optics Review:

- Light bends toward the base, and shifts the image toward the apex



Testing Vision in Infants

Fixation Preference:

- Induced tropia test (ITT) method
  - Induces vertical strabismus/tropia
  - Cover one eye and place a 12 PD BU lens over other eye
    - Eye should shift in direction of apex of lens to pickup fixation
  - Remove cover and should observe vertical saccades
  - A preference for fixation would suggest poor vision in one eye

OD: FFM

OS: FFM

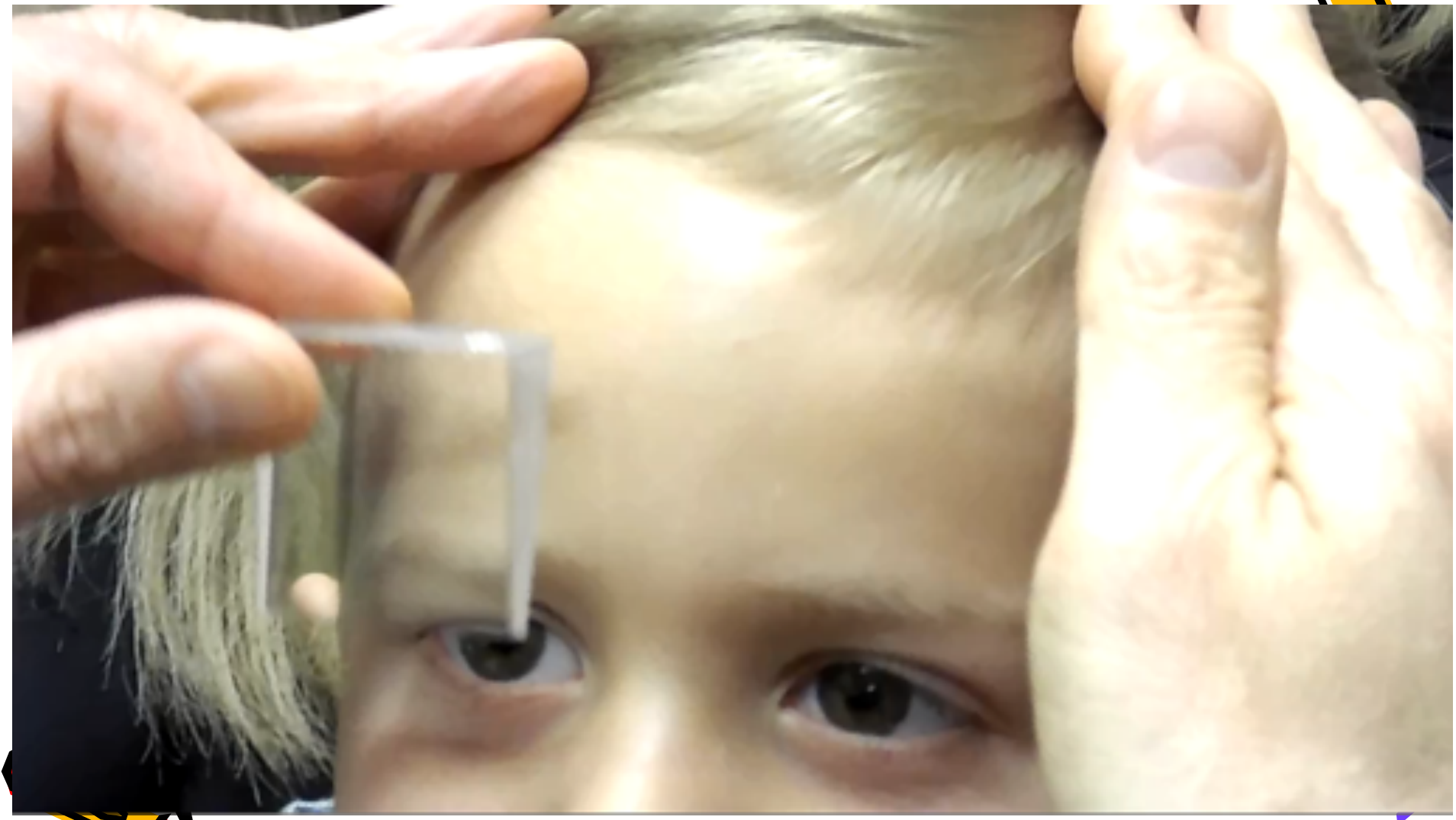
OD: FFM
OS: FFM

OD: FFM

OS: FFnoM

OD: FFM
OS: FFnoM

- Video Fixation Preference
  - Induced Tropia Test



Testing Vision in Infants

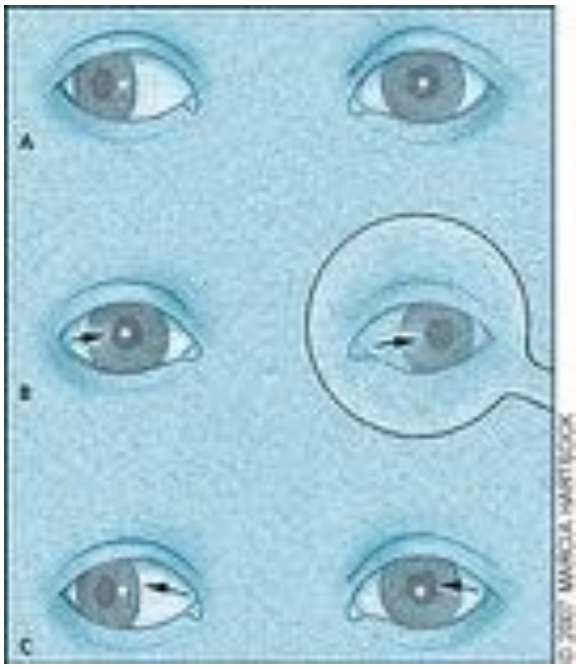
Fixation Preference:

