

# Reflexes, Learning and Behavior

## A Window Into the Child's Mind

By Sally Goddard

*Neural development—not chronological age—determines at what time each reflex emerges and at what time it becomes inhibited. Thus the presence or absence of reflexes at key stages in development may be used as diagnostic signposts of central nervous system (CNS) maturity.*

It is when the withdrawal reflexes are gradually lessening, estimated at 9 weeks in utero, that the first of the primitive reflexes emerge. The Moro reflex appears at 9-12 weeks after conception and continues to develop throughout pregnancy so that it is fully present at birth.

## MORO REFLEX

Emerges: 9 weeks in utero  
Birth: fully present  
Inhibited: 2-4 months of life



### TRIGGERS TO THE MORO REFLEX:

1. Sudden, unexpected occurrence of any kind
2. Stimulation of the labyrinth by change in head position (Vestibular)
3. Noise (Auditory)
4. Sudden movement or change of light in the visual field (Visual)
5. Pain, temperature change, or being handled too roughly (Tactile)

### PHYSICAL RESPONSE TO THE MORO REFLEX,

1. Instantaneous arousal
2. Rapid inhalation, momentary "freeze" or "startle" followed by expiration—often accompanied by a cry

3. Activation of "fight or flight" response, which automatically alerts the sympathetic nervous system and results in :
  - A. release of adrenaline and cortisol into the system (The stress hormones)
  - B. increase in the rate of breathing, particularly in the apices (upper lobes ) of the lungs (Hyperventilation)
  - C. increase in heart rate
  - D. rise in blood pressure
  - E. reddening of the skin
4. Possible outburst, e.g. anger or tears

### LONG TERM RESPONSE

#### Poorly developed CO<sup>2</sup> reflex

*The CO<sup>2</sup> reflex causes spontaneous inhalation of the upper and lower part of the lungs. When CO<sup>2</sup> levels become too high in the blood, chemical changes take place in the medulla, which will then open the arteries to increase blood supply to the brain and at the same time stimulate deep breathing.*

The Moro reflex is a composite series of rapid movements made in response to sudden stimuli. It consists of a sudden symmetrical movement of the arms upward—away from the body—with opening of the hands, momentary freeze and then a gradual return of the arms across the body into a clasping posture. Abduction is accompanied by a sudden intake of breath. Adduction facilitates the release of that breath. Moro in 1918 emphasized his belief that it is essentially a "grasping" reflex, analogous to the one seen in young apes who instinctively cling to their mothers. He called it "Umklammerungsreflex" which literally translated means clasping reflex.

**Abduction:**  
opening of the arms  
and legs outward

**Adduction:**  
closing of the arms  
and legs as if to  
embrace or to clasp

The Moro reflex is an involuntary reaction to threat. The baby cannot yet analyze incoming sensation to assess whether that threat is real or not. The brain stem releases an immediate Moro response as if an emergency trip-switch were triggered automatically. It acts as the earliest form of "fight or flight" response and may be triggered occasionally in later life in situations of extreme danger. Essentially, however, it should be inhibited in its crude form from 2 to 4 months of age to be replaced by an adult startle reflex or Strauss reflex.

Its role as a survival mechanism in the first months of life is to alert, to arouse and to summon assistance. It is also thought to play a major part in developing the baby's breathing mechanism in utero, coinciding with the earliest breathing-like movements observed in the womb. It facilitates the first "breath of life" at birth and helps to open the windpipe if there is threat of suffocation.

If the Moro reflex fails to be inhibited at 2-4 months of life, the child

will retain an exaggerated startle reaction which may result in continued hypersensitivity in one or several sensory channels, causing him to over-react to certain stimuli. Sudden noise, light, movement or alteration of position or balance—any of these—may elicit the reflex at unexpected moments, so that the child is constantly “on alert” and in a heightened state of awareness. The Moro-directed child is poised on the edge of fight or flight through most of his waking moments, caught up in a vicious circle in which reflex activity stimulates the production of adrenaline and cortisol—the stress hormones. These same hormones increase sensitivity and reactivity so that both the trigger and the response are built into the system. Such a child may present a paradox—acutely sensitive, perceptive and imaginative on the one hand, but immature and over-reactive on the other. He may cope in one of two ways: by being the fearful child who “withdraws” from situations, has difficulty in socializing, and can neither accept nor demonstrate affection easily. On the other hand, he may become the over-active, aggressive child, who is highly excitable, cannot read body language and who needs to dominate situations. Either child will tend to be manipulative, as he attempts to find strategies which will give him some measure of control over his own emotional responses.

Adrenaline and cortisol are two of the body’s chief defenses against allergy and infection. If they are in constant use as “Leitmotif” in the child’s life, they are diverted from their primary function, and there may be insufficient stores available to provide good immunity and balanced response to potential allergens. This may be the child who picks up every cough and cold in circulation and who over-reacts to certain medication. The child may be sensitive to certain foods or food additives, which in turn will affect behavior and concentration. He will also tend to burn up blood sugar quicker than other children, which will further exacerbate swings in mood and performance.

*In the first 2-4 months of life, at the time when the Moro reflex is active, an infant's visual attention is drawn to the outside edges of shape and form and to sudden movement or change of light on the periphery of vision. If this continues, the child has difficulty ignoring peripheral visual stimuli and maintaining visual attention on the center. This can contribute to distractibility in the older child.*

The child who still has a Moro reflex will experience the world as too full of bright, loud and abrasive sensory stimuli. The eyes will be drawn towards changes in light and to every movement within his visual field. His ears may receive too much auditory information. He cannot filter out or occlude extraneous stimuli, so he becomes easily overloaded. He is, in effect, “stimulus bound.”

