Normal Child Development Milestones

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Developmental Milestones

- What do we mean by developmental milestones?
- Why do they matter?

Developmental Milestones

- Developmental milestones are behaviours or physical skills seen in infants and children as they grow and develop
  - Rolling over, crawling, walking, and talking are all considered milestones
- The milestones are different for each age range
  - For every developmental milestone, there is a normal range in which a child may reach that milestone
- Developmental milestones involve physical, social, emotional, cognitive and communication skills such as walking, sharing with others, expressing emotions, recognizing familiar sounds and talking.

Developmental milestones

- **Atypical development**
  - Indicative of underlying
    - physical or neurodevelopmental disorders
    - neglect/abuse
    - parental ill health/deprivation
- **Screening**
  - Opportunity for early intervention
    - Improve long-term outcomes
    - Influences social policy

Screening Timeline

- **One day to one month: newborn hearing**
  - In hospital or by the health visitor
  - Early intervention – HA, CI, TOD
- **One to three days: newborn physical examination**
  - Screening of heart, hips and eyes, testes in boys, general physical examination
  - Early medical intervention
- **Six to eight weeks: physical examination**
  - screening of your baby's heart, hips and eyes, testes in boys, growth and motor development and reflexes
  - Early medical intervention
  - Health visitor monitoring of maternal mental health

Screening Timeline

- **Six to eight months**
  - Developmental review
- **Between 8 and 36 months: general reviews**
  - Developmental review
  - Hearing tests
  - Growth monitoring
- **Between four and five years: school entry screening**
  - vision screening, a height and weight check and a hearing test
  - Developmental reviews

Antenatal and Postnatal Factors

- Genetics
- Infection
- Drugs/alcohol
- Medication
- Nutrition
- Trauma

Development in infant and Child

- The sequence of development is the same for all children, the ***rate*** of development is different for each child
- The direction of motor development is from ***head to toe***
  - The child learns to control his head and neck, then his trunk, and eventually his arms and legs

Development in infant and Child

- Early development leads the infant to master four major types of skills:
  - gross motor, fine motor
  - language and social skills
- Gross motor skills require the use of large muscles to achieve sitting, crawling and walking in the first year of life
- Fine motor skills involve the use of small muscles in the hands and fingers, in tasks such as picking up small objects, and later for feeding and dressing

Development in infant and Child

- Language
  - Receptive language
    - the ability to understand others
  - Expressive language
    - the ability to express oneself
- Communication skills
  - verbal and non-verbal components
- Social skills
  - Describe interactions with family and other children

Definitions

- **Voice** is the sound made as air from our lungs is pushed between vocal folds in our larynx, causing them to vibrate. Basic sounds are called *phonemes*. In English language there are 46 speech sounds
- **Speech** is talking, which is one way to *express language*. It involves the precisely coordinated muscle actions of the tongue, lips, jaw, and vocal tract to produce the recognizable sounds that make up language.
- **Language** is a set of *shared rules* that allow people to express their ideas in a meaningful way. Language may be expressed verbally or by writing, signing
- The basic meaningful part of language is called **morpheme**. The rules for combining words into phrases and sentences are called **syntax**.
  - Most children can differentiate speech sounds before being able to produce them.
  - Language is slower to develop in boys, in twins, in large families, in those from social
  - classes 4 and 5 and those that lack speech stimulation e.g. deaf and neglected children.

Development of auditory system

- Genetic endowment/Activity independent
  - epigenetics
- Endogenous stimulation dependent
  - From <20/40 ganglion cells in spiral and cochlea nucleus exhibit irregular firing promotes axon growth and cell – cell connections
  - 22/40 regular synchronous firing and growth of axons in midbrain
  - 29/40 axon growth to temporal lobes
  - Process can be blocked by alcohol and drugs
- Exogenous activity dependent
  - 28/40 onwards Audtory system requires stimulation to develop
  - Tuning of cochlear cells to specific frequencies – starts at low frequency – sleep dependent
  - At birth can discriminate mothers voice, simple melody

Hearing

- Effects of sensory deprivation
  - Behavioural problems, LD, ADD, Speech problems, social communication problems, school refusal, anxiety, ODD
- Syndromes associated with deafness
  - VCF
  - NF2

