BEYOND THE ADJUSTMENT: SUPPORTING PEDIATRIC REFLEX INTEGRATION + DEVELOPMENTAL MILESTONES

Erica Boland DC, CPM, LM

01.

UNDERSTANDING PEDIATRIC REFLEXES

NEONATE

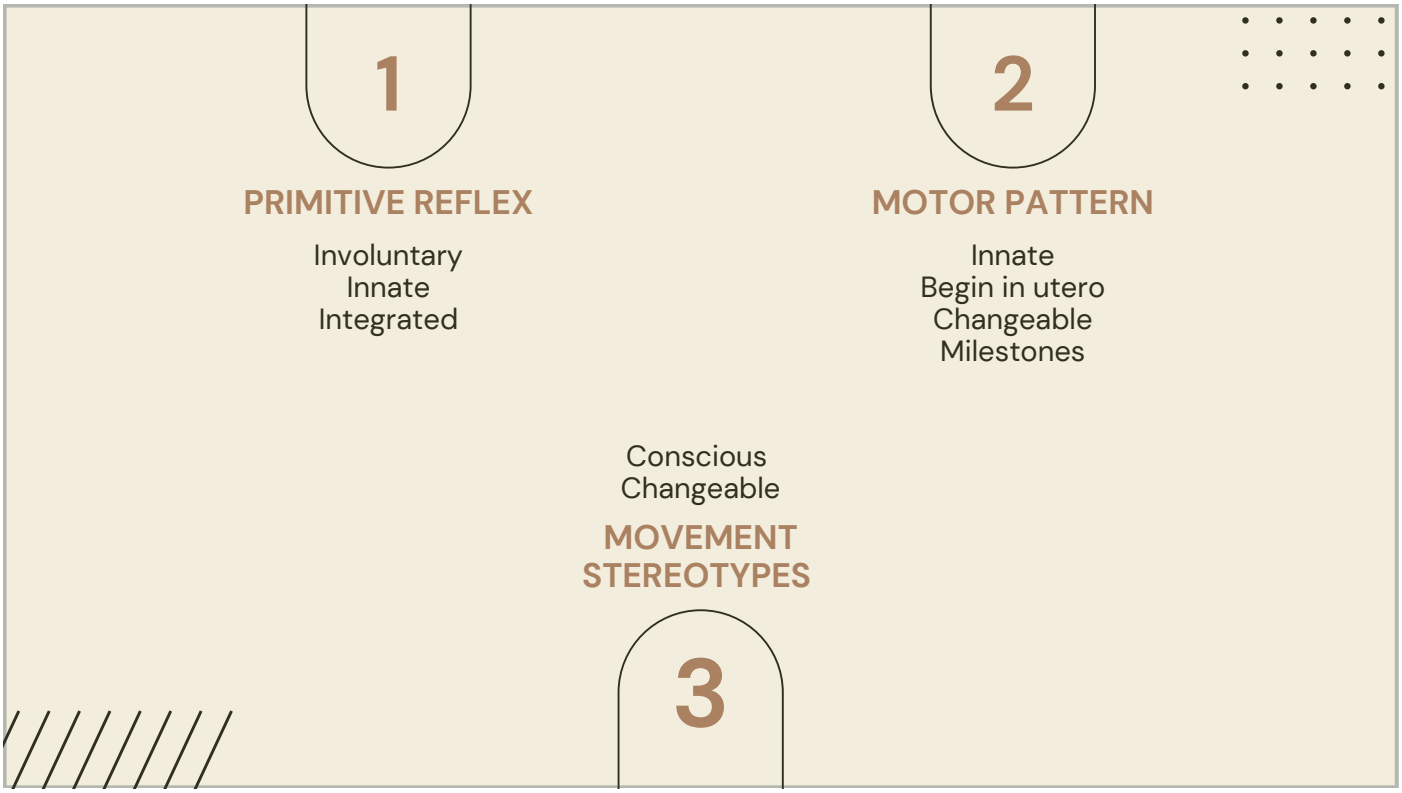
Motor Patterns | Milestones
0-12 months

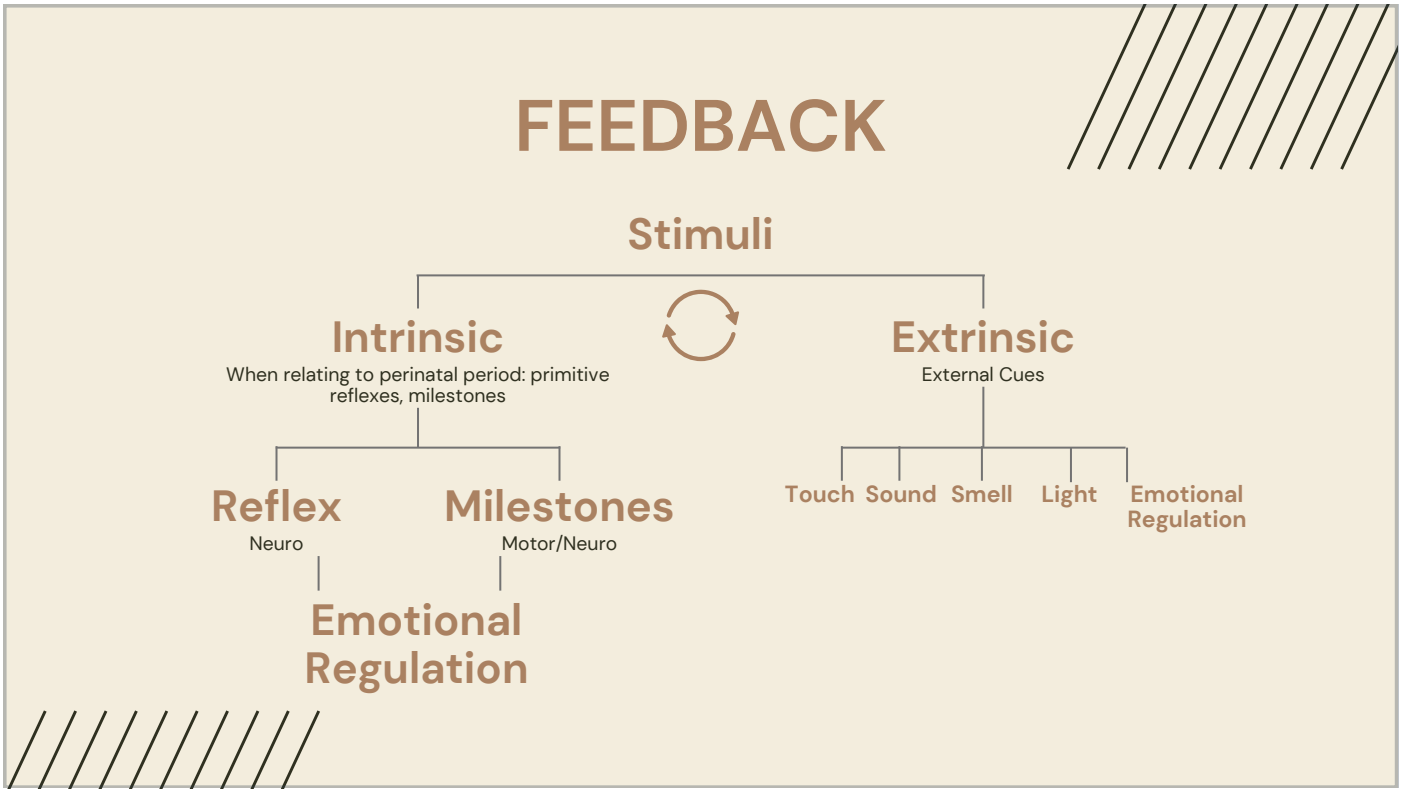
IN UTERO

Primitive Reflexes
28 weeks gestation
32 weeks gestation
34-42 weeks gestation

LIFESPAN

Movement Stereotypes


1
PRIMITIVE REFLEX
Involuntary
Innate
Integrated
2
MOTOR PATTERN
Innate
Begin in utero
Changeable
Milestones
Conscious
Changeable
MOVEMENT
STEREOTYPES
3



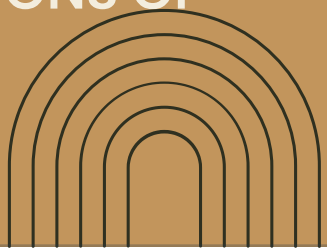
Davis et al.8 found
that prone sleeping was significantly associated with earlier attainment of head control, rolling, tripod sitting, creeping, crawling, and pulling to stand.

Dewey et al. 9 noted that
prone sleeping infants, in comparison with supine sleeping infants, achieved significantly higher gross motor scores on the Denver Developmental Screening Test

“Prone sleep and prone play enhance motor scores’

"CONSISTENT CRAMPED SYNCHRONIZED GMS ARE HIGHLY PREDICTIVE OF LATER DEVELOPMENT OF CEREBRAL PALSY. THE FIDGETY MOVEMENT QUALITY THAT APPEARS AT THE AGE OF 2 TO 3 MONTHS WAS FOUND TO BE A MOST SENSITIVE PREDICTOR OF NEURODEVELOPMENTAL OUTCOME IN DIFFERENT POPULATIONS OF INFANTS."

ZUK, 2011



Assess early

02.

REFLEX ASSESSMENT TECHNIQUES

PRIMITIVE REFLEX BASICS

MORO
ROOTING
PALMER
ATNR
Galant
TLR
Landau
STNR