As Arnheim (1969) said, “Too many impressions which arrive from several sensory sources and which fall simultaneously on a mind which has not yet experienced them separately, will fuse for that mind into a single undivided object.”

What then are the symptoms which a parent or a teacher might recognize as being suggestive of a strongly residual or retained Moro reflex?

#### **LONG TERM EFFECTS OF RETAINED MORO REFLEX.**

1. Vestibular related problems such a motion sickness, poor balance and coordination, particularly seen during ball games

2. **Physical timidity**
3. **Oculomotor and visual-perceptual problems, e.g. stimulus bound effect (cannot ignore irrelevant visual material within a given visual field, so the eyes tend to be drawn to the perimeter of a shape, much to the detriment of perception of internal features)**
4. **Poor pupillary reaction to light, photosensitivity, difficulty with black print on white paper. The child tires easily under fluorescent lighting**

In bright light the pupils should automatically contract to reduce the amount of light entering the eye. In dim light, they should rapidly dilate to allow maximum light to reach the retina. Failure to do this may result in photosensitivity and/or poor night vision.

5. **Possible auditory confusion resulting from hypersensitivity to specific sounds. The child may have poor auditory discrimination skills, and have difficulty shutting out background noise.**
6. **Allergies and lowered immunity, e.g. asthma, eczema, or a history of frequent ear nose and throat infections**
7. **Adverse reactions to drugs**
8. **Poor stamina**
9. **Dislike of change or surprise—poor adaptability**
10. **Poorly developed CO<sub>2</sub> reflex**
11. **Reactive hypoglycemia**

*\*\*\* While other residual reflexes tend to have an impact on specific skills, it is the Moro which has an overall effect on the emotional profile of the child. \*\*\**

#### **POSSIBLE SECONDARY PSYCHOLOGICAL SYMPTOMS.**

1. **Free floating anxiety—"Angst" (continuous anxiety seemingly unrelated to reality)**
2. **Excessive reaction to stimuli**
  - A. **Mood swings—labile emotions**
  - B. **Tense muscle tone ( body armoring )**
  - C. **Difficulty accepting criticism, as this child finds it so difficult to change**
3. **Cycle of hyperactivity followed by excessive fatigue**
4. **Difficulty making decisions**
5. **Weak ego, low self esteem**
  - A. **Insecurity/Dependency**
  - B. **Need to "control" or "manipulate" events**

The Moro reflex is the only one of the primitive reflexes to be connected in some way to each one of the senses. As the earliest primitive reflex to emerge, it forms a corner-stone in the foundation for life and for living. It is essential for the neonate's survival, but its effects are profound if it fails to be inhibited at the correct time and transformed into an *adult startle response*.

*The adult startle response consists of a shrugging movement, followed by a turn of the head to check for the source of the disturbance, and once that has been identified, the infant proceeds with whatever it was doing.*

# The Neuro Functional Organization Chart The Profile of Development from Dr. Temple Fay, Neurosurgeon

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		<b>Visual</b>	<b>Auditory</b>	<b>Tactile</b>		<b>Manual</b>	<b>Language</b>	<b>Mobility</b>
<b>V11</b>	36-96 months	Reading & math at a grade 2 level laterality	Understanding of complete vocabulary laterality	Tactile identification of objects laterality	<b>C O R T E X</b>	Writing at a 2nd grade level laterality	Vocabulary/ good sentence structure (2nd gr) laterality	Skilled activities laterality
<b>V1</b>	22-67 months	Identification of visual symbols & letters within experience	Understanding of 2000 words and short sentences	Description of objects by tactile means		Bimanual function with one hand in a dominant role	2000 words of language and short sentences	Walking and running in complete cross-pattern
<b>V</b>	13-45 months	Differentiation of similar but unlike simple visual symbols	Understanding of 10-25 words of speech and two words couplets	Differentiation of similar but unlike objects		Cortical opposition bilaterally & simultaneously	10-25 words of speech and 2 word couplets	Walking with arms below waist
<b>IV</b>	8-26 months	Convergence Simple depth perception	Understanding of two words of speech	Perception of 3rd dimension in objects that appear to be flat		Cortical opposition in either hand	Two words of speech used spontaneously & meaningfully	Walking with arms in primary balance at/or above shoulder height
<b>III</b>	4-13 months	Detail perception Vertical tracking	Appreciation of detail meaningful sounds	Appreciation of gnostic sensation	Mid brain	Prehensile grasp	Creating meaningful sounds	Creeping toward cross pattern
<b>II</b>	1-4.5 months	Outline perception Horizontal tracking	Vital response to threatening sounds	Perception of vital sensation - pain	<b>P o o n s</b>	Vital release	Vital crying in response to threats to life	Crawling in prone position - cross pattern crawling
<b>I</b>	Birth	Light reflex	Startle reflex	Babinski reflex	<b>M e d u l l a</b>	Grasp reflex	Birth cry & crying	Movements arms- legs without bodily movement
		<b>S T E R E O P S I S</b>		<b>S T E R E O G N O S I S</b>				
		<b>S T E R E O P H O N E T I C</b>						