Language

- The rate and quality of language development is more sensitive to the infant's environment than the other parts of development
- Infants acquire language ***only*** through interaction with responsive people in their environment
- TV and radio have little to no effect on the infant's language learning
- Through games and caretaking rituals during the first year, children learn to take turns communicating

Language

- The production of language is the result of ***cognitive, oral-motor and social processes***
- Receptive ability precedes expressive language ability
  - a child can point to a picture of a named object before they can say that name
- During the 2nd and 3rd years of life, expressive vocabulary expands rapidly
  - on average, at 18 months they can say 10 words, and by 3 years, 1000 words
- At 18 months, infants begin putting 2 words together

Auditory Processing

- Is what happens along the pathway form auditory nerve to the brain and what the brain does with the auditory signal from the ears
- Includes:
  - Auditory attention—being able to "tune in" to auditory input
  - Auditory discrimination—the ability to distinguish between different sounds or words
  - Auditory sequential processing—Related to auditory memory Often tested in terms of digit spans
  - Auditory tonal processing—has a significant impact on language processing
  - Auditory memory—ability to store and recall auditory information
  - Auditory sensitivity
  - Auditory figure-ground processing
  - Language processing—processing the meaning of verbal input
  - Temporal processing—related to the "time" aspect of the auditory signal; rate of processing

Auditory processing

- **Auditory processing disorder**
  - Language delay
  - Specific reading disorder
  - Global developmental delay
  - ID
  - Social communication difficulties

Theories of Language development

- **Vocabulary** acquired by ordinary processes of learning in which children acquire the forms, meanings and uses of words and utterances from the linguistic input
- **Syntax** principles and processes by which sentences are constructed
- **Nativis**t approach by which some principles of syntax are innate and are transmitted through the human genome. Chomsky says that all children have what is called an innate language acquisition device (LAD). Theoretically, the LAD is an area of the brain that has a set of universal syntactic rules for all languages. This device provides children with the ability to construct novel sentences using learned vocabulary.
- **Empiricist** theories – Skinner – operant conditioning by imitation of stimuli and by reinforcement of correct responses used in approaches to ASD
- **Piaget's** theory of cognitive development, which considers the development of language as a continuation of general cognitive development
- ? Critical period – early intervention – 2-4 years

Stages of language development

- **The pre-linguistic state (0 to 12 m):**
- Crying is important form of communication.
- A one month old child is able to distinguish speech sounds although these phonemes are almost identical sounds.
- This categorical speech perception is supposed to be innate. By six weeks the child starts cooing.
- By six months **babbling** is seen. Babbling is nothing but production of speech sounds repetitively. Spontaneous babbling refers to the situation when the child enjoys making these sounds alone. All babies around same age irrespective of the culture start babbling. Even the deaf babies of the deaf parents start marbling. But unfortunately the deaf babies stop babbling at 9 to 10 months.

Stages of language development

One word stage (12 m to 18 m):

- Jargon words and babbling continue up to 18 months. First words are often self invented. But these words carry a meaning and consistently match with the same
- meaning. There is a clear intention to communicate.
- Earliest words are **context bound**; sometimes they do not have any communicative purpose but are used as performatives to refer to actions. A child says ‘teddy’ only when the teddy is thrown up on the air while playing; thus teddy refers to ‘throw up’ action rather than the doll.

Stages of language development

- **Holophrases** are one word substitutes for whole phrases or sentences. At this stage a child understands more words than it could produce.
- Gradually words get decontextualised and fall into one of the following functions;
- nominals – specific e.g. Sarah, or general – e.g. ball pen
- action words e.g. bye bye, look.
- Function words e.g. the, for, what etc. propositions and grammatical functions.
- modifiers – e.g. red, big etc
- personal and social function – e.g. oops, ouch etc

Stages of Language Development

Two word sentences / stage 1 grammar(18 to 30m):

- Telegraphic speech is seen where meaningful words are used without connecting words. At this stage adults interact with children in a motherese – short simple raised pitch paraphrased language directed at infants. As object permanence is achieved by this stage, words start to have representational functions.

