

1  **VISUAL DEVELOPMENT & PRIMITIVE REFLEXES**

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2  **DISCLOSURE**

3  **LEARNING OBJECTIVES**

4  **VISION IS DEVELOPED**

- Infants are not born with complete vision.
- Good vision is developed through a learned process of looking, touching, and exploring.
- Optometrists play an important role in educating parents on their role in helping to ensure that their baby learns to see well.

5  **VISION IS THE DOMINANT SENSE.**

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However, visual development tends to be overlooked by parents & pediatricians.

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7  **VISUAL DEVELOPMENT IS COMPLEX**

8  **DISRUPTION OF CHILD DEVELOPMENT**

- Poor/Incomplete Nutrition
- Genetic Causes
- Illness/Allergies
- Poverty: Lack of Resources and/or Education on child development
- Lack of Proper Sensory & Motor Stimulation (tummy time)
- Being unsafe emotionally or physically
- Idiopathic
- Retained Primitive Reflexes
  - C-section birth?

9  **WHAT ARE PRIMITIVE REFLEXES AND WHAT ROLE DO THEY HAVE IN VISION DEVELOPMENT?**

10  **WHAT ARE PRIMITIVE REFLEXES**

- The primitive reflexes are a set of movement patterns in the newborn that emerge during the prenatal period.
- These primitive reflexes are present at birth and provide an indication of the neurological development of the newborn.
- The reflexes are movements that are automatic. Reflexes do not require thinking.
- The reflexes help the protect the newborn until they can develop more complex visual, motor, & cognitive skills.
- Primitive reflexes provide an important prerequisite for later development of voluntary vision & motor-based abilities.

11  **PRIMITIVE REFLEXES SHOULD BE "INTEGRATED"**

- Primitive reflexes should normally be present for only a short period of one's life, and later they should be inhibited (referred to as integration) by higher-level centers in the brain, so that these higher brain centers can develop and mature properly.

- If the primitive reflexes remain after 6 months of age, they may hinder normal development of the postural reflexes and of ocular motility, as well as other visual skills.

12  **DEVELOPMENT OF THE VISUAL SYSTEM DEPENDS FIRST ON THE EARLY PRESENCE OF THESE REFLEXES, AND THEN THEIR LATER INHIBITION.**

13  **FIVE PRIMITIVE REFLEXES THAT MOST AFFECT VISUAL DEVELOPMENT**

14  **VISION**

Vision is built on a developmental sequence which needs to take place; each skill built on a previous skill.

Reflexes need to be integrated in order to this development to take place at the proper developmental time.

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15  **NEWBORN**

- Can see color variations and contrasting colors at near
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- Can't distinguish between pastel colors or two similar colors
- 
- Sensitive to light
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16  **NEWBORN**

- Visual regard for environment
- Random eye movements
- Monocular vision
- Eyes move together with head
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17  **BIRTH TO 6 WEEKS OF AGE**

- Stares at surrounding when awake
- Momentarily holds gaze on bright light or bright object
- Eyes and head move together
- One eye may seem turned in at times
- Blinks at camera flash
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18  **1 MONTH**

- Alternating monocular fixation on hand or moving, large target w/in 10 inches (25.4cm)
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- Slow, jerky tracking from periphery to midline

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19  **MORO REFLEX**

- Emerges at 9 weeks in utero. It should be integrated by 2-4 months post-natally.
- Involuntary reflex to threat/survival mechanism
- Composed of a series of rapid movements of the arms upward away from the body.
- The Moro reflex is the earliest primitive reflex to emerge and forms a strong foundation for future life experiences.

• Video

20  **MORO REFLEX  
RETENTION CAN CAUSE:**21  **2 MONTHS**

- Beginning binocular fixation (overlapping field of view)
- Tracks slightly past midline with head rotation
- Beginning vertical tracking
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22  **3 MONTHS**

- Observes the hand
- Improved binocular fixation
- Tracking horizontally through 180 degrees eyes and head together
- Shifts glance between two targets
- Can distinguish between pastel colors
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23  **TONIC LABYRINTHINE REFLEX (TLR)**

- This reflex emerges at 16 weeks in utero and should be integrated at approximately 4 months postnatally.
- Initiated in response to the head moving backwards or forwards.(vestibularly related)
- This head control is crucial for later postural reflexes that involve neurological tone and balance.
- Video

24  **TLR RETENTION CAN CAUSE:**25  **4 MONTHS**

- Visually directed reach and grasp
- Eyes begin to move independently from head
- Visually fixates on nearby objects longer
- Briefly fixates on object further away spatial fields
- Begins to scan 3 or more objects, may lose fixation in the process
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26  **5 MONTHS**

- Improved horizontal, vertical, circular tracking
- Can scan 3 or more objects with more consistent fixation
- Sees objects and reaches for it:
  - eyes and hand establish partnership
  - 
  -

27  **THE ASYMMETRICAL TONIC NECK REFLEX (ATNR)**

- The reflex develops at 18 weeks in utero and is postnatally integrated by 6 months of life.
- The ATNR reflex is demonstrated by moving the baby's head to one side and seeing an automatic extension of the arm and leg on the side that the head is turned while the opposite arm and leg are in a flexion posture.
- Video

28  **ATNR RETENTION CAN CAUSE:**

29  **6 MONTHS**

**EXPECTED BEHAVIOR**

- Eyes move together all the time
- Becomes skillful with hand-eye coordination and is able to reach and grasp at objects freely or direct a bottle into the mouth
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- Smiles at or pats mirror image
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30  **6 MONTHS**

- Eyes move independently from head
- More consistent binocular fixation at all distances
- Accurate and consistent tracking in all directions
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31  **6 MONTHS**

- Shifts gaze easily to scan several objects
- Shifts gaze easily from one distance to another
- Fully developed visual control
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32  **6 TO 8 MONTHS**

- Picks up and touches small objects with "raking" motion
- Searches for hidden objects
- Shows color preference for reds and yellows

33  **8 MONTHS**

- Acuity:
  - Previously about 20/40 at best –
  - now almost adult-like in its clarity and depth perception at this point.