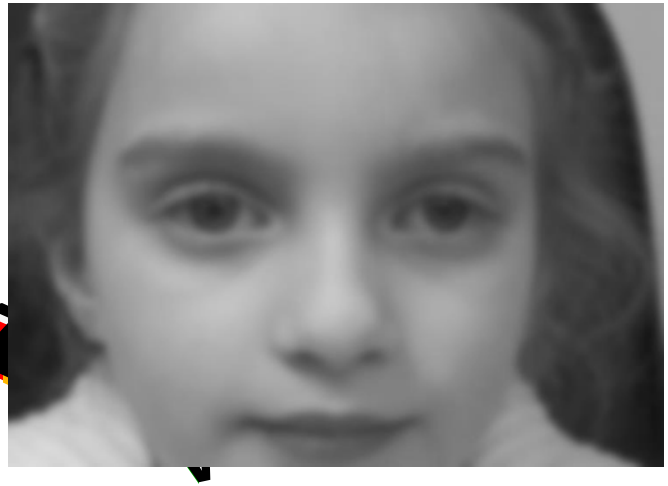
- Cover test (CT) method
  - Occlusion of one eye and present fixation target
  - Remove occlusion and observe it's fixation

Testing Vision in Infants

Fixation Preference:

- Cover test (CT) method
  - Two options:
    - Continues to fixate
      - Maintain
    - Shifts back to other eye
      - Non-maintain



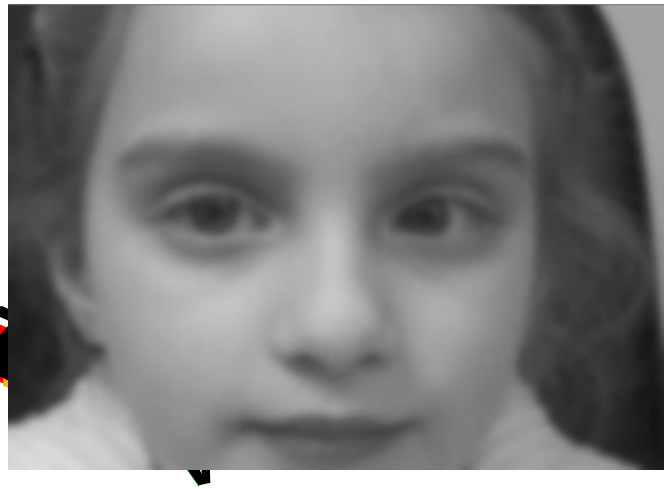


OS: FFM

OD: FFM

OD: FFM
OS: FFM

OD: FFM



OS: FFnoM

OD: FFM
OS: FFnoM

Typical Scenarios

- FFM OU
- FFM OD FF(M) OS
- FFM OD FF no M OS
- FFM OD F no F OS
- FFM OD no Fix OS
    - Each scenario depicts worse amblyopia

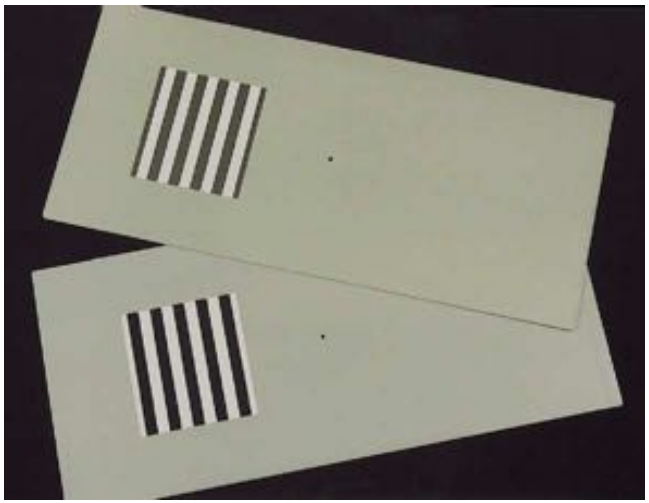
Things we see that make no sense

- FF(M) OU
  - Remember maintain is an binocular test.
  - Better to document:
    - FFM OU – alternates freely OR
    - FFM OU – prefers non-prism eye equally

