

Primary Reflexes and Their Influence on Behaviour

The neurodevelopmental approach is based on neuroplasticity: the central nervous system can be “rewired” providing the proper intervention. This approach addresses the behavioral and learning inefficiencies of an individual while looking at the steps of brain development from the lower level (the foundation) to the highest centres (the roof). It considers which functions of the central nervous system (CNS) should be in place from birth to seven-years old (grade two) in order to be an efficient learner able to self-regulate his attention span and behavior. This approach looks at the “input” of information coming from the visual, auditory, and tactile domains in order to yield the necessary quality “output” in the manual, language, and mobility areas.

The primary reflexes should be in place in the human body from conception. The reflexes emerge at different periods of the brain development. As they are integrated they give rise to more mature neurological functions. When these reflexes are not integrated, they yield inefficiencies in motor control, eye-hand coordination, sensory perception, emotional behaviour, attention, and/or higher cognitive abilities.



These four pictures illustrate favorite positions characteristic of people (children, teens and even adults) when primary reflexes are not integrated. This lack of integration keeps the person from reaching the maturity of postural reflexes that is a step further in the higher levels of organization of the central nervous system.

Neurodevelopmental Reflexes (Primary Reflexes)

The term “stimulus-response arc,” or what is more commonly referred to as a “reflex,” can be described as being an automatic response of the CNS to a specific stimulus. The central nervous system is the only hierarchical system of the body. The nervous influx enters the brainstem from the spinal cord (via the reticular formation), to the midbrain (including the limbic system), to the cortex which is responsible for sensori-motor processing and association. The pre-cortex is the final step in that hierarchy and manages planning and self-control.

This neurological organization develops in hierarchical stages through primary movement patterns from conception to the toddler years. These designed movements are called primary reflexes. These reflexes allow the baby to make body movements before the cortex is fully mature. When these movements are done in the right proportion and the proper sequence, they contribute to integrating these primitive reflexes and give place to higher neurological organization called “functions.” The higher functions of the CNS relate to learning (memory, ability to categorize, logic), to attention span (arousal and inhibition) leading ideally to self-regulated behaviour.

Here is an analogy to help you understand. Let’s pretend that the brain is a building with a phone relay in its center (thalamus). Over the years, the electric connections are used, then replaced by newer ones. However, if certain connections are not updated because they have not been used enough, the phone relay will have connections from 1950 that makes the whole system inefficient. When the primary reflexes are not integrated, we find their manifestations in children and adults, who struggle with learning, attention span, behaviour and emotional dis-regulation.

“Non-integrated primitive movement patterns or reflexes force a person to function on a survival level. Survival leads to a narrowing of the attention span, lack of “cause and effect” in thinking, and poor spontaneous control of movements, skills and behaviour. As a result of this limited experience, a person automatically chooses “freezing” or “fight and flight” defense strategies for organizing his thinking and behaviour. The “choice” at a higher reasoning level is not available for this person, and they demonstrate lower motivation for learning and achievement.”

Svetlana Masgutova, Russian psychologist, *Integration of Infant Dynamic and Postural Reflex Patterns*

Sally Goddard from the *Institute of Neuro-Physiological Psychology* has done amazing work in the area of primary reflexes. Here is a list of the main primary reflexes that are involved in the brain development from birth (some are in place even before birth).

Primary dynamic reflexes:

Vestibular Activated Moro Reflex
Palmar Grasp Reflex
Hand Pulling Reflex
Babinsky Reflex
Leg Cross Flexion Reflex
Automatic Gait Reflex
Crawling Reflex
Spinal Galant Reflex
Spinal Pereze Reflex
Rooting Reflex
Sucking Reflex

Primary postural reflexes:

Walking/stepping Reflex
Babkin Palmomentary Reflex
Asymmetrical Tonic Neck Reflex
Symmetrical Tonic Neck Reflex
Plantar Reflex
Swimming Reflex
Hand Pulling Reflex
Hand Supporting Reflex
Landing Reflex
Landau Reflex
Trunk Extension Reflex

We also work with visual and auditory reflexes.

Let us look at five reflexes that are most commonly found “non-integrated” in people with different cognitive and emotional issues.