- Close-range still better than distance
- Recognizes people and objects across a room.
- Iris color near its final color.

#### 34 **SPINAL GALANT REFLEX**

- This reflex is first seen at 20 weeks in utero. It should be integrated postnatally by nine months.
- The reflex is seen when the baby is placed on its stomach, a finger lightly stimulating one side of the back near the spine resulting in a rotation of the hip on the side of the response
- Video

#### 35 **SPINAL GALANT RETENTION CAN CAUSE:**

#### 36 **SYMMETRICAL TONIC NECK REFLEX (STNR)**

- The STNR reflex presents at 6-9 months of life. It should be integrated at 9-11 months postnatally.
- This reflex is displayed when the infant while on their knees, lifts and extends their head which causes the legs to flex and the arms to straighten
- video

#### 37 **STNR RETENTION CAN CAUSE:**

#### 38 **10 TO 12 MONTHS**

- Understands and accomplishes vision related motor tasks such as:
  - stacking blocks
  - putting pegs into round holes
  - crawling
  - standing
  - walking

#### 39 **12 MONTHS TO 18 MONTHS**

- Uses both hands, and visually steers hand activity (12-14 mos.)
- Visually interested in simple pictures (14-16 mos.)
- Often holds objects very close to eyes to inspect (14-18 mos.)
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#### 40 **12 MONTHS TO 18 MONTHS**

- Points to objects or people using words "look" or "see" (14-18 months)
- Looks for and identifies pictures in books (16-18 months)
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#### 41 **18 MONTHS TO 2 YEARS**

- Identifies geometric forms by placing blocks in appropriately shaped holes
- Shows interest in pictures
- Scribbles on paper

#### 42 **2-3 YEARS**

- Occasionally visually inspects without needing to touch (20-24 months)
- Smiles when views favorite objects and people (20-24 months)
- Enjoys watching movement of wheels, egg beater, etc. (24-28 months)
- Watches own hand while scribbling (26-30 months)

#### 43 **2-3 YEARS**

- Visually explores and steers own walking and climbing (30-36 months)
- Watches and imitates other children  
(30-36 months)
- Begins to color on paper (34-38 months)
- "Reads" pictures in books  
(34-38 months)
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#### 44 **2-3 YEARS**

- Finds object that moves out of sight without following its path
- Recalls visual images
- Puts together six-piece puzzles
- Able to match six pairs of items

#### 45 **3 TO 4 YEARS**

- Copies geometric figures
- Reading readiness present – responds to vision/speech-sound coordination activities like those on "Sesame Street"

#### 46 **3 - 4 YEARS**

From this age on:

most games stimulate an intricate combination of the necessary developing motor and visual skills (visual tracking and binocularity)

#### 47 **3 - 4 YEARS**

- Hopping
- Climbing equipment
- Tricycle
- Wagons and wheel-barrows
- Blunt scissors
- Crayons & paints
- Blowing bubbles
- Clay

#### 48 **3 - 4 YEARS**

- Construction toys
- Puzzles
- Musical instruments
- Water play & sand play
- Dressing dolls and lacing toys

- Toys with large nuts, bolts & wrench

#### 49 **3 - 4 YEARS**

- During this stage, it is time to help with the development of visual memory. Toys and games for this purpose include:
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  - Match photographs to a past holiday or place visited.
  - Hide an object and explain where it is, then have the child find it.
  - Build a simple pattern with blocks and hide it. See if the child can remember and build one like it.

#### 50 **4 YEARS TO 5 YEARS**

- Uses eyes and hands together well and in increasing skill
- Moves and rolls eyes in an expressive way
- Draws and names pictures
- Cuts and pastes quite well on simple pictures
- Colors within lines
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#### 51 **4 YEARS TO 5 YEARS**

- Copies simple forms and some letters
- Can place small objects in small openings
- Visually alert and observant of surroundings

#### 52 **4 TO 5 YEARS**

- Tells about places, objects, or people seen elsewhere
- Shows increasing visual interest in new objects and place
- Recognizes names or colors

#### 53 **4 - 5 YEARS**

- Connecting dots & coloring books
- Scooters (bicycle with trainer wheels)
- Construction toys such as tinker toys and Legos
- Tracing within a maze
- Frisbee throwing
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#### 54 **PROPER VISUAL DEVELOPMENT**

Ideally all children should be examined at the age of:

- Six months
- Two and a half years
- Before commencing school
- Yearly thereafter
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#### 55 **WHEN IS A DEVELOPMENTAL VISION EVALUATION INDICATED?**

Any Delay in Visual Development:

- Poor Eye Contact

- Not crossing midline
- Visual tracking
- Poor focusing
- Strabismus/Amblyopia
- Nystagmus