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Reflex Table

Reflex	Purpose	Age Appears	Age Integrates	Signs of Retention
Moro Reflex	Fight or Flight reaction, sympathetic nervous system response	Birth	2-4 Months	Hypersensitivity to one or more sensory systems, vestibular deficits (motion sickness, poor coordination and balance), oculomotor and visual-perceptual problems, poor pupillary reactions to light, hypersensitivity to auditory input, allergies and lowered immunity, adverse drug reactions, poor stamina, poor adaptability, reactive hypoglycemia.
Rooting Reflex	Autonomic Response to locate food and breast	Birth	3-4 Months	Anterior Tongue Tie, thumb sucking, oral hypersensitivity, poor eating, speech and articulation problems, swallowing and chewing deficits.
Palmar Grasp Reflex	Autonomic Flexion of the fingers to grab when the palm is stimulated	Birth	3-6 Months	Poor manual dexterity, deficits wiyh pencil grip, poor visual coordination, poor posture during handwriting, poor writing skills, correlated speech and hand movements, dysfunction of the tactile and proprioceptive ensory systems
Asymmetric Tonic Neck Reflex (ATNR)	Assists with movement through the birth canal at delivery and is important for cross pattern movements	Birth	6 Months	Decrease hand eye coordination, poor handwriting, uncoordinated gait, poor balance, poor visual motor skills and tracking, problems with math and reading, difficulty crossing midline.