Preferential Looking

Cardiff Cards
1 to 3 years of age

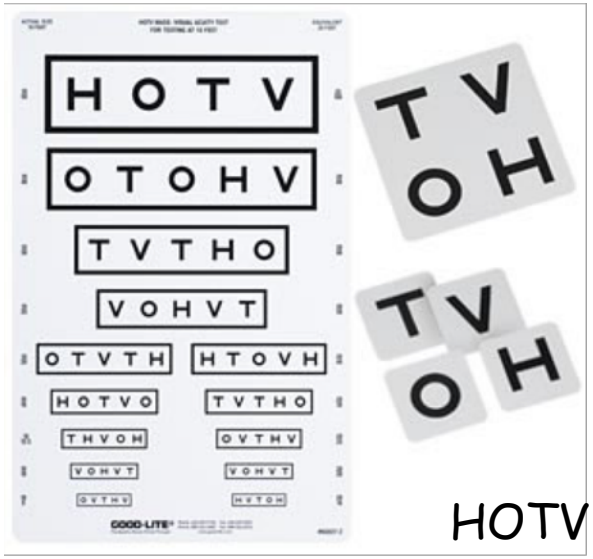
Teller Cards
Birth to 12 months



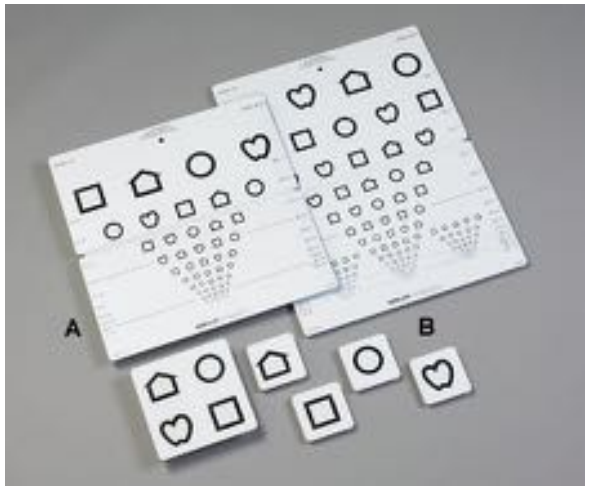
Lea Gratings
Birth to 12 months

Vision Testing in Preschool

Allen Figures



HOTV



Lea Symbols

Pupils

Testing Visual Fields in Children

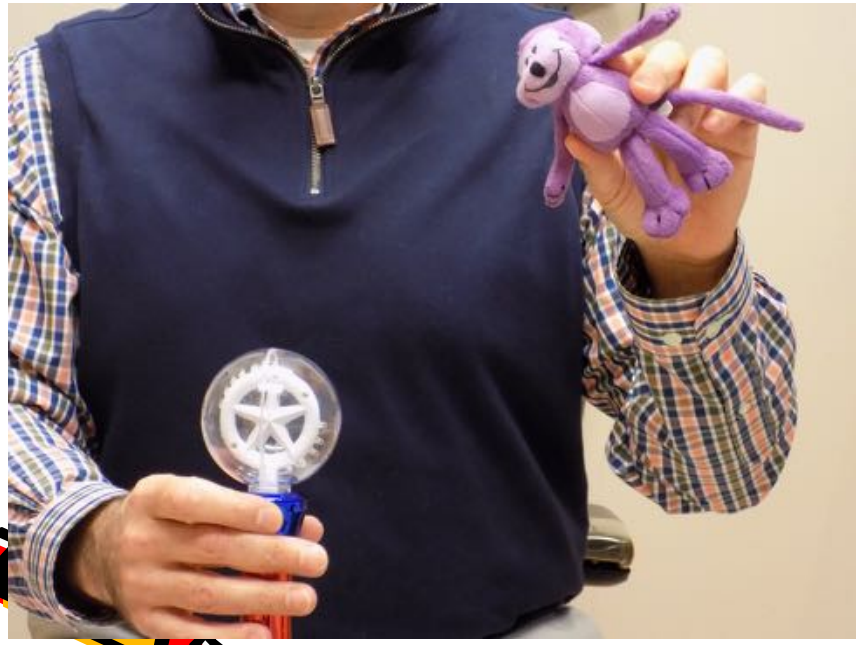
Visual Field Testing:

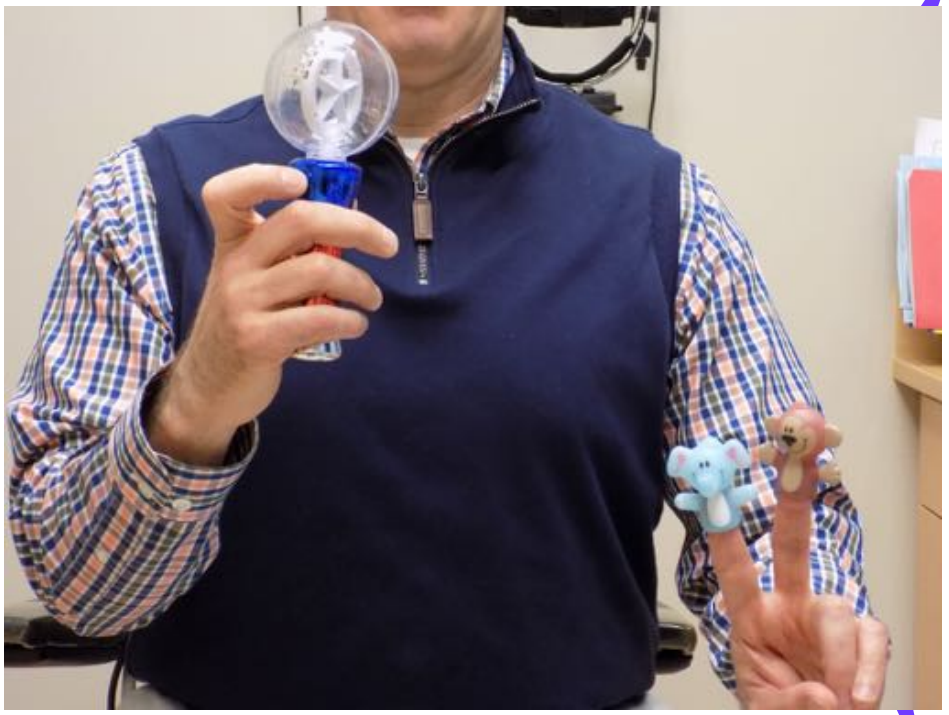
- Static Perimetry
  - Image stationary
    - Can they detect spot or not
  - Humphrey Visual Field
- Kinetic Perimetry
  - Image moves inward
    - When can they detect
  - Goldmann Visual Field