Fear Paralysis Reflex (FPR)

The Fear Paralysis Reflex is a withdrawal reflex that emerges in the embryonic stage. During this stage the embryo reacts to stress and stimulation by withdrawing and freezing. As the foetus' tactile awareness develops, withdrawal upon contact gradually lessens. It is thought that this reflex is the first step in learning to cope with stress. Ideally, the FPR merges into the Moro reflex and has become inactive before birth. If the FPR is not fully integrated at birth it may contribute to life-long challenges related to fear. People with the FPR active may often be very anxious and tend to veer towards negativity which can prevent them from easily moving forward to living a meaningful, interactive life. An active FPR often goes hand-in-hand with an un-integrated Moro reflex.

Symptoms suggesting that the FPR is not integrated:

- Low tolerance to stress
- Underlying anxiety or negativity
- Hypersensitivity to touch, sound, changes in visual field
- Shallow, difficult breathing, breath-holding
- Poor adaptability: dislikes changes
- Insecure, low self-esteem
- Depression/isolation/withdrawal
- Constant feelings of being overwhelmed
- Fear of social embarrassment
- Lack of trust in oneself
- Clinging (fear of separation from a loved one)
- Sleep & eating disorders
- Feeling stuck
- Elective mutism
- Compulsive and obsessive traits
- Withdrawal from touch
- Extreme fear of failure, perfectionism
- Phobias
- Aggressive or controlling behaviour, craves attention
- Temper tantrums
- Immediate motor paralysis under stress – can't think and move at the same time

The Moro Reflex

The Moro Reflex, one of the most basic and important reflexes to influence emotion and learning, emerges at nine weeks in utero and is fully present at birth. It should be integrated by four months after birth. The integrated Moro reflex should give place to the Strauss reflex (startle reflex). The Moro reflex manifests itself in a sudden movement of the arms extending with opening of the fingers and with legs folded, with a momentary freeze before the coming back of the arms and legs in a closed position.

The Moro Reflex develops:

- The survival mechanism in the first months of life
- An involuntary reaction to threat, whether real or not, such as change in one or several sensory receptors: visual, auditory or tactile, pain or temperature
- The baby's breathing mechanism
- The first "breath of life" at birth
- The opening of the windpipe if there is a threat of suffocation



Symptoms suggesting that the Moro Reflex is not integrated:

- Hyper-sensitivity to sudden change in his surroundings like bright light, loud noise, touch, temperature, change in body position, etc.
- A constant state of alert with reactions of fight, flight, or freeze: free floating anxiety (seemingly unrelated to reality)
- A withdrawal or aggressive behaviour, trying to control the environment with hyper-activity
- Poor adaptability: the person dislikes changes or surprises

The Tonic Labyrinthine Reflex (TLR)

The Tonic Labyrinthine Reflex (TLR) emerges in utero, is present at birth, and integrated at approximately four months after birth. As the head moves away from the spine, the arms and the legs extend (when the head moves backward) and they will curl when the head moves forward.

The TLR develops:

- The head-control essential for the development of all functions
- The head-control for the sense of balance:
(Ex: astronauts start “mirror-writing”)
- The proprioception (perception of different parts of the body in space, at rest or in motion)
- The vision perception
- The muscle tone



Tonic Neck Reflex Forward



Tonic Neck Reflex Backward

Symptoms suggesting that the TLR is not integrated:

- Poor posture
- Weak muscle tone
- Oculomotor dysfunctions
- Vestibular related problems such as tendency to get car sick
- Poor sense of time
- Poor sequential skills
- Poor organizational skills
- Dislike of sporting activities

The Asymmetrical Tonic Neck Reflex (ATNR)

The Asymmetrical Tonic Neck Reflex (ATNR) emerges at 18 weeks in utero, is present at birth, and should be integrated at six months. When the baby's head moves to one side, the arm and leg of the same side extend while the limbs of the other side bend. Most published research and articles on primary reflexes point to this reflex as being the most actively involved in the learning and attention span functions. This is called the "learning reflex."



The ATNR develops:

- The kicking movements in utero
- The muscle tone linked to the vestibular stimulation in utero
- The basis for the development of each hemispheric brain dominance: auditory and visual perception is more active on the side that the head is turned toward
- The ability to cross the auditory and visual midline
- The binaural hearing and binaural vision
- The listening, attention and learning processing
- The phonological awareness essential for reading efficiency
- The capacity to intentionally turn only his head without turning his whole body (arm and leg), an important basis for writing skills

Symptoms suggesting that the ATNR is not integrated:

- Difficulty in crossing the midline of the body: the child needs to "connect" with his midline in order to cross it
- Later in life, handwriting will be impaired: moving his head, shoulder and whole arm together when trying to use his fingers. He will constantly have to readjust this immature movement using too much energy that often yields poor results and becomes part of what is called "dysgraphia."