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Reflex Table

Reflex	Purpose	Age Appears	Age Integrates	Signs of Retention
Spinal Galant Reflex	Important during the birthing process and helps to facilitate movement of the hips during descending the birthing canal	Birth	3-9 Months	Postural issues like scoliosis, misaligned or rotated pelvis, and pain in lower back, bedwetting after potty training, hyperactivity, attention and concentration issues, decreased endurance, chronic digestive issues, decreased lower body coordination, pain and tension in legs.
Tonic Labyrinthine Reflex (TLR)	Foundation for postural stability for large muscle groups	In Utero	3 & 1/2 Years	Decreased balance, poor spatial awareness, toe walking, hypermobility of joints, weak muscles, poor posture, motion sickness, poor ability to climb, atypical head position (forward to side)
Landau Reflex	Necessary for postural development	4-5 Months	1 Year	Poor posture and muscle tone, summersaults are challenging, poor coordination for activities that require upper body and lower body to move together, delayed motor development.
Symmetric Tonic Neck Reflex (STNR)	Foundation for crawling	6-9 Months	9-11 Months	Poor posture in standing, poor seated posture, ape-like walk, low muscle tone, W sitting position common, sloppy/messy eater, poor hand/eye coordination.

GALANT

INTEGRATE

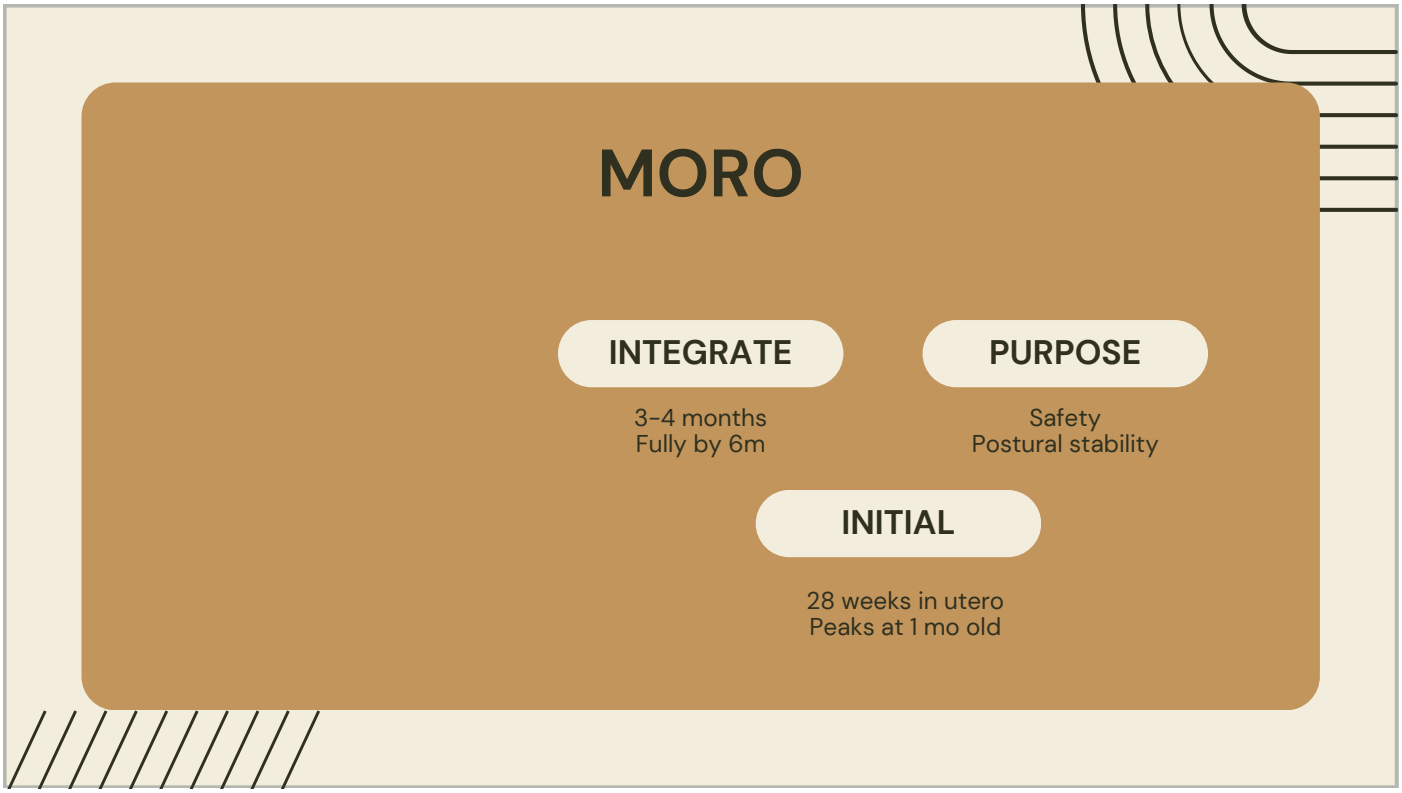
4-6 months (when rolling starts)

PURPOSE

Navigate birth canal
Differentiation of hips

INITIAL

35 weeks


MORO
INTEGRATE
3-4 months
Fully by 6m
PURPOSE
Safety
Postural stability
INITIAL
28 weeks in utero
Peaks at 1 mo old

ROOTING

INTEGRATE

3w-4m

PURPOSE

Locating food

INITIAL

32 weeks in utero

SUCKING

INITIAL	INTEGRATE	PURPOSE
14 weeks in utero	2 mo becomes voluntary Salivate while holding objects	Food coordination with breath coordination with swallow