Testing Visual Fields in Children

Visual Field Testing:

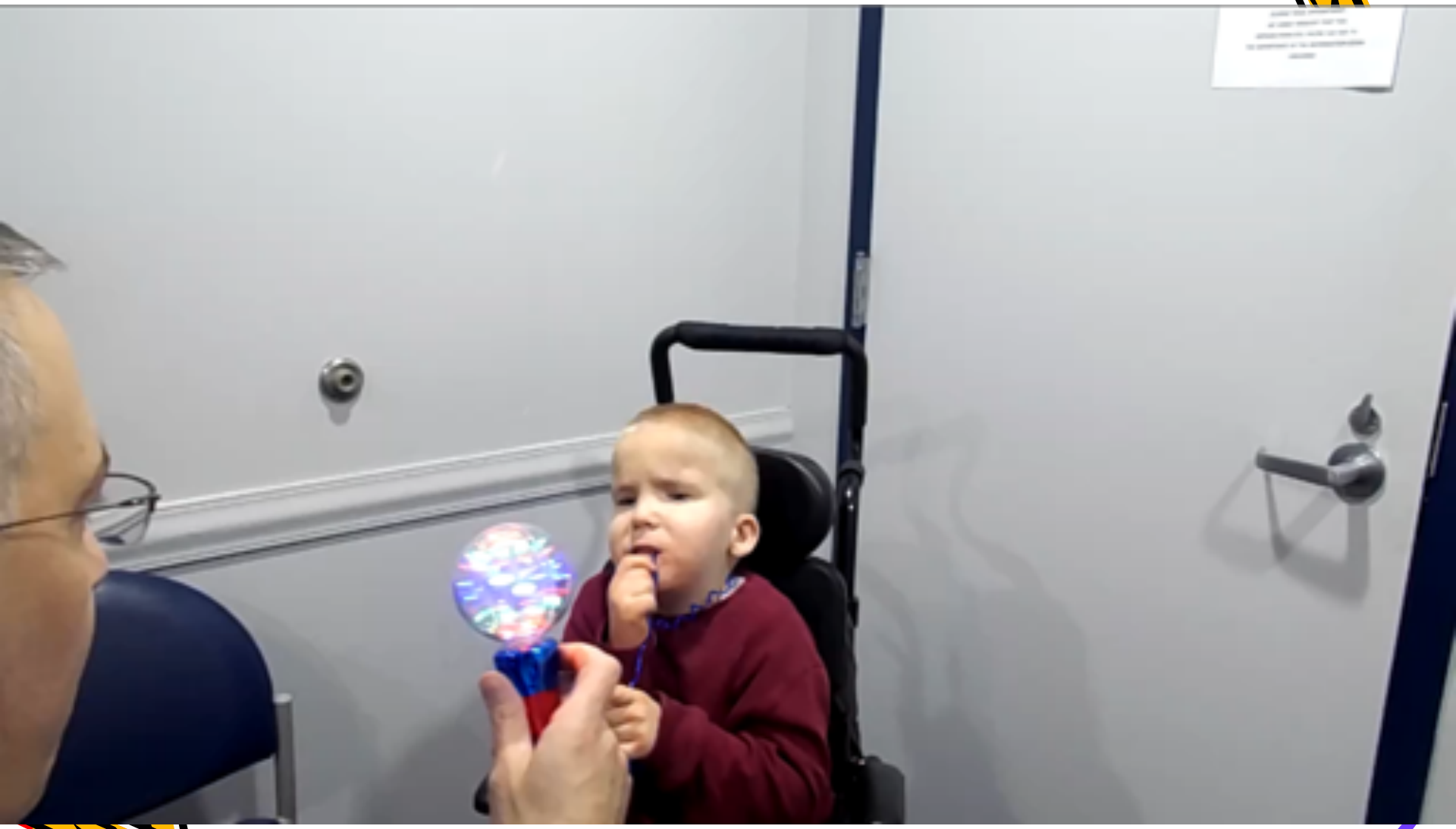
- Evoked Saccades
  - Static Perimetry





- Video Visual Field Testing
  - Evoked Saccades

- Video Visual Field Testing
  - Evoked Saccades



- Eye Alignment….

