



NEUROVision
CLINIC



Primitive Reflexes & Development



Primitive Reflexes: effects on vision, behavior and learning

When children are born, they are equipped with primitive reflexes that provide them an immediate response to their environment for survival. These reflexes are automatic, and directed from the brain stem without cortical involvement. They pave the way for later voluntary control. It's important that they are inhibited and controlled by higher centers of the brain at the appropriate time to allow for more sophisticated neural structures to develop properly.

If the primitive reflexes remain active beyond the first year of life, they are referred to as retained, and they are a structural weakness and immaturity in the central nervous system. This can result in immature patterns of behavior or may cause immature systems to remain prevalent despite the acquisition of later skills.

Depending on the degree of primitive reflex activity, this poor organization of nerve fibers can affect one or all areas of functioning such as: gross motor, fine motor, or oculomotor coordination, sensory perception, cognition, and expression. If the reflex activity is mild it's not likely to have a significant impact on functioning and behavior. If, however, the reflex activity is moderate or severe, or there is a cluster of reflexes present, neuro-developmental delay will ensue. Unless the primitive reflexes are integrated and assimilated into higher level functioning, the child's performance will continue to be impeded, despite a potentially normal level of intellect. Reflexes are integrated when the developing brain releases further movement patterns which contain the inhibitor to the initial primitive reflex, allowing more complex skills to be acquired.

By the application of stylized sequential movements practiced daily, it is possible to give the brain a chance to register the reflex inhibitory movement patterns which should have been made at the appropriate stage in development. As primitive reflex activity is corrected, many physical, academic and emotional problems disappear.

Four of the primitive reflexes are directly involved in the development and functioning of the visual system. They are: the Moro reflex, Asymmetrical Tonic Neck Reflex (ATNR), Tonic Labyrinthine Reflex (TLR), and Symmetrical Tonic Neck Reflex (STNR). Other notable reflexes that have effects on behavior are: the Palmar Reflex, Rooting Reflex, and Spinal Galant. The purposes of these reflexes and what they can cause when they are not properly integrated are presented in the following tables.

MORO REFLEX

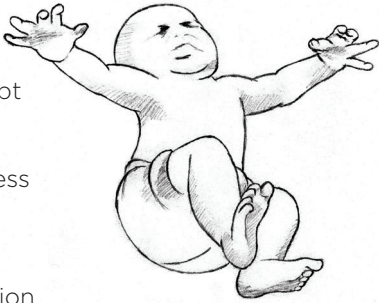
This is a primitive whole body reaction when startled by any type of sensory stimuli causing movement of the arms and legs outward and extension of the head (withdrawal response) with intake of breath. It is the precursor to the adult startle reflex.

Reflex Effect

- fight or flight reaction
- adrenaline stress response
- connects to all the senses

Possible results when not inhibited

- exaggerated startle reaction; highly excitable
- sensory hypersensitivity/over-stimulation
- constantly on alert, on edge of fight or flight
- fearful withdrawal or overactive aggressive behaviour
- manipulative or controlling behavior in attempt to gain control over own emotional response
- easily distracted; mood swings
- poor balance and coordination; motion sickness
- oculomotor and visual perception problems
- pupil dilation and light sensitivity
- can't filter sensory information
- auditory confusion; poor auditory discrimination
- dislike change or surprise; anxiety/angst
- insecurity, low ego and self esteem



ASYMMETRICAL TONIC NECK REFLEX

Arm, hand, and leg extend on the same side of the body when head is turned to that side.

Reflex Effect

- involved in birthing process
- develops extensor muscle tone
- trains one side of body at a time
- provides basis for later reaching movements
- early hand-eye coordination; visually directed reaching
- prevents baby from lying face down when on tummy
- trains eyes to focus from 7 inches to arms length

Possible results when not inhibited

- inability to do cross-lateral crawl
- upset center of balance when walking
- awkward; clumsy
- difficulty crossing the vertical mid-line
- failure to establish dominant side; mixed laterality
- impaired bilateral movement
- hesitancy in directing eye movement from one side to the other; prevents reading fluency
- impairs visual tracking and ocular pursuits
- visual perceptual problems
- poor handwriting, immature pencil grip



TONIC LABYRINTHINE REFLEX

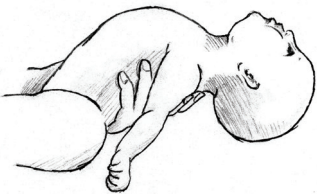
This is activated by stimulation of the labyrinths when head moves forward or backward. For the forward reflex, when head tips forward arms and legs go into fetal position; for the backward reflex, when head tips back arms and legs extend out.