PALMAR

INTEGRATE

5-6m
When hand becomes integrated in support

PURPOSE

Feeding, Babkin repsonse

INITIAL

In utero

PLANTAR

INTEGRATE

Up until 1-2 years
Full foot integration

PURPOSE

Babinski sign
feeding

INITIAL

In utero / birth

FENCER

INTEGRATE

3m old

PURPOSE

Cervical spine rotation
Hand/Eye Coordination

INITIAL

35w gestation

TONIC LABYRINTHINE

INTEGRATE

Flexion 4m
Extension 3yrs

PURPOSE

Birth position
breech/cephalic
Forward and Backward
response to gravity
Balance coordination

INITIAL

3rd trimester in utero

STEPPING

INTEGRATE

2-5m

PURPOSE

Hip differentiation
Walking

INITIAL

Birth

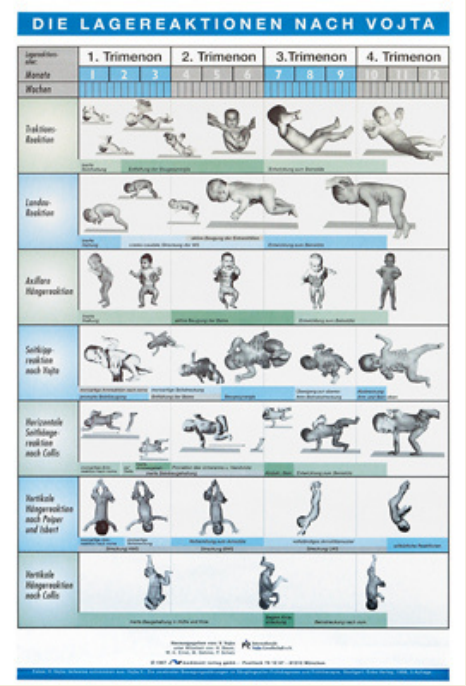
VOJTA

"The reflex locomotion elicited by **Vojta therapy** is associated with specific changes in **cortical and subcortical brain activation** when compared to the sham treatment.

Tactile stimulations on pre-defined zone of body activates central nervous system.

If stimulation is given correctly and repeatedly, motor pattern generated are learned by brain and could be executed voluntarily by an individual.

Moreover, it can activate vegetative and autonomic reactions such as **eye coordination, jaw and tongue movements, bowel and bladder coordination, sucking, swallowing and breathing.**"



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Vojta Table

Key Motor Milestones in the First Year of Life

Dr. Vaclav Vojta & E. Schweizewr

The table describes the IDEAL Development. Deviations within 6 weeks of the declared age are still the norm. Large Time Deviation inevitably mean the Development of Abnormal Movement Patterns.

	1st Trimester			2nd Trimester			3rd Trimester			4th Trimester			
Month	1	2	3	4	5	6	7	8	9	10	11	12	13
	Stage of Primitive Reflexes	**Subsiding Primitive Reflexes**	**Differentiating Phase of Gross Motor Function**					**Verticalization Phase and Beginning of Fine Motor Skills**					
Contact with the Surroundings	**0 - 1 Short Term** Turn to stimulation Receive sounds, smells, touch, sights.	**1.5** Contact with environment with watching and hearing. Laughs. Monotone Vocalizations		**4** Shouts with glee. Laughs Modulates Vocalization	**5** Identifies people			**8** Richly mimics. Plays. Afraid of Strangers.			**11.5** Concrete formation of sounds	**12** First Word	
Support Function of Upper Extremities	**0 - 1.5** No Support Capabilities Only Support point in area of Xiphoid	**0.5** Optic and Different orientation. Short duration lifting of upper part of axis organ on the forearms. Support point: Distal forearm. COG: Caudalwards in area between sternum and navel		**3 Symmetric Elbow Support:** Head is held and carried for a long time outside support area. Upper arm flexes 90°. Support function: Humerus. COG: Caudalwards in high navel.	**4.5 Single Elbow Support:** Head and grip arm will be carried outside the support area. Grip arm flexes 120°. Support function: One arm, same hip, opposite thigh. COG: Caudalwards to lower 1/2 of navel and lateral.		**6 Symmetric Arm Support:** Support function: Arms and thigh. COG: Caudalwards in high pelvis.	**7 4-Foot Stand** (homolateral pattern). Support function: Arm and thigh. Support point: Hand & Knee. COG: Only cranial/caudal - ends in rocking horse (for 2-3 wks)	**8 Seal Crawl Diagonal Sit:** Support Function: One arm. side of gluteals and thigh.	**8 - 9** High pull to standing. Flexion movement of the arm over 120°	**9-10** Coordinated crawling	**11 - 13** Step sideways with both hands holding. **11 - 13** In standing can be busy with either hand.
Support Function of Lower Extremities	**0 - 1** Thigh bends to at least 90° Hyperlordosis of L\S **NO** support capabilities	**1 - 2** Lessening of bending posture. Begin with relaxed leg stretch in outer rotation.		**3** Legs relaxed in extension, outer rotation, abduction. Support Function: Upper arm & pelvis. Support point; Symphysis & epicondyles. COG: Caudalwards in high navel.	**4.5** Face side thigh in support function. Support point:Medial epicondyer of arm, same side hip, and opposite medial epicondyer of femur. COG Caudalwards to lower 1/2 of navel and lateral.	**5 - 6** Swimmer	**6** Support function: Both thighs and arms. Support Point: Both thighs and hands. COG: Caudalwards in high pelvis.	**7 Diagonal Sit:** First sideways	**8-9 Long Sit.**		**11.5 - 12.5** Free Walking.	**11.5 - 12.5** Free Stand with wide base.	