Photo 1

Photo 2

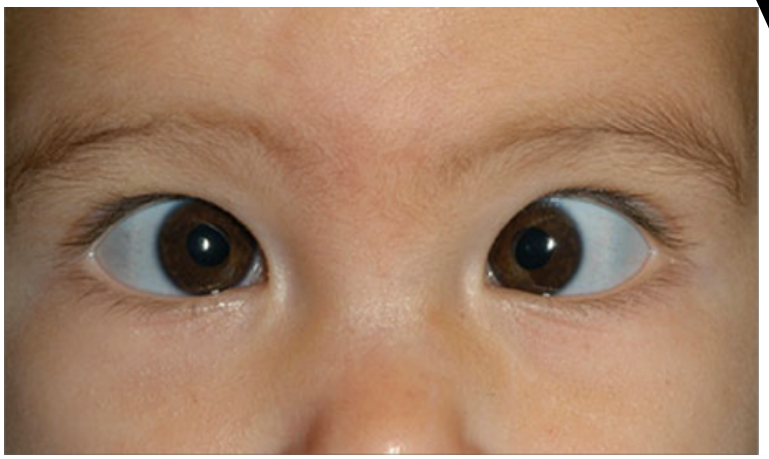


Photo 3

Testing Eye Alignment in Children

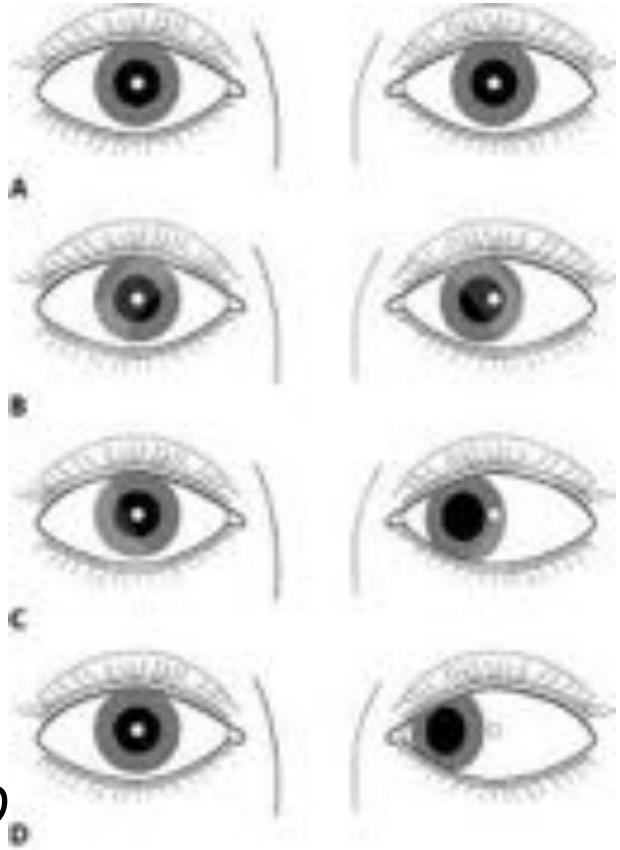
Motility Assessment:

- Hirschberg test
  - Simplest and least accurate but most relied upon
  - Position a small spot of light arms length from patient
  - Sit directly behind light source
  - Patient fixates on light while examiner compares the relative location of the corneal reflection of each eye

Testing Eye Alignment in Children

Motility Assessment:

- Hirschberg test



- Nasal Displacement – EXO
- Temporal Displacement - ESO

- Eye Alignment….

Photo 1

Photo 2

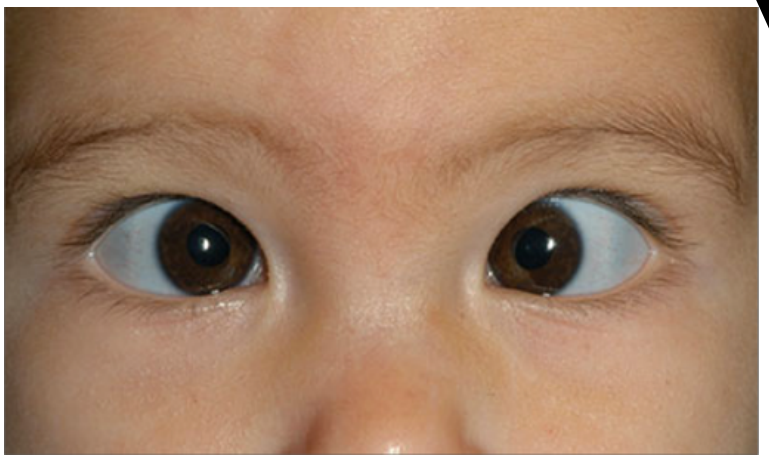
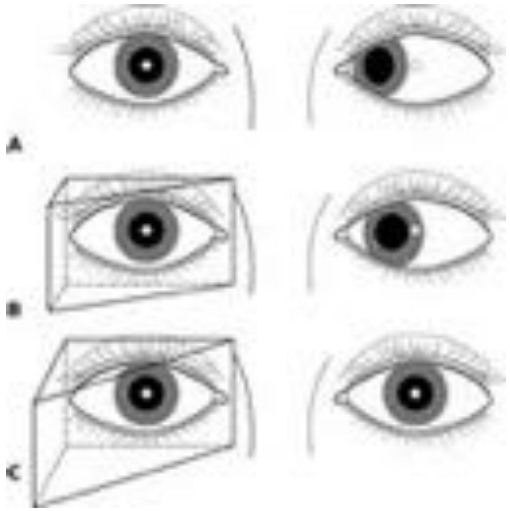


Photo 3

Testing Eye Alignment in Children

Motility Assessment:

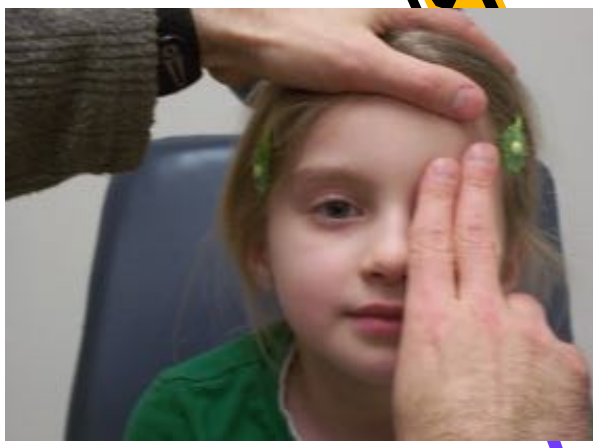
- Krimsky test
  - Similar to Hirschberg test
  - Prism is used to center corneal light reflex
  - Prism is changed until corneal light reflexes are symmetrically centered
  - EXO – Base IN
  - ESO – Base OUT