Reflex Effect

- assists birthing process
- precursor for oculo and labyrinthine head righting reflexes for necessary head control
- balance, muscle tone, and proprioception development
- gravitational security development

Possible results when not inhibited

- unstable reference point in space
- difficulty judging space, distance, speed and depth
- lack of spatial and directional awareness
- reverse numbers and letters
- poor sequencing skills; poor sense of time
- impedes head righting reflex and vestibulo-ocular reflex
- creates mismatch between balance, vision, and proprioception
- may prevent crawling and creeping
- impaired depth perception and figure-ground discrimination
- poor posture; motion sickness



SYMMETRICAL TONIC NECK REFLEX

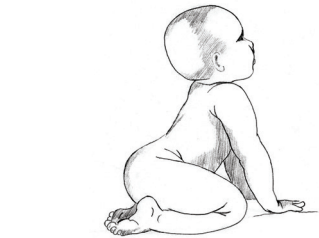
For flexion, when the head bends forward the arms bend and the legs extend; for extension, when the head extends the arms straighten and the legs bend.

Reflex Effect

- helps baby up off the floor onto hands and knees from the prone position
- helps train eyes to fixate/focus change from far to close
- integrates developing visual skills with other senses

Possible results when not inhibited

- interferes with crawling on hands and knees
- baby will either: bear-crawl, scoot or skip crawling
- interferes with eyes learning to cross the mid line
- interferes with visual tracking for reading and writing
- interferes with developing near point vision
- impairs vertical visual tracking
- stooped posture; severe slouching
- clumsy; poor hand-eye coordination
- "W" sitting position
- problems with vision focus change from far to close
- difficulty with copying tasks
- can affect attention



PALMAR REFLEX

This involuntary grasp reflex can be elicited by the action of sucking due to a neurological loop connecting the hands with the mouth.

Reflex Effect

- grip

Possible results when not inhibited

- poor manual dexterity
- lacking pincer grip
- immature pencil grip
- speech difficulties
- palms hypersensitive
- mouth movements when writing



ROOTING AND SUCKING REFLEX

Touching baby's cheek elicits head to turn in that direction with open mouth and extended tongue for sucking. It is linked to the palmar reflex.

Reflex Effect

- insures baby turns toward the source of food, and opens to latch
- vital for early feeding

Possible results when not inhibited

- hypersensitivity around mouth
- dribbling
- speech problems
- poor manual dexterity



SPINAL GALANT REFLEX

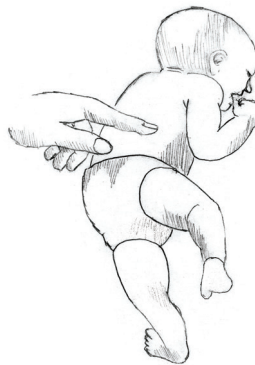
Stimulation of the back to one side of the spine will result in hip movement 45 degrees toward the side of the stimulus. This is present in equal strength on both sides.

Reflex Effect

- may have an active role in birthing process
- helps baby work its way down birth canal
- functional relationship with hearing

Possible results when not inhibited

- poor bladder control; bed wetting
- difficulty sitting still; fidgeting
- dislike clothing around waist
- can affect attention and short-term memory
- poor concentration
- poor posture
- gait anomalies; limping
- uncoordinated in physical activity or sports



RETAINED PRIMITIVE REFLEXES

ASYMMETRICAL TONIC NECK REFLEX

- poor co-ordination & handwriting
- impaired bilateral movement & visual tracking
- prevents reading fluency

TONIC LABYRINTHINE REFLEX

- lack of spatial & directional awareness
- letter reversals
- motion sickness

ROOTING & SUCKING RELFEX

- imparied speech & manual dexterity
- hypersensitivity around mouth
- dribbling

MORO REFLEX

- exaggerated fight or flight
- highly excitable, over-reactive; easily dstracted
- oculomotor & sensory perception problems

SYMMETRICAL TONIC NECK REFLEX

- poor posture
- "W" sitting
- impairs vision focus change from far to close



SPINAL GALANT REFLEX

- fidgeting & trouble sitting still
- poor bladder control & bed-wetting
- poor concentration

PALMAR REFLEX

- impaired speech & manual dexterity
- immature pencil grip
- mouth movements when writing





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Dr. Coralee Mueller is an Optometrist in Vision Development. She is the founder of Neurovision Therapy Clinic, and practices through Behavioural and Neuro-Optometric assessment. She is a Fellow with the College of Optometrists in Vision Development and Board Certified in Rehabilitative Optometric Vision Therapy. She is a Clinical Associate with the Optometric Extension Program Foundation, and a member of Canadian Optometrists in Vision Therapy and Rehabilitation.

Dr. Mueller completed her Doctor of Optometry with Honours from the University of Waterloo in 2001. In 1997 she graduated from the University of Western Ontario with an Honours Bachelor of Science double major in Physiology and Psychology, with Distinction. Throughout her university career she was involved in vision research, and received numerous awards for academic achievement and research.

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