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	Stage of Primitive Reflexes	Subsiding Primitive Reflexes		Differentiating Phase of Gross Motor Function				Verticalization Phase and Beginning of Fine Motor Skills					
Grip of the Hand	**0 - 1.5 Holokinetic Phase** The whole body reacts with moro reflex upon sudden stimulation	**2 - 3 Dystonic Phase** Irradiating contact with the whole body.	**About 2 Hand to Hand Coordination.** Hands come together with associated pull of legs	**4 Goal Directed Grip** of the hand to side. First segmental mobility to the side of visual field. Hand opens and grips from ulnar side. Grip reflex of hand lessens	**4.5 - 6** Grip over midline with development of radial grip **5 - 6** Hand-Genital-Coordination. Hand-Thigh-Coordination. Change object from hand to hand. Grip reflex disappears		**6 - 7** Hand-Foot-Mouth-Eye Coordination	**7.5 - 8 Forceps Grip.** Begin fine motor function	**8 Goal Directed Grip to Above.** Shoulder flexion above 120°	**9 Pincer Grip** with the thumb.			
Grip of the Foot	**0 - 1.5** Primitive kicking foot in eversion with bending.	**6 & 7 Weeks Fencers Position:** Optical contact with position of the whole body with hand & foot grip function.		**After 3.;** All leg its in 90° flexion. Carried outside support point, feet held in frontal plane. COG: Shifting Cranial.	**4** Foot-Foot-Coordination. Thigh in light abduction/external rotation.	**4 - Ends 6** Associated Grip movement of the foot with goal directed grip of the hand.	**6 - 7** Foot-Hand-Eye-Mouth-Coordination.						
Turning				**4-6** Forming the turning event from back to belly.	**4.5** COG: shifts headward & lateral while in back lying. Diagonal pelvis in frontal plane. Begin to turn from back to side.	**6** Side lying unstable. Coordination turn from back to stomach.	**7 - 8** Secure side lying. COG: Changes from secure side lying to back and front. 8 Diagonal Sit		Coordination turn from back to stomach.				

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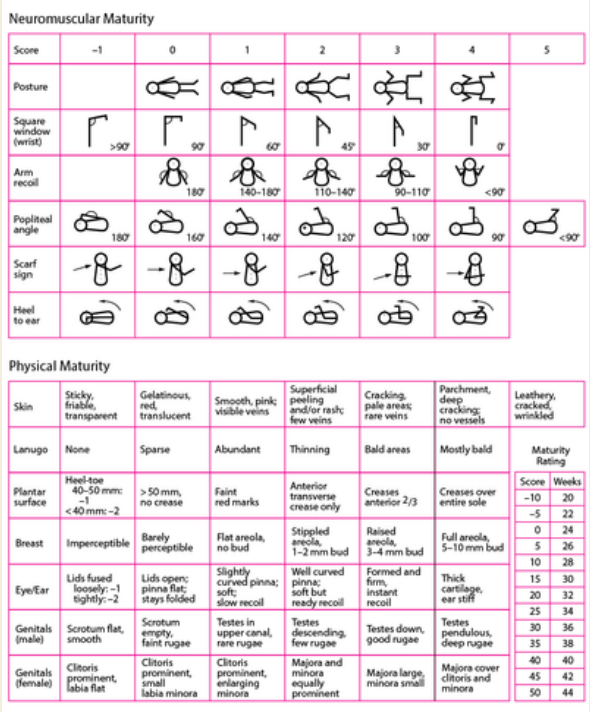
	Stage of Primitive Reflexes		Subsiding Primitive Reflexes		Differentiating Phase of Gross Motor Function			Verticalization Phase and Beginning of Fine Motor Skills					
Sight	**0 - 1** Puppet Eye Phenomena Brief Fixation (2-3 sec)	**1** Longer visual fixation with view contact near. **Visual Orientation:** The most important assumption for orientation in space is seeing. **1 - 1.5** Visual Orientation with view turning in same direction as head turn.		**3** View turns partially free: Eyes go to 30° from midline as 1st isolated movement to side.	**4 Reflex Facial Optics.** With latest 6 months. 100% available.								
Mouth	Prenatal Period **Rooting Reflex.** Strongly positive. Sucking reflex is positive in whole area of Trigeminal Nerve (grip mechanism)		At the end of 1st month, the suck reflex in triggerable in peri-oral area.	**3** Suck reflex reducing.	**4 - 6** Subsiding rooting and reflex sucking.	**4** Have a bite.	**5 - 6** Massive salvation with use of grip. **6** Chewing						

Glossary:

COG: Center of Gravity
Xiphoid Area: Small, triangular part of the sternum
Caudalwards: Directed toward or situated in or near the posterior part of the body.
Hyperlordosis L/S: Pronounced inward curving of the lumbar spine.
Epicondyle: Projection on the condyle (site for the attachment of muscles).