- Video Hirschberg/Krimsky

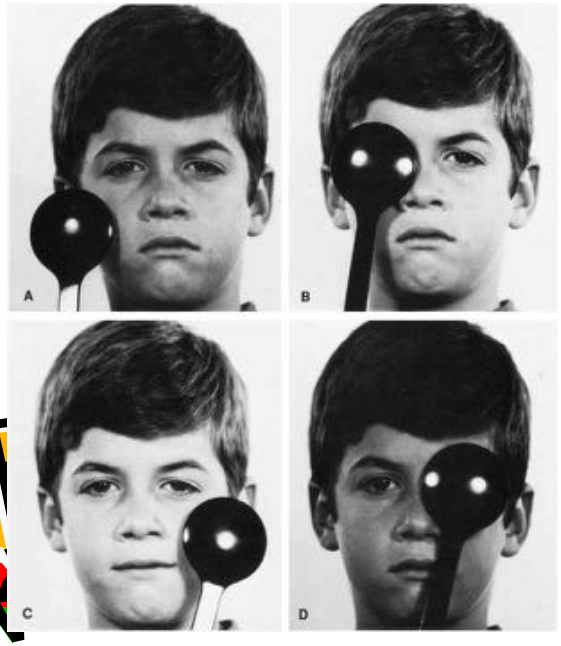
- Video Hirschberg/Krimsky

Testing Eye Alignment in Children

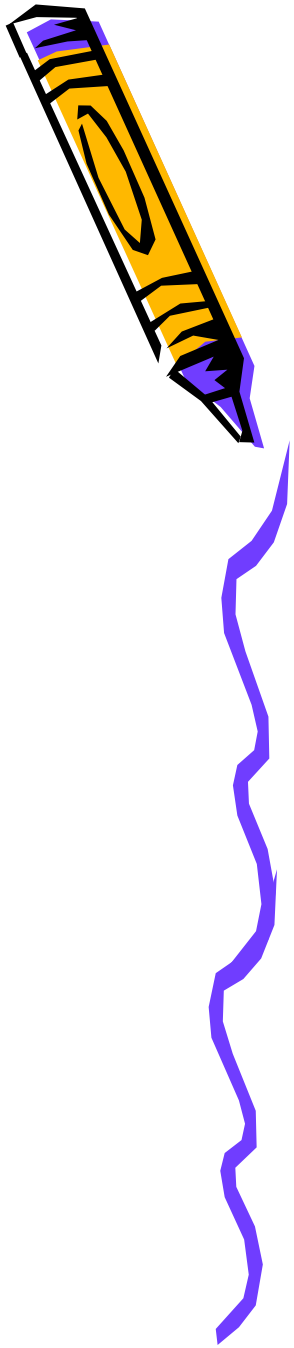


Motility Assessment:

- Cover Test
  - Unilateral (cover/uncover) cover test
  - Alternating (cross cover) cover test



Testing Eye Alignment in Children



2pm – Muscle Balance Testing!

Sensory/Stereo Testing in Children

- Prism Vergence
- Worth 4 Dot
- Randot Dot/Stereo Fly

Sensory/Stereo Testing in Children

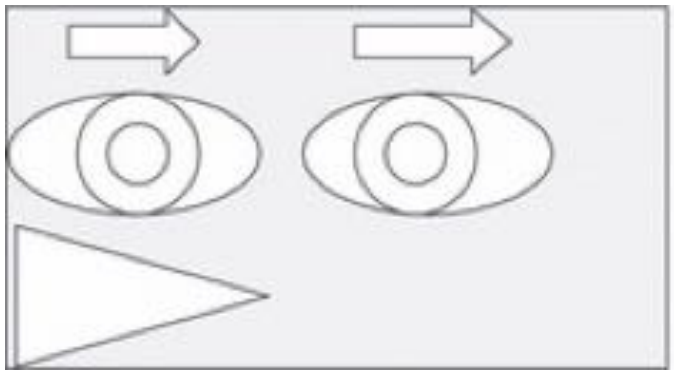
Prism vergence test

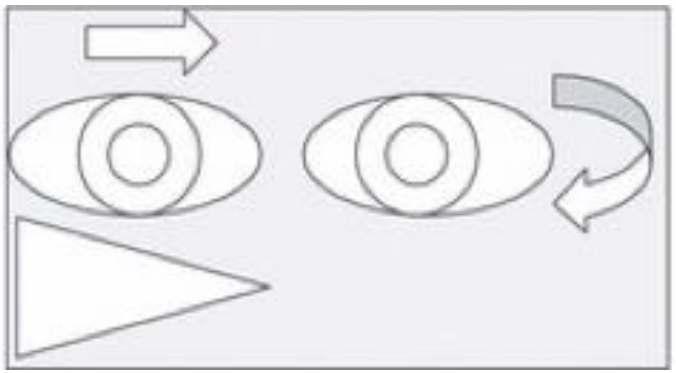
- Perfomed binocular at near
- Fixation on target, place a 18 PD base out lens over one eye
- **Tests motor fusion**
  - Motor response used to align the two eyes to eliminate image disparity (diplopia)

Sensory/Stereo Testing in Children

Prism vergence test

- Version movement (bilateral) toward apex of lens
- Fusional convergence movement (unilateral) of the eye not behind prism

