

Introduction to Primitive Reflexes

How to assess and treat retained primitive reflexes

by Barbara Luborsky, OTR/L

with information adapted from occupationaltherapy.com and solvelearningdisabilities.com

Primitive Reflexes

- **Definition:** Automatic responses crucial for infant development.
 - **Impact of Retained Reflexes:** Can lead to coordination, attention, learning, and emotional challenges.
 - **Signs of Retained Reflexes:** Clumsiness, focus issues, emotional outbursts.
 - **Assessment:** Each reflex can be assessed by having the child engage in specific movements in specific positions and observing specific responses.
 - **Intervention Strategies:** Targeted activities and exercises will help integrate reflexes.
-



Retained Primitive Reflexes (RPR) and ASD

[Copyright](#) © 2022 Melillo, Leisman, Machado, Machado-Ferrer, Chinchilla-Acosta, Kamgang, Melillo and Carmeli.

This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). terms.

Retained Primitive Reflexes (RPR) and ASD

RPR leading to **interregional brain dysconnectivity** associated w/ **maturational delays** in dev of brain networks

May result in

Increased cortical maturation and development in other networks

Leading to

Developmental asynchrony and unevenness of functional skills and symptoms

Indicating that **inhibition of RPR** can effect **positive change** in **ASD**.

There is a **close relationship** between retained primitive reflexes and cognitive and motor function in general and **in ASD** in particular

THE ULTIMATE CHEAT SHEET



PRIMITIVE REFLEXES CHEAT SHEET



A QUICK REFERENCE OF PRIMITIVE REFLEX DEVELOPMENT AND INHIBITION

;)

Reflex Name	Description	Age Develops	Age Inhibited	Signs and Symptoms of Retention
Moro Reflex	<ul style="list-style-type: none"> Considered the “fight or flight” response - activation of the sympathetic nervous system Triggered by sudden unexpected occurrence of any kind Arms and legs move outwards with quick inhalation, then freeze momentarily and then arms and legs tuck back in and the child exhales Accompanied by a possible outburst of cries 	Begins to develop 9 weeks in utero	2-4 months of life	<ul style="list-style-type: none"> Hypersensitive/reactive Poor impulse control Vestibular related problems such as motion sickness, poor coordination (noticeable in ball games) Physically timid Oculomotor and visual perception problems Poor pupillary control (sensitivity to light) likely caused by adrenal fatigue Poor auditory discrimination Dislike of change or surprise
Palmar Reflex	<ul style="list-style-type: none"> Light touch or pressure in the palm of the hand will cause the fingers to close 	Begins to develop 11 weeks in utero	2-3 months of life	<ul style="list-style-type: none"> Poor manual dexterity/fine motor skills Poor writing skills (messy writing or pressing too hard) Speech difficulties (hand and mouth relationship via the Babkin response)
Asymmetrical Tonic Neck Reflex (ATNR)	<ul style="list-style-type: none"> Movement of baby’s head to one side will result in extension of the arm and leg to the side that the head is turned and bending of the limbs on the other side of the body ATNR assists in a vaginal birth 	Begins to develop 18 weeks in utero	Approx. 6 months of life	<ul style="list-style-type: none"> Balance may be affected as a result of head movement to either side Homolateral, instead of normal cross-lateral movements when walking, marching, skipping etc. Difficulty crossing the mid-line Poor ocular pursuit movements (eye tracking) Difficulties with hand eye coordination Poor handwriting and poor expression of ideas on paper
Rooting Reflex (Grasp Reflex)	<ul style="list-style-type: none"> Searching, sucking and swallowing reflex Light touch of the cheek or stimulation of the edge of the mouth will cause the baby to turn the head toward the stimulus and open the mouth in preparation for sucking 	Begins to develop 24-28 weeks in utero	3-4 months of life	<ul style="list-style-type: none"> Hypersensitivity around lips and mouth Tongue may remain too far forward in the mouth (makes swallowing and chewing of certain foods difficult) Speech and articulation problems Poor manual dexterity (Babkin response)
Spinal Galant Reflex	<ul style="list-style-type: none"> Assists in the birthing process While the child is in the prone position, stimulation of the 	Begins to develop 20 weeks in utero	3-9 months of life	<ul style="list-style-type: none"> Fidgeting Bedwetting