Stage 2 grammar (> 30m):

- Mean length of utterances increase largely due to the use of function words propositions etc

Social Skills

- Social skill is any skill facilitating interaction and communication with others
- Social rules and relations are created, communicated, and changed in verbal and nonverbal ways
- Social communication groups in schools, visual timetables
- Social stories/ADOS/ADI/School observation

Theory of mind

- Social cognition is at the heart of children's ability to get along with other people and to see things from their point of view. The basis of this crucial ability lies in the development of theory of mind.3,4 "Theory of mind" refers to our understanding of people as mental beings, each with his or her own mental states – such as thoughts, wants, motives and feelings. We use theory of mind to explain our own behaviour to others, by telling them what we think and want, and we interpret other people's talk and behaviour by considering their thoughts and wants.

Theory of mind

- By age 2, children clearly show awareness of the difference between thoughts in the mind and things in the world. In pretend play (e.g., pretending a block is a car), toddlers show that they can distinguish between an object – the block – and thoughts about the object – the block as a car.
- They also understand that people will feel happy if they get what they want and will feel sad if they do not.
- And at this age children see that there may be a difference between what they want and what another person wants.
- This developing awareness is seen in children's language too: 2-year-olds talk about what they and others want and like and feel; when they are 3, they also talk about what people think and know

Theory of mind

- A crucial development occurs around 4 years of age when children realize that thoughts in the mind may not be true. For example, children are allowed to discover that a familiar candy box actually contains pencils, and then are asked what their friend will think is in the box, before looking inside it.
- Three-year-olds assume that the friend will know it has pencils inside, just as they now do, but 4-year-olds recognize that the friend will be tricked, just as they were. Three-year-olds also do not remember that their own belief has changed.
- If the pencils are put back in the box and they are asked what they thought was inside before opening it, they'll say "pencils" not "candy" but 4-year-olds remember they thought it was candy. That is, 3-year-olds are not simply egocentric, i.e., thinking everyone knows what they know, rather, they come to understand their own minds and those of other people at the same time.
- By the age of 4 or 5 years, children realize that people talk and act on the basis of the way they think the world is, even when their thoughts do not reflect the real situation, and so they will not be surprised if their uninformed friend looks for candy in the box they know has pencils inside.