Ballard's Score

Midwifery neonate assessment tool



Neuromuscular Maturity

Score	−1	0	1	2	3	4	5
Posture							
Square window (wrist)	>90°	90°	60°	45°	30°	0°	
Arm recoil		180°	140–180°	110–140°	90–110°	<90°	
Popliteal angle	180°	160°	140°	120°	100°	90°	<90°
Scarf sign							
Heel to ear							

Physical Maturity

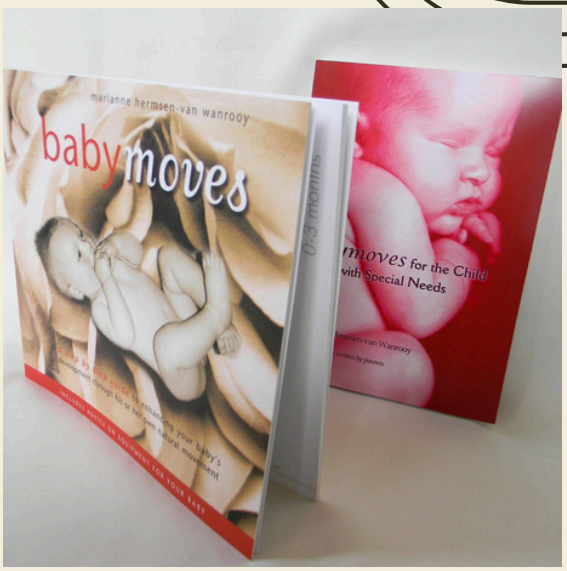
Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink; visible veins	Superficial peeling and/or rash; few veins	Cracking, pale areas; rare veins	Parchment, deep cracking; no vessels	Leathery, cracked, wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	
Plantar surface	Heel-toe 40–50 mm: −1 <40 mm: −2	>50 mm, no crease	Faint red marks	Anterior transverse crease only	Creases anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola, no bud	Stippled areola, 1–2 mm bud	Raised areola, 3–4 mm bud	Full areola, 5–10 mm bud	
Eye/Ear	Lids fused loosely: −1 tightly: −2	Lids open; pinna flat; stays folded	Slightly curved pinna; soft; slow recoil	Well curved pinna; soft but ready recoil	Formed and firm, instant recoil	Thick cartilage, ear stiff	
Genitals (male)	Scrotum flat, smooth	Scrotum empty, faint rugae	Testes in upper canal, rare rugae	Testes descending, few rugae	Testes down, good rugae	Testes pendulous, deep rugae	
Genitals (female)	Clitoris prominent, labia flat	Clitoris prominent, small labia minora	Clitoris prominent, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	

Maturity Rating	
Score	Weeks
−10	20
−5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

BABY MOVES

Baby Moves + Baby Moves for the Child with Special Needs

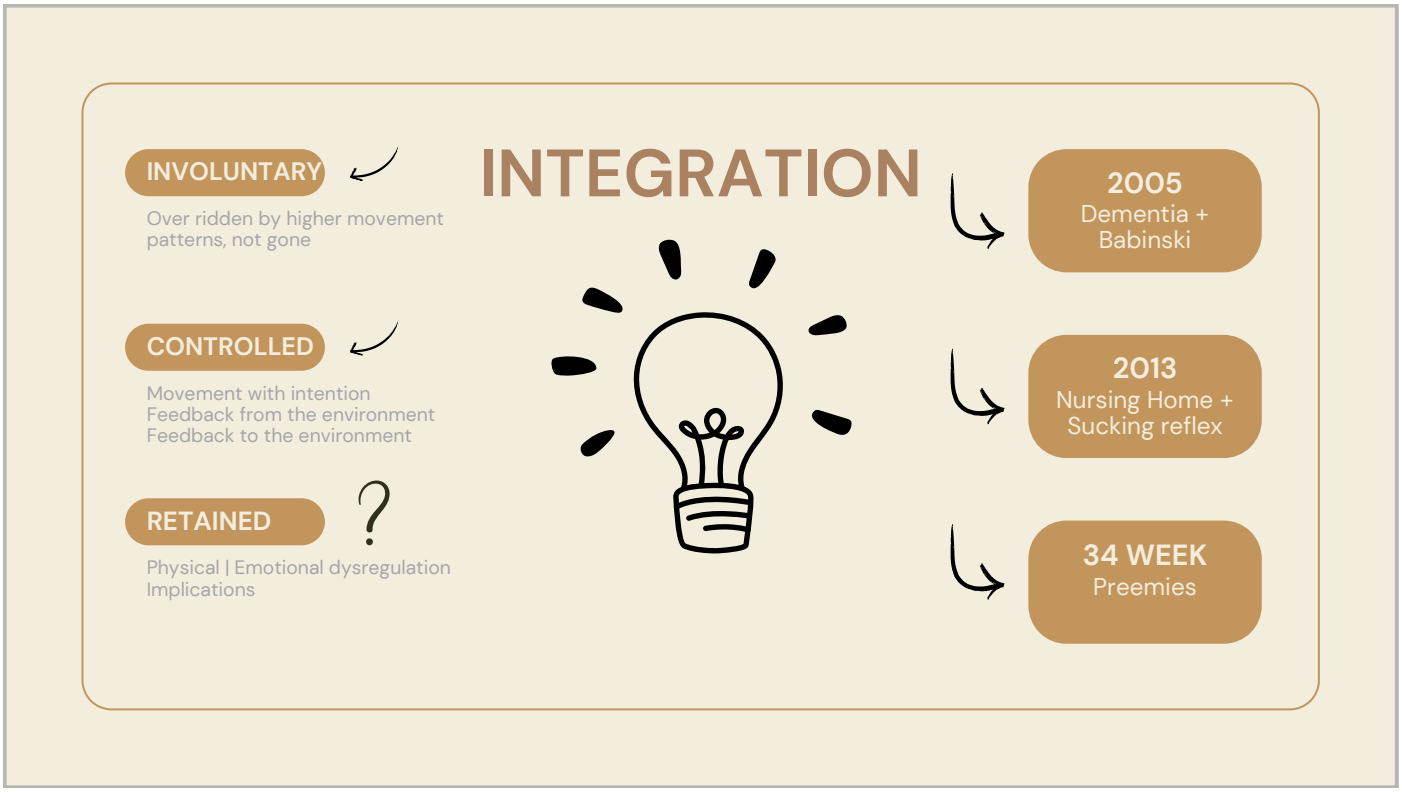
Marianne Hermsen-van Wanrooy
Author



2023 study with preemie babies

03.