Reflex Name	Description	Age Develops	Age Inhibited	Signs and Symptoms of Retention
Tonic Labyrinthine Reflex (TLR)	<ul style="list-style-type: none"> Two parts to this reflex: flexion (forward) and extension (backwards) Basis for head management and postural stability using major muscle groups Reflex is elicited by either moving the head forward (flexion) or backwards (extension), either above or below the spine TLR exerts a tonic influence on the distribution of muscle tone throughout the body - helping the baby "straighten out" from the flexed position in the womb Balance, muscle tone (balance between flexor and extensor muscles) and proprioception are all trained during this process 	<p><u>Flexion</u>: Begins to develop in utero</p> <p><u>Extension</u>: Present at birth</p>	<p><u>Flexion</u>: Approx. 4 months of life</p> <p><u>Extension</u>: Up to 3 years old</p>	<ul style="list-style-type: none"> Poor posture - stoop (Flexion) walk on toes (Extension) Hypotonus -weak muscle tone (Flexion), stiff jerky movements (Extension) Vestibular problems (poor sense of balance, motion sickness) - (Flexion and Extension) Oculomotor dysfunctions - visual-perceptual difficulties and spacial perception problems (Flexion and Extension) Poor sequencing (Flexion and Extension) Dislike of sporting activities (Flexion) Poor sense of time (Flexion) Poor organizational skills (Extension)
Symmetrical Tonic Neck Reflex (STNR)*	<ul style="list-style-type: none"> Two parts to this reflex: flexion (forward) and extension (backwards) When child is prone resting on all four limbs, flexion of the head causes the arms to bend and the legs to extend Head extension, on the other hand, causes the legs to flex and the arms to straighten. Helps the child to defy gravity by getting up off the floor onto hands and knees from the prone position Helps to inhibit the TLR and forms the bridge to the next stage of development 	Both flexion and extension emerges 6-9 months of life	Both flexion and extension 9-11 months of life	<ul style="list-style-type: none"> Poor posture Tendency to "slump" when sitting especially at desk/table Simian (ape like) walk Poor hand-eye coordination such as copying from the board Inability to sit still and concentrate
Landau Reflex*	<ul style="list-style-type: none"> Helps to inhibit the TLR and forms the bridge to the next stage of development Engages the extensor tone throughout the body in the prone position if the baby is suspended in the air with support under the stomach 	Emerges 4-5 months of life	3.5 years of life	<ul style="list-style-type: none"> Affects the development of balance and muscle tone in rapidly changing conditions Runs with stiff awkward movement Find hopping , skipping and jumping difficult

Moro Reflex - often referred to as “startle reflex”, serves infant as a protective response to a sudden movement or a loud noise

An **unintegrated moro reflex** can be connected to symptoms of motion sickness, decreased eye contact, light and sound sensitivity, allergies, poor immune system, anxiety and emotional dysregulation, and challenges with sports involving hand-eye coordination - “fight or flight”

Test:

Have the child sit on a low chair. Ask them to open their arms and legs out like a starfish. Now ask them to bring them in crossing them as they curl up. Then ask them to spread arms and legs out again and cross/curl up, again but with the same arm as leg on top. Right leg and right arm on top. Their head should go backwards as they spread their arms and legs out and then come in so that their chin touches their chest as they curl up. They should alternate sides - crossing the same sided arm and leg.



If they struggle doing this, the reflex is likely still present. Exercises needed!

Moro

Main Exercise: Starfish

HEP:
10x per side,
1-2 times per day

EXERCISES FOR RETAINED MORO REFLEX



Open arms/legs in starfish position Move slowly, counting to 5 between positions Cross Right Arm and Right Leg over Left Move slowly, counting to 5 between positions Open arms/legs in starfish position Move slowly, counting to 5 between positions Cross Left Arm and Left Leg over Right

Emphasize neck extension in starfish position, and flexion when crossing over

Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and able to consistently do 10 repetitions of starfish exercise with smooth, coordinated movements, alternating same side arm and leg

Starfish Exercise

Rooting Reflex - helps infants to initiate feeding

An **unintegrated rooting reflex** an be connected to extreme picky eating, speech/articulation issues, chewing/swallowing deficits, excessive drooling, and latch difficulties in infancy

Test:

Stroke down around one side of the child's mouth from nose to chin. Do this three times, moving a little further out each time. Repeat on the other side of the mouth.