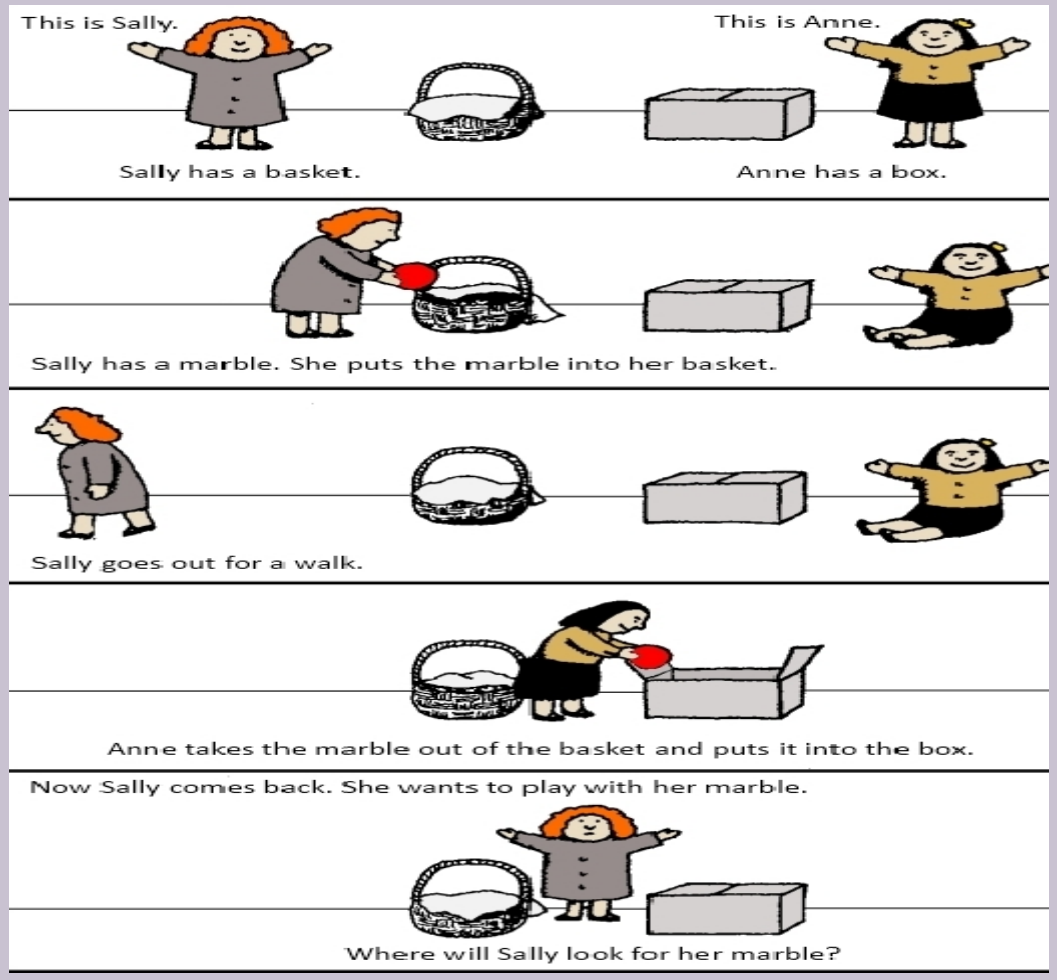
Theory of mind

- Some factors in the social environment influence the rate of typical development of theory of mind: for example, children show earlier awareness of mental states if their mothers talk about thoughts, wants and feelings, and provide reasons when correcting misbehaviour. Children with brothers and/or sisters are aware of mental states sooner than only children.The rate of development is also influenced by children's participation in pretend play,their experiences of story-book reading and of talking with others about past experiences.
- Factors internal to the child that influence the rate of development include language abilities, and cognitive abilities that control and regulate behaviour (known as executive functions)

Theory of mind

- Research shows that theory-of-mind development has consequences for children's social functioning and school success. Children with more developed theory of mind are better communicators and can resolve conflicts with their friends;25 their pretend play is more complex; their teachers rate them as more socially competent; they are happier in school and more popular with peers; and their school work is more advanced in some ways.
- However, a well-developed theory of mind can also be used in antisocial ways, such as in teasing, bullying and lying.
- It can be enhanced by opportunities: – to engage in rich pretend play;
  - – to talk about people's thoughts, wants, and feelings, and the reasons why they act the way they do;
  - – to hear and talk about stories, especially those involving surprises, secrets, tricks, and mistakes, that invite children to see things from different points of view (for example, Red Riding Hood doesn't know that the wolf is dressed up as grandma).

Sally Anne Test



Social skills

- **Seeing in a social situation**, involves picking up on social cues. It means noticing the context: Is the setting casual or formal? Are these other kids close friends, acquaintances, or strangers? Different situations call for different kinds of behavior. Social seeing also means noticing other children's behavior. If a child feels lost regarding how to act in a new situation, answering the question, "What is everyone else doing?" may provide some hints about what to do. (Obviously, I'm not advocating lemming-like following of the crowd — good judgment is always necessary.)
- Monitoring others' reactions can also help children change course if things aren't going well. For instance, noticing, "She seems bored with this game" could prompt a child to suggest a new game or to ask the friend what she would like to do.
- Children who have trouble with social seeing often unwittingly annoy others. They may do things that are inappropriate for the context, such as being silly when everyone else is being serious. Worse, they may persist in doing annoying or upsetting things because they overlook the signs that others want them to stop (e.g., glaring at them, avoiding eye contact, moving away).

Social skills

- **Thinking in social settings** involves interpreting other children's behavior to understand why they're doing what they're doing. Are they being playful or aggressive? Was it deliberate or accidental? It also means being able to predict others' likely responses and to come up with effective strategies for influencing peers in desired ways.
- Research on social cognition tells us that children who struggle socially often misinterpret others' intentions. For instance, aggressive children are more likely than other children to view a peers' behavior as stemming from deliberate meanness. They're also less able to come up with constructive strategies for resolving social difficulties.

Social skills

Doing in a social context means interacting with peers in positive ways. Some children know what they ought to do, but have trouble actually doing it. For instance, they may want to join a conversation, but they feel anxious and freeze up, so they say nothing. Other children tend to act impulsively, blurting out inappropriate comments.