The Symmetrical Tonic Neck Reflex (STNR)

The Symmetrical Tonic Neck Reflex (STNR) emerges at six-to-nine months of life and should be integrated by 11 months. It manifests itself in the “creeping” movement of the baby on his hands and knees.



It may be seen as a stage of the labyrinthine reflex because of the crucial involvement of the vestibular system. Bender (1976) estimated that 75% of learning disabled children have retained STNR.

The STNR develops:

- The capacity to defy gravity as it synchronizes different systems to work together for the first time: the vestibular system (balance), the visual system (vertical tracking of the eyes), and the proprioception system (the perception of the torso being different than the limbs and yet in synchrony)
- The flexibility of the fingers as they open and close, as well as extend from each other to support the body, integrating the Grasp reflex which prepares for manual dexterity
- The eye-hand coordination with crossing of the midline
- Eye tracking and convergence develop the capacity to not lose his place when reading and to align the letters properly when writing
- The eye accommodation (through the rocking back and forth on hands and knees before moving forward) which will manifest in the capacity of copying from the board: ability to pass back and forth from near point vision to far point vision
- The capacity to sit effortlessly: capacity to push down on the legs while simultaneously lifting the hips, spine, and shoulders, resulting in a straight, upright position

- The sense of going forward and backward as well as the experience of stopping his speed in the movement constitutes an important basis for the control of attention span (inhibitory control)
- The link from the brainstem to the mid-brain to the cortex and pre-frontal cortex (through the reticular formation)
- The basis for written language (writing on the line and in straight columns)
- The corpus callosum, the “highway” between hemispheres, that allows information to move back and forth and is therefore a very important integrative structure

Symptoms suggesting that the STNR is not integrated:

- Poor posture, with tendency to “slouch”
- Poor hand-eye coordination: messy eater and “clumsy”
- Ape-like walk: right arm and right foot move forward, then left arm and left foot move forward
- “W” leg position when sitting on the floor
- Poor eye-hand coordination
- Difficulty changing focus from near point vision to far point (looking back and forth from his desk to the board is very slow)
- Difficulty learning to swim above the water
- Difficulty sitting in one position over a short time

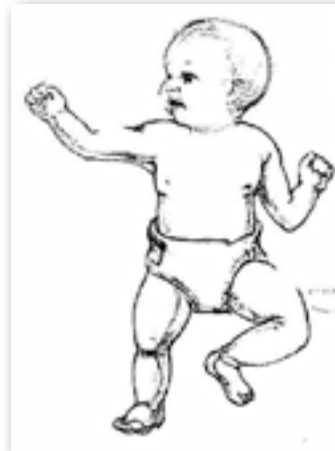
One of the main function of these reflexes integration is the development of the midline and space awareness which is so crucial for learning efficiency and behavioral self-regulation.



TLR: front and back



ATNR: right and left



STNR:
from the waist up and
from the waist down

This article is summarizing some of the reflexes that, when not integrated in a person, are part of the neurological root-based causes of labels such as Learning Disability, Dyslexia, Dysgraphia, Attention Deficit Disorder, Autism, Depression, Anxiety, Addiction, and many others. It is possible to give a “second chance” to the brain in providing the right movement patterns in the proper sequence: that is what neurodevelopmental functional re-organization is all about.

Here are some of the books on the subject of primary reflexes and its impact on the development of learning and attention skills:

Blomberg, Harald (2011) *Movements That Heal*

Goddard, Sally (2002) *Reflexes, Learning, and Behavior*

Goddard Blythe, Sally (2004) *The Well Balanced Child*

Goddard Blythe, Sally (2008) *What Babies and Children Really Need*

Goddard Blythe, Sally (2009) *Attention, Balance and Coordination*

Goddard Blythe, Sally (2012) *Assessing Neuromotor Readiness for Learning*

Goddard Blythe, Sally (2012) *Screening test for Physicians: Signs of Neuromotor Immaturity in Children and Adults*

Masgutova, Svetlana (2002) *Integration of Infant Dynamic and Postural Reflex Patterns*

Pheloung, Barbara (2004) *Help your Child to Learn*

Teitelbaum, Osnat and Philip (2008) *Does Your Baby Have Autism?*