Rooting Reflex Test

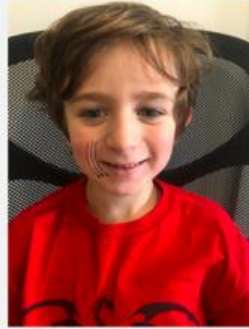


Look for their mouth or hands to twitch on either side. If it does, the reflex is most likely still present. Exercise Needed!

Rooting

Main Exercise: Input to Face and Mouth

1. Stroke face in horizontal direction from ear to mouth, with light pressure. Make 3 strokes, ½ inch lower than previous stroke.



2. Stroke face in vertical direction from nose to chin, with light pressure. Make 3 strokes, ½ inch higher than previous stroke.

HEP:
3 strokes on each side, for each exercise,
5 times per day

Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and no twitching in mouth or hand during exercise

Exercise to Address Retained Rooting

Palmar Reflex - connected to foundational use of hand

An **unintegrated palmar reflex** can be connected to poor handwriting, tactile sensitivity, decreased upper body strength, poor hand dominance, right/left confusion, speech/articulation challenges, tongue movement during fine motor tasks

Test:

Have your child hold their hands out toward you with arms straight, palms open flat and up. Brush along their lifeline crease starting between their thumb and finger, then across their palm toward their wrist. Do this 3 times. Look for their fingers to twitch or their elbows twitch or bend in slightly. Do this on both hands.

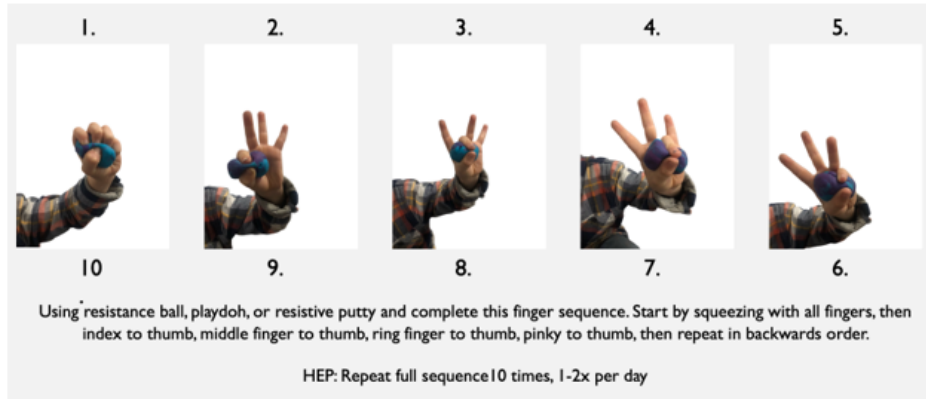


If either hand or elbow shows movement, the reflex is most likely present. Exercise both hands. Alternatively: have the child complete “finger touches” exercise, difficulty completing the sequence can indicate that the reflex is still present.

Palmar

Exercise to Address Retained Palmar

Main Exercise: Finger Touches



Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and ability to consistently complete hand exercise with smooth and accurate sequencing and movements

Asymmetrical Tonic Neck Reflex (ATNR) - connected to infants developing separation of both sides of the body and ability to coordinate movement

An **unintegrated ATNR** can be connected to symptoms of eye tracking difficulty, poor crossing midline, poor hand dominance, right/ left confusion, mixes b's and d's during writing, clumsy gross motor skills

Test:

You can also have them get down on their hands and knees like a “kitty” with their head straight out and face toward the floor. Ask them to look to one side then to the other side, keeping their neck and arms straight. Have them complete this 10 times and then ask them to let you use your hands to gently turn their head.



When their head is turned to the side, look for elbows to bend or the body to shift from one side to the other. If so, the reflex is most likely present. Exercises needed!

ATNR

Main Exercise: Lizards



Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and ability to turn head while on all fours or with arms out straight without elbows bending

Exercise to Address ATNR



ATNR

Pediatric
Potentials

The Robot

Smile



Spinal Galant Reflex - encourages movements in infants and helps to develop range of motion in the hip in preparation for walking and crawling

An **unintegrated spinal galant reflex** can be associated with symptoms of fidgeting, bed wetting beyond age 5, sensory sensitivities, reading difficulties, "Ants in the pants", and decreased concentration

Test:

Have the child get down on their hands and knees like a "kitty". At the lower part of their back, stroke down one side of the spine, then the other.



If the child's muscles on the same side tighten, twitch, or jerk, the reflex is most likely still present. Do this to both sides. If either side twitches, exercises needed!

