

Development 1 and 2

- “Growing up” involves three major dynamic processes: Growth, Development, Sexual Maturation.
- **Growth** refers to an increase in physical size of the whole body or any of its parts. It is simply a quantitative change in the child’s body. It can be measured in Kg, pounds, meters, inches.
- **Development** refers to a progressive increase in skill and capacity of function. It is a qualitative change in the child’s functioning. It can be measured through observation.

The Principles of Development

1. **Development is a continuous process from conception to maturity.** This means that development occurs in utero, and birth is merely an event in the course of development, though it signals the beginning of extraneous environmental factors.
2. **The sequence of development is the same in all children, but the rate of development varies from child to child.** For example, culture can influence the sequence of development; in general, a child must learn to sit before he can learn to walk. More than the sequence, the age at which children learn to sit and to walk varies considerably. There is a sequence of development within each developmental field, but the development in one field does not necessarily run parallel with that in another even in children with normal development, as often it depends on the dominant side of the brain. For instance, though the stages in the development in grasping and in locomotion (sitting and walking) are clearly delineated, development in one field may be more rapid than in another. A child with cerebral palsy involving mainly the lower limbs will be late in learning to walk, but if his intelligence is normal the development of manipulation will be average.
3. **Development is intimately related to the maturation of the nervous system.** For instance, no amount of practice can cause a child to walk until his nervous system is ready for it, but lack of opportunity to practice will impede it.
4. **Generalized mass activity is replaced by specific individual responses.** For instance, while the young infant wildly moves his trunk, arms and legs, and pants with excitement when he sees something interesting which he wants, the older infant merely smiles and reaches for it.
5. **Development is in the cephalocaudal direction.** The first step towards walking is the development of head control—of strength in the neck muscles. The infant can do much with his hands before he can walk. He can crawl, pulling himself forward with his hands, before he can creep, using hands and knees.
6. **Certain primitive reflexes, such as the grasp reflex and walking reflex, must be lost before the corresponding voluntary movement is acquired.**

Factors affecting development

- 1- Intelligence.
- 2- Environment.
- 3- Familial.
- 4- Variation of CNS maturity.
- 5- Personality.
- 6- Prematurity.
- 7- Physical handicap: Deafness → delay in speech,
Blindness → delay in fine movement.

Parental concern regarding delays in fine and gross motor skills, language skills, and social/emotional development are often highly accurate and should always warrant further evaluation.

Primitive reflexes

- Primitive reflexes are involuntary motor responses originating in the **brainstem** present after birth in early child development that facilitate survival.
- These central nervous system motor responses are eventually inhibited by (4 to 6 months of age) as the brain matures and replaces them with voluntary motor activities but may return with the presence of neurological disease
- If an infant is very sleepy, irritable, or satiated after feeds, the primitive reflexes will be diminished and should be reevaluated when the infant is alert between feedings.
- The primitive reflexes should always be symmetrical and are considered abnormal if asymmetrical or absent at birth

1. Grasp reflex: if the examiner's finger is slipped into the baby palm, the baby closes his hand. In full term baby the grasp is so tight that you can lift the baby off the couch. There is a corresponding planter grasp reflex. It begins at 32 weeks and premature baby up to 36wk has weak grasp reflex. It disappears at 3-4 months of age, persistence of this reflex in spastic cerebral palsy

2. Moro reflex: stimuli are given to muscles of neck. It can be elicited in several ways. The head is supported in the palm of the examiner 2 cm above the table, then suddenly released. The reflex consists of abduction & extension of arms, opening of the hands, then adduction & flexion of the arms. The reflex may be accompanied by crying. When eliciting the response, the head should be in the midline, and the hands should be open.

- Established by: 28 weeks of fetal life
- Disappears by: 4- 6 months after birth
- Exaggerated in: cerebral palsy,
- Decreased in: hypotonia,
- Asymmetrical: in Erb's palsy, fracture of clavicle or humerus & spastic hemiplegia. It is inhibited on one side if the hand is holding an object.

3- Startle reflex: sudden noise or tapping the chest. The response is similar to Moro reflex but the hands remain closed & elbow remain flexed.