How do we learn social skills

Play

- Play is used to help children master specific abilities (jumping, throwing a ball etc)
- Children also use imaginative play to help deal with their fears (fascination with monsters) and with their identification with adult roles (playing house)
- Play evolves from solitary and parallel play at age 2, to understanding turn-taking at age 3, to interactive and cooperative play at age 4
- Children with less play time are more likely to feel anxious, depressed, helpless and narcissistic. Writing in a special issue of the American Journal of Play, he also said children today have less freedom to play than they did 50 years ago
- Free play allows children to acquire basic competencies needed as they approach adulthood, including problem solving, decision-making and self control – emotional regulation
- The American Academy of Paediatrics (AAP) recommends that parents limit combined screen time from television, DVDs, computers, and video games to 2 hours per day for preschool-age children.
- In a recent study, children on average were exposed to 4 hours of screen time each weekday
- Television viewing in young children has been associated with speech delays, aggressive behaviour, and obesity

Play and cognition

- Links between socially interactive pretence and cognitive dev
- TOM – mental representational ability – role play
- Social and linguistic competence
- Academic skill dev – literacy/math embedded play
- Problem solving – narrative recall – rule understanding – self regulation

Development of Vision

- Unlike many other sensory systems, the human visual system – components from the eye to neural circuits – develops largely after birth, especially in the first few years of life.
- At birth, visual structures are fully present yet immature in their potentials. From the first moment of life, there are a few innate components of an infant's visual system.
- Newborns can detect changes in brightness, distinguish between stationary and kinetic objects, as well as follow kinetic objects in their visual fields
- Visual acuity in newborns is very limited as well compared to adults – being 12 to 25 times worse than that of a normal adult – combination of muscle weakness and proportions of pupil and immaturity visual system

Vision

- The foetus responds to bright light flashed on the abdominal wall of the 20-week with changes in heart rate and position.
- Vision is the least developed sense at birth; the acuity if newborn is around 20/300.
- At birth, infants are able to track and scan objects, can discriminate levels of brightness, able to fix objects, fixed focus at about 20 cm, figure ground
- discrimination.
- At 1month- differentiate faces; preference shown for complex stimuli
- 2 months - possesses depth perception, prefers 3 dimensional rather than
- 2 dimensional representations of a face
- 4 months-colour vision and accommodation
- 6 months-accurate acuity

Development of Vision

- At 6 months 20/20 vision
- Can distinguish edges of contrast – preferentially look at patterns
- Exceptionally good at face discrimination and recognition – preference for mothers face at 2 weeks
- Colour sensitivity improves over first year – dev of cones – like strong colours and contrasts
- Highly light sensitive
- Eye movements not well coordinated
- Visual development – dependent on visual stimulus and competition between 2 eyes – neural plasticity and critical period

Development of vision

- Problems with vision and impact on social development/bonding?
- Eye test on starting school – to make sure they can see to be able to read and write
- Sensory deprivation
  - cataracts from birth – removed at 8 child cant see vs man of 75 has cataracts which when removed – normal sight.