Spinal Galant

Main Exercise: Snow Angels



Have the child slowly move arms and legs up and out to a count of 10 going out and then back in for at least 10 repetitions, once per day.

Exercise to
Address
Spinal
Galant

Tonic Labyrinthine Reflex (TLR) - with the development of neck and head control, increases muscle tone, improves posture and balance, and develops the proprioceptive and balance senses

An **unintegrated TLR** can be associated with poor balance, difficulty with ball games, visual-perception challenges, auditory processing challenges, decreased organizational skills, spatial awareness difficulties

Test:

Have the child lie on their stomach with arms down to the side and legs straight. Have the child raise his head, legs, and arms off the floor while keeping arms and legs straight.



If they cannot keep both legs straight and hands up, the reflex is most likely still present. Exercises needed!

TLR

Main Exercise: Superman and Popcorn hold



Exercises to Address TLR

Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and ability to hold “superman” (prone extension) and “popcorn” (supine flexion) positions for at least 20 seconds each.

Landau: helps the child develop posture skills

An **unintegrated Landau** will cause low muscle tone, poor posture and motor development, short term memory difficulty, toe walking/tension the back of the legs, weak upper body, lack of stimulation in the prefrontal cortex causing attention/ organization and concentration issues

Test:

Have the child lay flat on the floor, face down with arms straight out in front. Have the child lift their upper body and arms off the ground while keeping the top of their feet on the floor.



If they struggle with keeping both feet flat on the floor, the Landau Reflex is most likely still present. Exercises needed!

Landau

Main Exercise: Half Superman



The exercise uses the same positioning as the testing. You'll just instruct them to lift their upper body and arms off the floor to a point that they're able to maintain their feet on the floor. Most likely, the child will be able to lift their head off the floor, but then trying to move their arms off the floor will be where we see the challenge.

You might need to help support

their arms while also giving pressure at their feet or legs to help keep that positioning correct. They need to have their legs down and arms up. They will start really low, and we want to get them to a place where their head and chest, and arms are fully off the ground and hold that for 15 seconds. Again, at first, it may be one inch and one second off the ground.

Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and ability to hold a half superman with good form consistently for at least 20 seconds.

Exercise to Address Landau

Symmetric Tonic Neck Reflex (STNR) - helps your infant learn to move the top half and the bottom half of their body independently from each other

An **unintegrated STNR** can be connected to symptoms such as poor posture, low tone, laying head on desk while writing, decreased ball skills, clumsiness, messy eating, decreased attention, difficulty copying from the board, and a poor crawling pattern; common in children who skipped crawling or had a short crawling period

Test:

Have the child get down on their hands and knees, with their neck straight and their body slightly forward enough to put weight over their hands. Now ask the child to lower the head bringing the chin toward the chest slowly, then raise head up toward their back. Have them repeat this 10 times.

Symmetrical Tonic Neck Reflex Test



Repeat 3 times.

www.SolveLearningDisabilities.com

If you notice legs twitching, back trying to arch up when head is up, arms bending or body weight shifting back toward their legs when head goes up, the reflex may still be present. Exercise needed!

STNR

Main Exercise: Cat Cow



Chin tucked, head down, back arched



Head up and back, stomach down

Date Tested	Symptoms Present	Reflex Present During Testing

Signs of Integration: decreased symptoms and able to consistently do 10 repetitions of cat cow exercise with smooth, coordinated movements, without “collapsing” in lower or upper body, bending of arms or legs, weight shifting, or back twitching

Exercise to Address STNR

Primitive Reflex Exercise Tracker

Child's Name: _____

Reflex: _____

Exercise: _____

Date started: _____

Have the teacher or parent track how often the child does the exercise and how many were done each time.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Primitive Reflex Tracking Sheet

Child's Name: _____



Reflex	Symptoms of Reflex Present	Reflex Present During Testing	Integrated
Moro			
Rooting			
Palmar			
ATNR			
Spinal Galant			
TLR			
Landau			
STNR			

Use this form to track information you collect about each reflex as you assess and then address it

Resources and References

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9301367/>

<https://www.mychildwillthrive.com/wp-content/uploads/Primitive-Reflexes-Cheat-Sheet-Final.pdf>

occupationaltherapy.com

solvelearningdisabilities.com

[short video from Harkla- You Might Have Retained Primitive Reflexes if You Notice These 3 Signs](#)