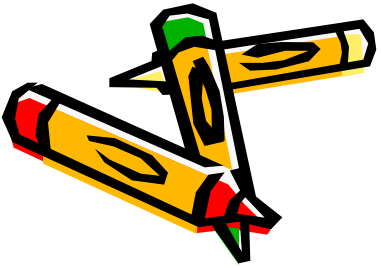




Prism Vergence Test

Positive OD

Prism Vergence Test



Positive OS

Negative OD
Positive OS

Concerned about OD

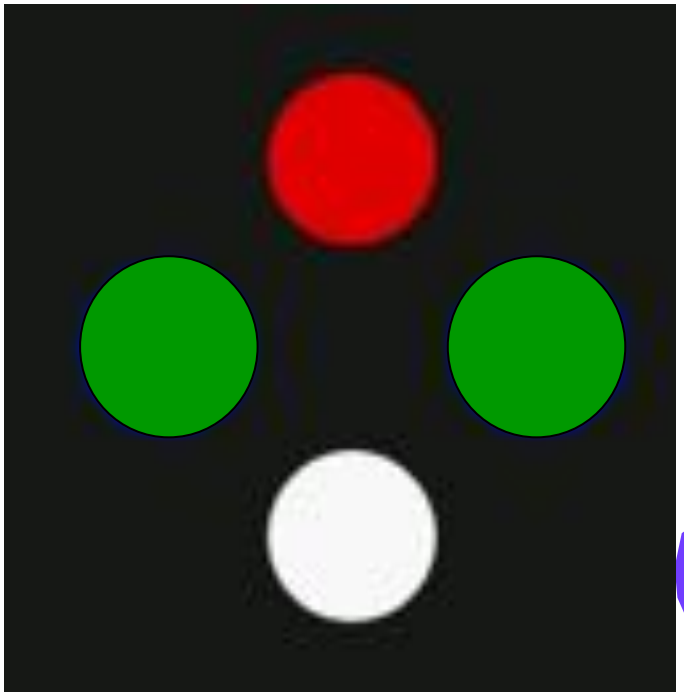
- Video Prism Vergence

- Video Prism Vergence

- Video Prism Vergence

Sensory/Stereo Testing in Children

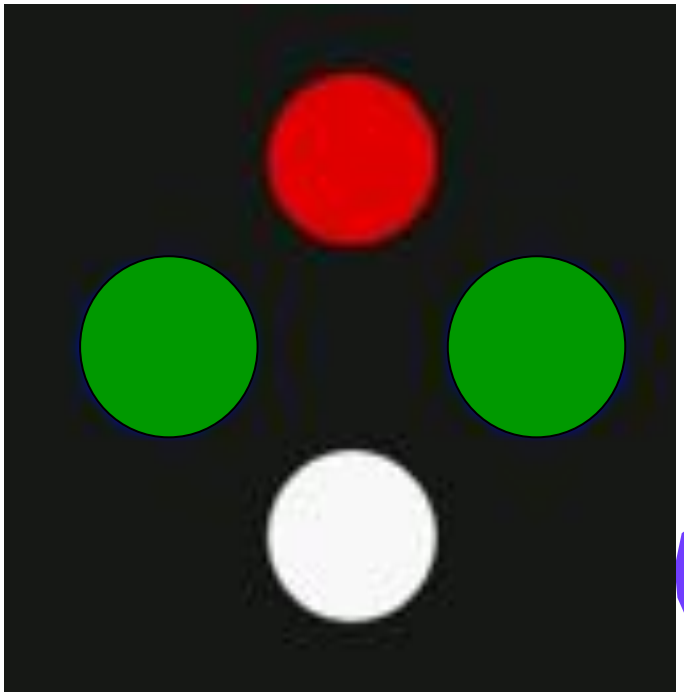
- **Worth 4 Dot**
  - Red over Right Eye
  - Responses:
    - 4 lights - normal
    - 5 lights - diplopia
    - 3 green lights - suppression OD
    - 2 red lights - suppression OS



Sensory/Stereo Testing in Children

Worth 4 Dot

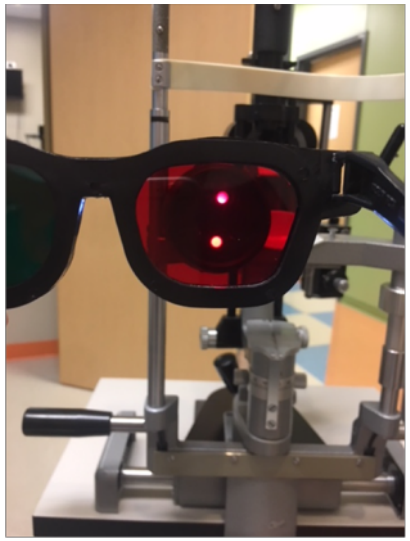
- **Peripheral fusion**
  - Tested at near (2-3 feet)
  - Projects on peripheral retinal area
  - Image falls outside of 4 degree central fixation
- **Central fusion**
  - Tested at distance (10 feet)
  - Projects on central retina