Motor Development

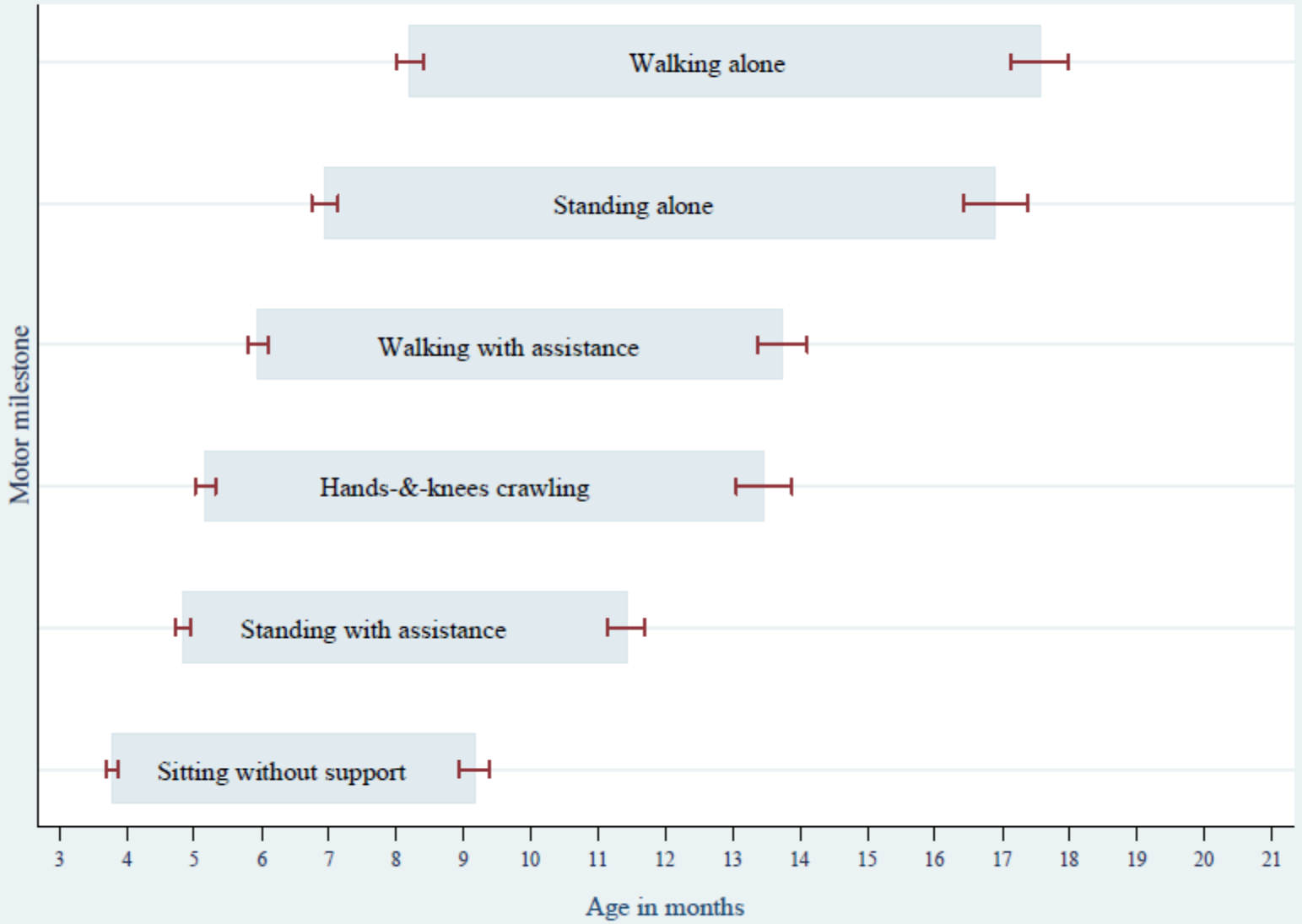
- Mothers usually detect foetal movements 16 to 20 weeks into the pregnancy; Fetal movement can be activated by stimulation of ventral skin surface by the 14th week.
- The foetus may be able to hear by the 18th week, and it responds to loud noises with muscle contractions, movements, and an increased heart rate.
- Grasp reflex appears in uterus by 17 weeks
- The Moro (startle) reflex appears at 25 weeks
- The sucking reflex appears at about 28 weeks.
- A foetus can suck on thumb and fingers