4- Limp placement reflex: the infant held vertically by the trunk, the tibia or dorsum of the foot brought up against the edge of the table, the baby steps up the table. It appears in full term baby, disappearing in 6 weeks. It is absent in brain damage

5- Asymmetrical tonic neck reflex: The baby lying awake at rest in supine position, the head is turned to one side → the arm & leg on the same side is extended & the contralateral knee is flexed. It occurs spontaneously in 7 weeks baby. Disappear in 2-3 months. Persist in spastic child.

6- Walking (stepping) reflex: feet are pressed against the surface of the table with the infant held vertically, the baby makes walking movements. It lasts for 1-2 months, but more if the neck remains extended (for several months). The reflex is not well developed until 40 weeks of fetal life.

7- Crossed extension reflex: child in supine position, stimulation of the sole of one foot with the leg held in extension causes flexion of the opposite hip followed by adduction & extension of the leg. It is not normally obtained after 1 month of age, found in spastic children.

8- Rooting reflex: elicited by baby's cheek contacting the mother's breast resulting in reflex moving the angle of the mouth towards the stimulus & open the mouth. Disappear by 4-6 mo.

9. The Galant reflex (trunk incurvation): is obtained by placing the baby in ventral suspension, then stroking the skin on one side of the back. The baby's trunk and hips should swing towards the side of the stimulus. This reflex is absent in transverse spinal cord lesions or injuries.

10. Lateral propping: In sitting, the arm extends on the side to which the child falls as a saving mechanism. It appears at age of 6-8 months, fully developed at age of 10-11 months and never disappears. Asymmetric lateral propping can be an early sign of hemiparesis; the baby will prop on one side but on the paretic side he will not extend the arm to catch himself with the infant sitting

11. Parachute reflex: When suspended face down, the arms extend as though to save themselves. It is the last of the postural reflexes to develop. It usually appears at 8 to 9 months of age. Asymmetry of the reflex is abnormal and may indicate paresis in the non-extended extremity.

The doll's eye response. This is so named because there is a **delay** in the movement of the eyes after the head has been turned. If the head is turned **slowly** to the right or left, the eyes do not normally move with the head. The reflex is always present in the first 10 days, disappearing thereafter as fixation develops. It would be asymmetrical in abducens paralysis. The reflex may persist beyond the first few days in abnormal babies

Development milestones

Developmental milestones are a set of goals or markers that a child is expected to achieve during maturation. They are categorized into 5 domains: gross motor, fine motor, language, cognitive, and social-emotional and behavioral.

Neonatal period:

- prone: flexed attitude, turn face from side to side, head sags on ventral suspension
- supine: flexed, a little stiff.
- visual: may fixate on light in line of vision, doll's eye movement of eye on turning the body
- reflexes: (Moro, stepping, walking, grasp) are active.
- social: visual preference for human face.

1month:

- prone: legs more extended, hold chin up, turn head, head lifted momentarily to plane of body on ventral suspension.
- supine: tonic neck posture predominates, head lags on pulling to sitting position.
- visual: follow moving objects, watch persons.
- social: begins to smile, body movement in cadence with voice of others in social contact.

2months:

- prone: raises head slightly further, head sustained in plane of body on ventral suspension.
- supine: tonic neck posture, head lags on pulling to sitting position.
- visual: follow moving objects 180 degrees
- social: smile on social contact, listen to voice& coos (long, vowel-like sounds: Gooo, Agoo)

3 months:

- prone: lifts head & chest, arm extended, head above plane of body on ventral suspension.
- supine: tonic neck posture predominates, reach towards & misses objects, wave at a toy.
- sitting: head lags partially compensated on pull to sitting position, early head control with bobbing, back is rounded
- reflexes: typical Moro reflex disappears, make defensive movement or selective withdrawal reactions
- social: sustained social contact, listen to music, say aah- ngah

4months:

- prone: lifts head on chest, head is approximately in vertical axis, legs are extended.
- supine: symmetric posture predominates, hands in midline, reach & grasp objects & bring them to mouth.
- sitting: no head lag on pull to sitting position, head is steady tipped forwards, enjoy sitting with full trunk support
- standing: when held erect push with feet
- adaptive: see pellet but makes no move to it.
- social: laugh aloud, displeasure when social contact is broken & excited at sight of food.