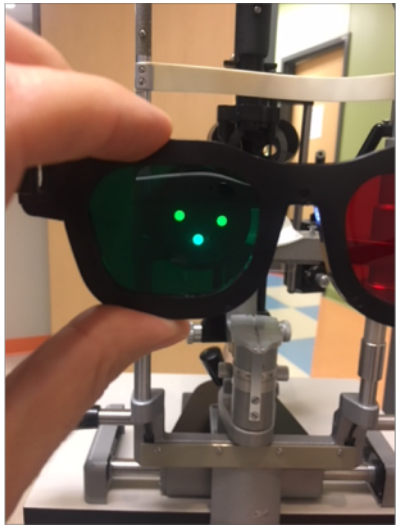
Sensory/Stereo Testing in Children

Worth 4 Dot

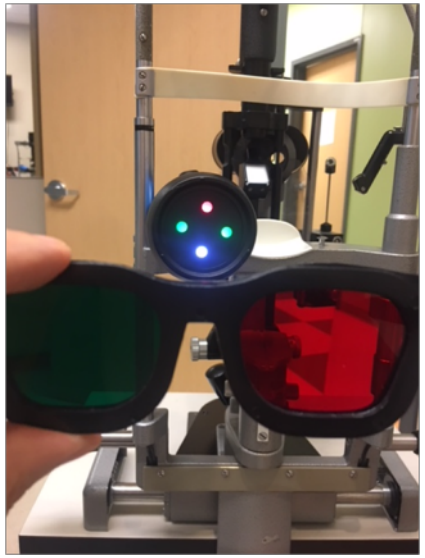
Right Eye



Left Eye



Binocular



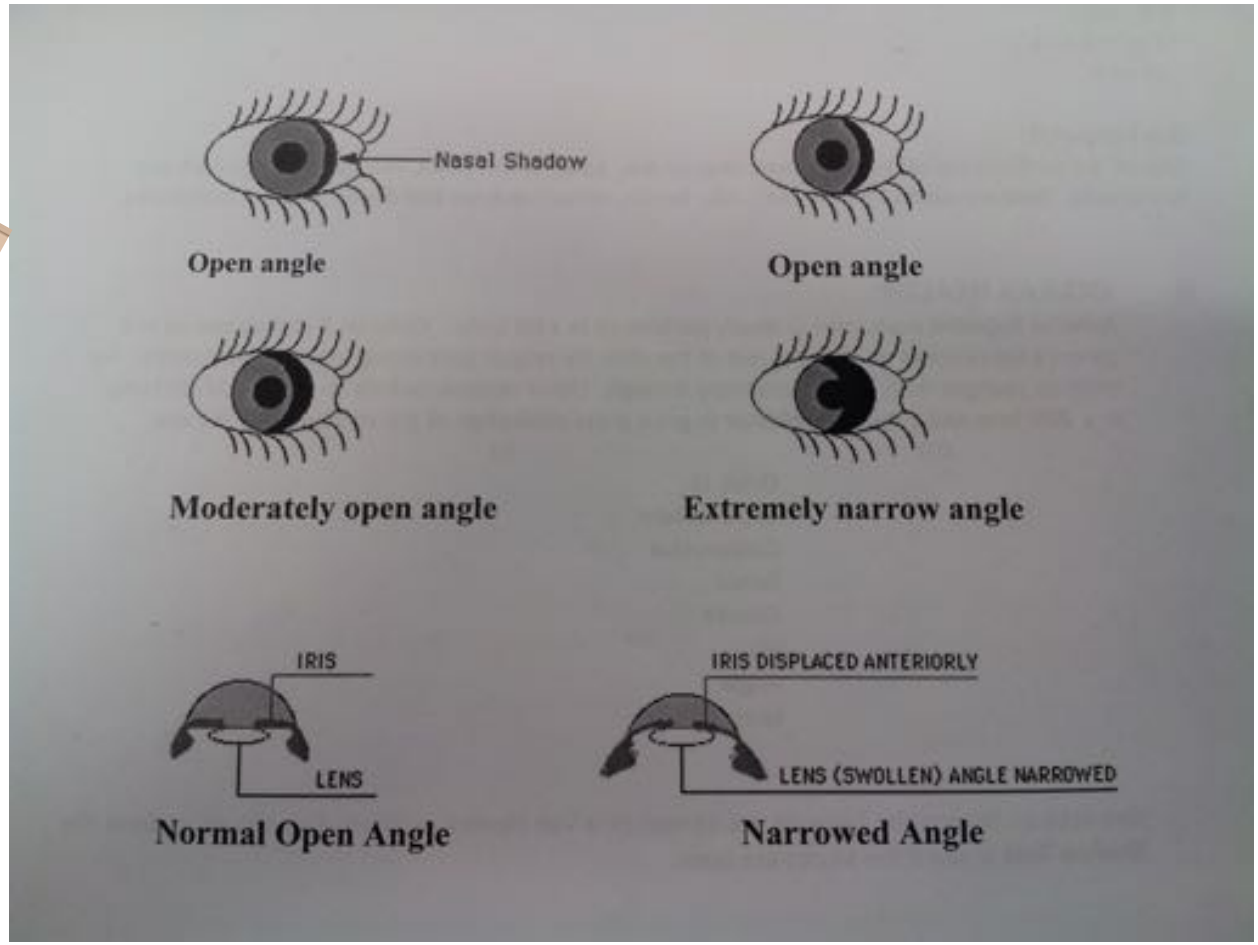
Sensory/Stereo Testing in Children

Steropsis:

- Titmus stereo test (Fly)
  - Most widely used for testing sensory stereopsis
  - A positive fly and larger figures proves at least peripheral fusion exists

Ocular Health

- Angle Evaluation



Ocular Health

- IOPs
  - Finger Touch
  - Tono-Pen
  - iCare Tonometer

Ocular Health

Dilation Drops

- Cycloplegic 0.5% OR 1%
  - In insolation, provides moderate but variable dilation
    - Use with 2.5% phenylephrine or Paramyd
      - Paramyd = 0.25% tropicamide and 1% hydroxyamphetamine
- Tropicamide and phenylephrine
- Use one drop at a time, repeat after 5 minutes if necessary
- Spray atomizer
  - Greater volume over a wider area
  - Potential for side effects is increased

- Video When all Else Fails

QUESTIONS

nicholas.silvestros@ulp.org
kara.tison@ulp.org