Origins of motor development

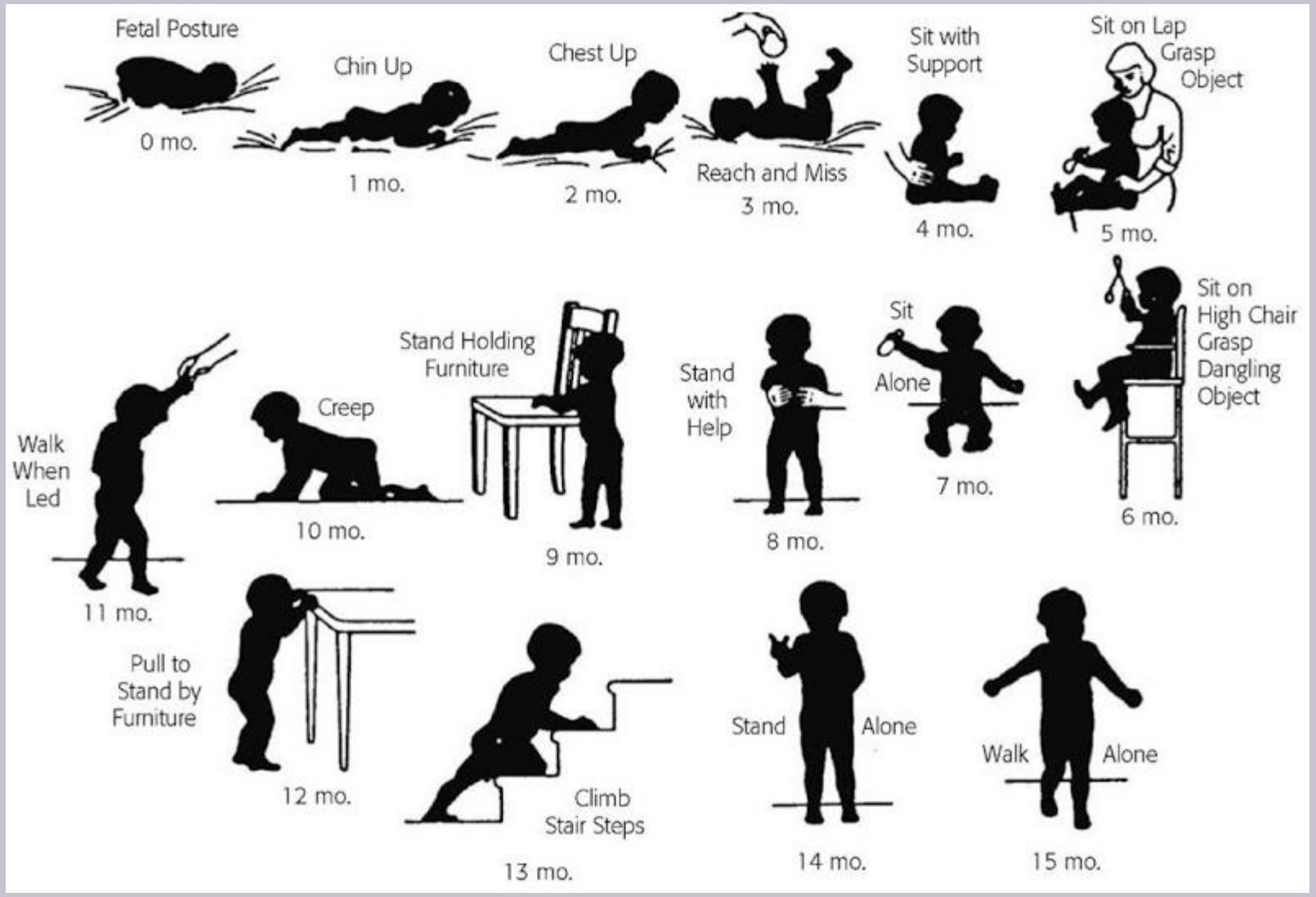
- Emerge gradually by a process of sequential changes in structure and function – not predetermined
- Small changes in anatomy, motivation or environment can lead to different outcomes
- Probabilism (absence of certainty)
- Emergence of a new milestone requires functional readiness of many variables – each variable has its only trajectory and exert control at different times