7 months:

- Prone: roll over, crawl or creep.
- Supine: lift head, roll over, squirming movement
- Sitting: sits briefly with support of pelvis, lean forward
- Standing: support most of weight, bounce actively.
- Adaptive: reach out & grasp large object, transfer objects from hand to hand.
- Language: polysyllabic vowel sounds. (babbling: ba-ba-ba-ba)
- Social: prefer mother, enjoy looking at mirror. Respond to change in social & emotional contact.

10 months:

- sitting: sit alone indefinitely without support.
- standing: pull to standing position, walk holding furniture.
- motor: creep, crawl.
- adaptive: grasp object with thumb & forefinger, pick pellet with assisted pincer movement, attempt to retrieve dropped objects, release object grasped by others uncovers hidden toy.
- social: respond to sound of name play peekaboo, wave bye-bye.
- language: mama, baba (repetitive constant sounds).

1 year:

- motor: walk with one hand held, rises independently, takes several steps.
- adaptive: pick up pellet with unassisted pincer movement of forefinger & thumb, request to gesture.
- language: few words beside mama, baba.
- social: play simple ball games. Makes postural adjustment to dressing

15 months:

- motor: walk alone, crawl upstairs.
- adaptive: make tower of 3 cubes, insert pellet in a bottle, make a line.
- language: jargon (speech-like babbling with adult-like intonation → sounds like sentences, but words are not meaningful), follow simple commands, name familiar objects, respond to his name.
- social: indicate some desire or need by pointing hugs parents.

18 months:

- motor: run stiffly, sit on small chair, walk upstairs with one handheld, explore drawers & waste baskets.
- adaptive: make a tower of 4 cubes, scribble, imitate vertical stroke, dumps pellet from bottle.
- language: 10 words, name pictures, identify one or more parts of the body.
- social: feeds self, seek help when in a trouble, complain when wet or soiled, kisses parents with pucker

24 months:

- Motor: runs well, walk up & downstairs with one step at a time, opens doors, jumps.
- Adaptive: tower of 7 cubes, circular scribbling, imitate horizontal stroke, folds paper once imitatively, handle spoon well.
- social: tell immediate experience, help to undress, listen to stories with pictures.
- language: Puts 3 words together (subject, verb, object), well developed questioning, expressing, sing nursery rhyme

30 months :

- **motor:** goes upstairs on alternating feet.
- **adaptive:** tower of 9 cubes, make vertical & horizontal strokes but generally will not join them to make a cross, imitates circular stroke, forming closed figures.
- **language:** knows full name, refers to self by pronoun (I).
- **social:** helps put things away, pretends in play.

3 years:

- Motor: rides tricycle, stands momentarily on one foot.
- Adaptive: tower of 10 cubes, imitates construction of bridge of 3 cubes, copies a circle, imitates a cross.
- Language: knows age & sex, counts 3 objects correctly, repeats 3 numbers or a sentence of 6 syllables, most of speech intelligible to strangers
- Social: plays simple games (in parallel with other children), helps in dressing (unbuttons clothing & puts on shoes), washes hands.

4 years:

- motor: hops on one foot, throws ball overhand, uses scissors to cut out pictures, climbs well.
- adaptive: copies bridge from model, imitates construction of gate of 5 cubes, copies cross & square, draws a man with 2-4 parts besides head, name longer of 2 lines.
- language: Counts 4 pennies accurately, tells a story
- social: plays with several children with beginning of social interaction & role playing, goes to toilet alone.

5 years:

- motors: skips.
- adaptive: draws triangle from copy, names heavier of 2 weights.
- language: names 4 colors, repeats sentence of 10 syllables, counts 10 pennies correctly.
- social: dresses & undresses, asks questions about meaning of words, domestic role playing.

6 years

Tie the shoelaces.
Distinguish the morning from the afternoon.
Recite up to 30.
Know right hand and left hand.