TREATMENT TIMELINE

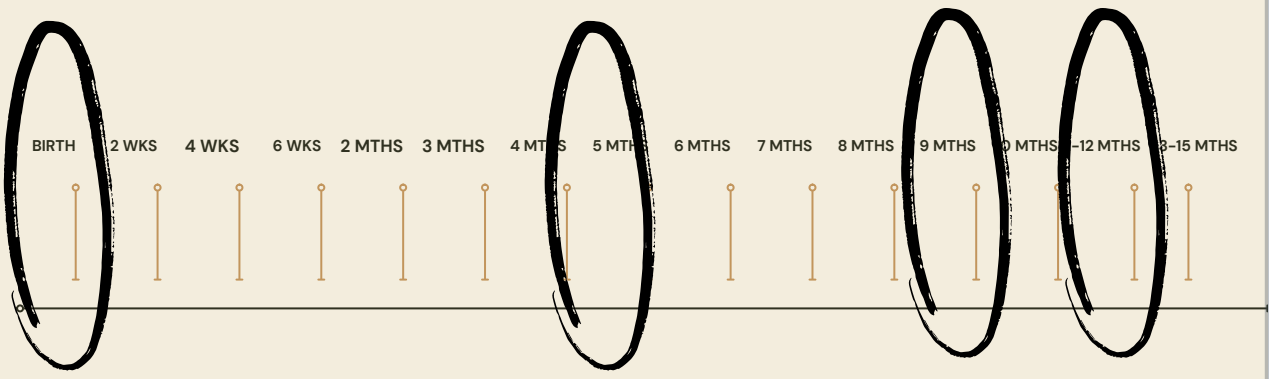


2005- those with dementia had abnormal Babinski sign

2013 study - nurse home residents with a sucking reflex had increase risk for poor nutrition and increase risk for pneumonia

Preemies:
Milestones are based on Edd not birth date
Ex: Suck - Swallow - Breathe coordination does not start until 35+ weeks
Suck / Swallow at 32 , breathe at 34-42

ASSESS | TREAT TIMELINE

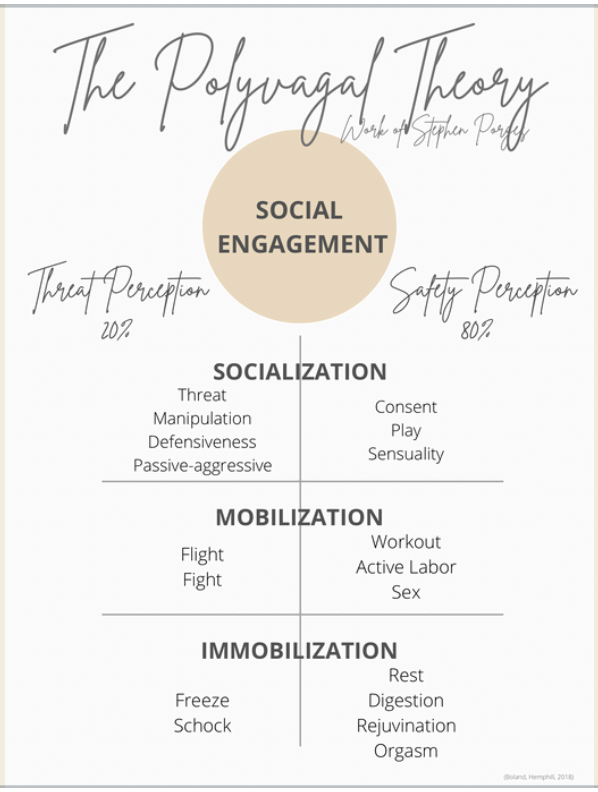


Prenatal
Nutrition
Movement
Breath work
Sound
Polyvagal

Birth
Quiet
Dim
Smell
Golden Hours

PROACTIVE CARE

Movement during prenatal care affects on movement milestones


The Polyvagal Theory
Work of Stephen Porges
SOCIAL ENGAGEMENT
Threat Perception
20%
Safety Perception
80%
SOCIALIZATION
Threat
Manipulation
Defensiveness
Passive-aggressive
Consent
Play
Sensuality
MOBILIZATION
Flight
Fight
Workout
Active Labor
Sex
IMMOBILIZATION
Freeze
Schock
Rest
Digestion
Rejuvination
Orgasm

04.