Windows of achievement for six gross motor milestones

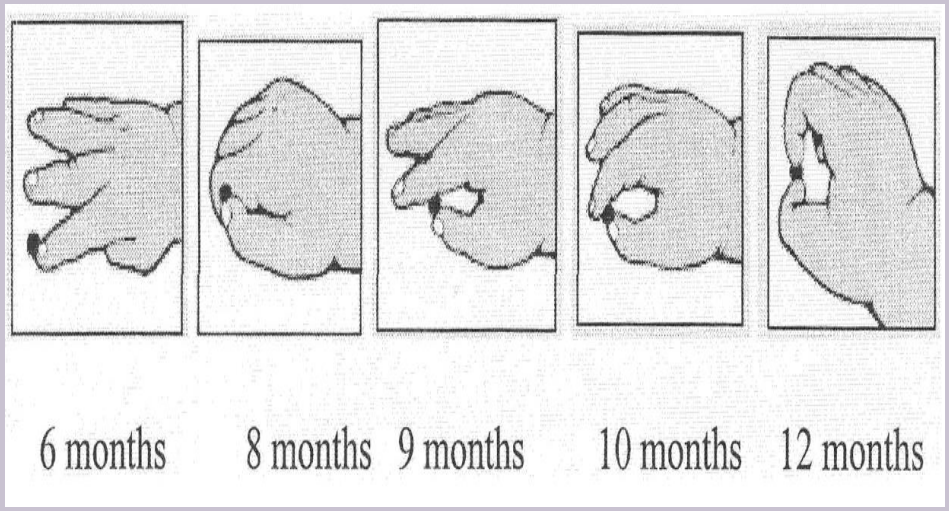
World Health Organization

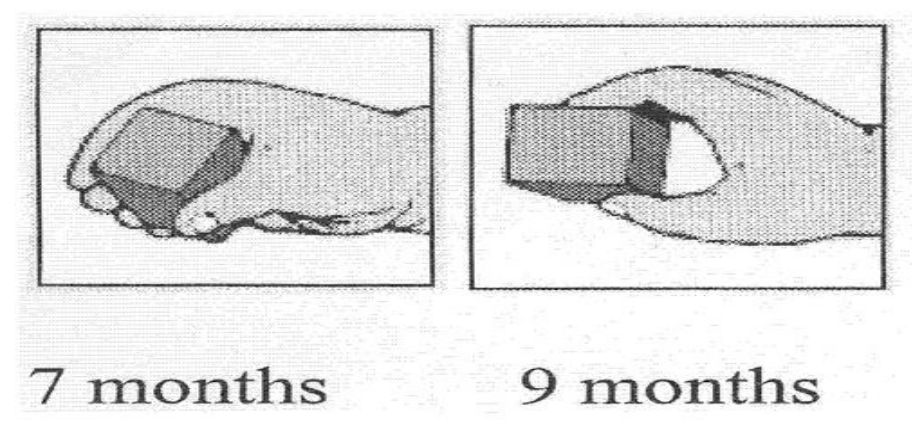


Reference: WHO Multicentre Growth Reference Study Group. WHO Motor Development Study: Windows of achievement for six gross motor development milestones. Acta Paediatrica Supplement 2006;450:86-95.


Fetal Posture
0 mo.
Chin Up
1 mo.
Chest Up
2 mo.
Reach and Miss
3 mo.
Sit with Support
4 mo.
Sit on Lap Grasp Object
5 mo.
Sit on High Chair Grasp Dangling Object
6 mo.
Sit Alone
7 mo.
Stand with Help
8 mo.
Stand Holding Furniture
9 mo.
Creep
10 mo.
Walk When Led
11 mo.
Pull to Stand by Furniture
12 mo.
Climb Stair Steps
13 mo.
Stand Alone
14 mo.
Walk Alone
15 mo.

Fine motor skills





Fine motor skills

- **Birth to 3 months**
- Hands are in a fist, thumbs are tucked in
- Baby's arms move randomly in asymmetric patterns
- Watches movements of her hands and can bring the hand to her mouth
- Swings at a target using her entire arm
- Follows a moving person with her eyes
- Holds objects in hands
- **3-6 months**
- Picks up objects with one hand
- Transfers objects from one hand to another
- Looks at objects a few feet away
- Holds hands together
- Reaches for a toy using both arms and holds it briefly
- **6-9 months**
- Rakes tiny objects with fingers
- Uses thumb and fingertips to grasp objects
- Uses thumb and side of index finger to grip objects
- Holds 2 objects, one in each hand, at the same time
- Uses 2 hands to pick up large objects

Fine Motor Skills

- **9-12 month**
- Puts small objects in cup or other container
- Turns book pages a few at a time
- Attempts to imitate new gestures
- Pokes and points at things using index finger
- Grabs crayons in fist
- Uses both hands and begins to show preference for one
- **12-18 months**
- Builds tower of 2 or more blocks
- Marks with crayon or pencil
- Marks a piece of paper with a crayon and scribbles imitatively
- Stacks 2-3 cubes
- Can hold an object with one hand and manipulate it with the other hand
- **18-24 months**
- Starts using fingers and thumb to grasp crayons
- Imitates vertical and circular scribbles
- Turns pages of a book one at a time
- Strings 1-3 inch beads
- Cuts paper using scissors
- Builds tower with 3-5 blocks
- **3-4 years**
- Cuts across paper with small scissors
- Draws or copies a complete circle
- **4-5 years**
- Prints first name (four letters)
- Draws a person that has at least 3 parts- head, eyes, nose, etc.
- Draws recognizable pictures

Puberty/Adolescence

- Hormonal changes/growth and development
- Brain development
- Individuation
- Social factors
- Educational factors