Red flags

Gross motor	Limit ages	Social behaviour	Limit ages	Vision and fine motor	Limit ages
Head control Sits unsupported Stands with support Walks independently	4 months 9 months 12 months 18 months 	Smiles Fear of strangers Feeds self/spoon Symbolic play Interactive play	8 weeks 10 months 18 months 2–2.5 years 3–3.5 years 	Fixes and follows visually Reaches for objects Transfers Pincer grip	3 months 6 months 9 months 12 months 

Summary

Supine positioning

Neonate	flexed, a little stiff.
1 month	tonic neck posture predominates, head lags on pulling to sitting position
2 months	tonic neck posture, head lags on pulling to sitting position
3 months	Tonic neck posture predominates, reach towards & misses objects, waves at a toy.
4 months	symmetric posture predominates, hands in midline, reach & grasp objects & bring them to mouth.
7 months	lift head, roll over, squirming movement

Age	Prone Position Milestones
Neonatal	Flexed attitude, turn face from side to side, head sags on ventral suspension.
1 month	Legs more extended, hold chin up, turn head, head lifted momentarily to plane of body on ventral suspension.
2 months	Raises head slightly further, head sustained in plane of body on ventral suspension.
3 months	Lifts head & chest, arm extended, head above plane of body on ventral suspension.
4 months	Lifts head on chest, head is approximately in vertical axis, legs are extended.
7 months	Roll over, crawl or creep.
10 months	Creep, crawl.

Age	Visual Milestones
Neonatal period	May fixate on light in line of vision, doll's eye movement of eye on turning the body.
1 month	Follow moving objects, watch persons.
2 months	Follow moving objects 180 degrees.
3 months	Wave at a toy, reach towards & miss objects (supine vision/coordination).
4 months	See pellet but makes no move to it.

Age	Social Milestones
Neonatal period	Visual preference for human face.
1 month	Begins to smile, body movement in cadence with voice of others in social contact.
2 months	Smile on social contact, listen to voice & coos.
3 months	Sustained social contact, listen to music, say aah-ngah.
4 months	Laugh aloud, displeasure when social contact is broken & excited at sight of food.
7 months	Prefer mother, enjoy looking at mirror, respond to change in social & emotional contact.
10 months	Respond to sound of name, play peekaboo, wave bye-bye.
1 year	Play simple ball game, makes postural adjustment to dressing.

Drawing

15 months	Imitates scribble or scribbles spontaneously.
18 months	Makes stroke imitatively.
2 years	Imitates vertical and circular stroke.
2½ years	Two or more strokes for cross. Imitates horizontal stroke.
3 years	Copies circle. Imitates cross. Draws a man.
4 years	Copies cross.
4½ years	Copies square.
5 years	Copies triangle.
6 years	Copies diamond.

Colors

3 years: Names one.

4 years: Names two or three

5 years: Names four.

Simple orders. (Put the ball under the chair, at the side of the chair, behind the chair, on the chair.)

3 years: Obeys two

3½ years: Obeys three

4 years : Obeys four

Stairs

15 months	crawl upstairs.
18 months	walk upstairs with one handheld
2 years	walk up and downstairs with one step at a time(both feet meet on each step before moving to the next)
2.5 years	goes upstairs on alternating feet.

Language

Age	Language Milestones
Neonatal period	Body movement in cadence with voice (starts by 1 mo), reacts to sound
1 month	Body movement in cadence with voice of others in social contact
2 months	Listen to voice & coos
3 months	Listen to music, say aah-ngah
4 months	Laugh aloud
7 months	Polysyllabic vowel sounds
10 months	Mama, baba (repetitive consonant sounds)
1 year	Few words beside mama, baba
15 months	Jargon, follow simple commands, name familiar objects, respond to his name
18 months	10 words, name pictures, identify one or more parts of the body
2 years	Puts 3 words together (subject, verb, object), well developed questioning/expressing, sing nursery rhyme
2.5 years	Knows full name, refers to self by pronoun (I)
3 years	Knows age & sex, counts 3 objects correctly, repeats 3 numbers or a sentence of 6 syllables, most of speech intelligible to strangers
4 years	Counts 4 pennies accurately, tells a story
5 years	Names 4 colors, repeats sentence of 10 syllables, counts 10 pennies correctly, asks questions about meaning of words

Block Stacking & Cube Towers

Number of Cubes in tower = [Age in Years ×3] +1

15 months	3 Cubes
2 y	7 Cubes
3 y	10 Cubes
4 y	bridge
5 y	Gate
6 y	Steps

Beyond 3 years of age, block-building assessment shifts from simple vertical stacking (towers) to constructing complex shapes (e.g., bridges, gates, and steps) rather than taller towers