CHIROPRACTIC TREATMENT + INTERVENTIONS

01. UNDERSTANDING PEDIATRIC MILESTONES

02. MILESTONE ASSESSMENT + TIMELINES

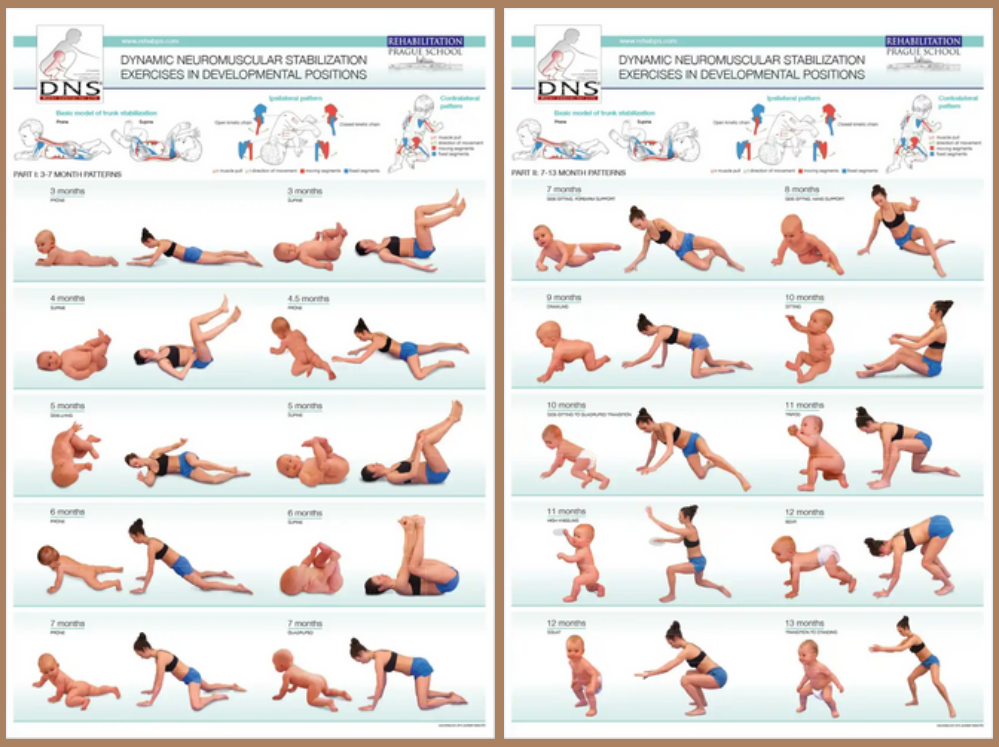
03. COLLABORATIONS IN CARE

04. APPLICATIONS


“JUST KEEP
MOVING
FORWARD.”

02.

MILESTONE TIMELINES


DNS
DYNAMIC NEUROMUSCULAR STABILIZATION
EXERCISES IN DEVELOPMENTAL POSITIONS
REHABILITATION
PART I: 3-7 MONTH PATTERNS
3 months
3 months
4 months
4.5 months
5 months
5 months
6 months
6 months
7 months
7 months
DNS
DYNAMIC NEUROMUSCULAR STABILIZATION
EXERCISES IN DEVELOPMENTAL POSITIONS
REHABILITATION
PART II: 7-13 MONTH PATTERNS
7 months
8 months
9 months
10 months
10 months
11 months
11 months
12 months
12 months
13 months

3 MONTHS

Open fist, support on elbows, can rotate head without moving trunk
Spine starts to upright from mid to upper back

4-5 months

4-5 Months

Initiate closure of DRA

Hands can touch hips and groin in supine position

Stability in sagittal plane occurs

The diaphragm flattens and a mature breathing pattern begins
Diaphragm is used as a stabilizer to maintain IAP with basic movement of extremities

6-7 months

OBLIQUE MUSCLE ACTIVATION BEGINS

BABY CAN ROLL FROM BACK TO BELLY WITH INTENTION

BABY CAN GRAB FEET WITH HANDS

HAPPY BABY ACTIVATION ENCOURAGES FULL USE OF ISSS, IAP, PF

7 months

Will rock backwards from base of support on hands to knees (dead end movement)

Helps to develop posterior chain, external rotators

7-8 months

CAN CREEP FORWARD WITH THE USE OF THEIR UPPER BODY

OBLIQUE SIT BEGINS. SUPPORT BEGINS ON ELBOW AND THEN HIGHER SUPPORT ON OPEN HAND

THIS MOVEMENT WILL TRANSITION TO ALL OTHER POSITIONS: FULL SIT, KNEEL, EVEN CRAWL, BEAR OR SQUAT AND EVENTUALLY LEAD TO STANDING.

After a baby has established rocking back to knees, he/she can now CRAWL forward

Crawling allows us as humans to develop optimal activation of anatomical slings and equal distribution of muscle pull in regards to posterior and anterior chain.

The stability in the core that crawling achieves is crucial for higher movements throughout the lifespan.

Baby can sit with up-righted spine and the foundation for seated posture begins

9-10 MONTHS

Tripod begins

The three bases of support developed transcend from crawling to tripod to kneel and stepping forward to standing

Baby may start side stepping along furniture and objects

10-12 months

EXPLORE HANDS IN STANDING POSITION

STAND FREELY

WALK BETWEEN OBJECTS

STEP FORWARD IN SAGITTAL PLANE

14 months

SQUAT

03.

COLLABORATIONS IN CARE

Myofunctional Therapy
Speech Therapy
Occupational Therapy (specifically oral)
Physical Therapy
ASD Resources

03.

COLLABORATIONS IN CARE

Connect With Me

@themovementmidwife
@couleehealthbirthcollective
@couleehealth

Harjpal P, Kovela RK, Qureshi MI. Promoting Survival and Primitive Reflexes to Prevent Brain Imbalance in Premature Infants: A Scoping Review of New Insights by Physiotherapists on Developmental Disorders. Cureus. 2023;15(8):e43757. Published 2023 Aug 19. doi:10.7759/cureus.43757

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