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
  - developmental milestones involve physical, social, emotional, cognitive and communication skills
  - rolling over, crawling, walking, and talking are all considered milestones
  - there is a normal time range in which a child may reach that milestone
  - the milestones are different for each age range

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 – Audiology, 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 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 adults and other children

Definitions

- **Voice**
  - the sound made as air from our lungs is pushed between vocal folds in our larynx, causing them to vibrate
- **Phonemes**
  - 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

Definitions

- **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
  - most children can differentiate speech sounds before being able to produce them
- **Morpheme**
  - the basic meaningful part of language
- **Syntax**
  - the rules for combining words into phrases and sentences
- 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 auditory 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 delay, social communication difficulties, school refusal, anxiety, ODD, CD
- **Syndromes associated with deafness**
  - VCF
  - NF2

Language Development

- The ***rate and quality of language development*** is 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
- Children learn to take turns communicating through caretaking rituals and games

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

- What happens along the pathway from auditory nerve to the brain and what the brain does with the auditory signal from the ears
  - **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
  - Attentional difficulties

Theories of Language development

- **Vocabulary**
  - acquired by ordinary processes of learning in which children acquire the forms, meanings and uses of words and from linguistic input
- **Syntax**
  - ***Nativist approach*** some principles of syntax are innate and are transmitted through the human genome
  - ***Chomsky*** - 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

Theories of Language Development

- **Empiricist theories**
  - **Skinner**
    - operant conditioning by imitation of stimuli and by reinforcement of correct responses used in approaches to ASD
  - **Piaget**
    - 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 - 12m**
  - crying is important form of communication
  - one month old child is able to distinguish speech sounds
  - six weeks the child starts cooing
  - six months **babbling** is seen - is production of speech sounds repetitively - spontaneous babbling when child enjoys making these sounds alone
  - all babies around same age irrespective of the culture start babbling
  - the phonemic expansion refers to expansion of production of phonemes even if such phonemes are not seen in the native language - innate

Stages of Language Development

- **One word stage: 12m - 18m**
  - jargon words and babbling continue up to 18 months
  - first words are often self invented - 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.
  - At this stage a child understands more words than it could produce
  - Gradually words get decontextualised

Stages of Language Development

- **Two word sentences stage 1 grammar: 18m – 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
  - Social stories/ADOS/ADI/School observation
- Temperament
- Attachment style

Theory of Mind

- **Social cognition**
  - central to children's ability to get along with other people and to see things from their point of view
  - basis of this crucial ability is development of theory of mind
- **Theory of mind**
  - 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

- **Age 2 children** clearly show awareness of the difference between thoughts in the mind and things in the world
- In pretend play - 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
- Children see that there may be a difference between what they want and what another person wants
  - 2 year olds talk about what they and others want and like and feel
- **Age 3 children** – talk about what people think and know

Theory of Mind

- **Around 4 years of age children realise that thoughts in the mind may not be true**
  - children are allowed to discover that a familiar sweet box actually contains pencils
  - asked what their friend will think is in the box
    - 3-year-olds assume that the friend will know it has pencils inside, because they do
    - 4-year-olds recognise that the friend will be tricked, just as they were
    - three-year-olds do not remember that their own belief has changed If they are asked what they thought was inside before opening it, they'll say "pencils" not "sweets" but 4-year-olds remember they thought it was sweets
  - **By the age of 4 or 5 years**, children realise 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

Theory of Mind

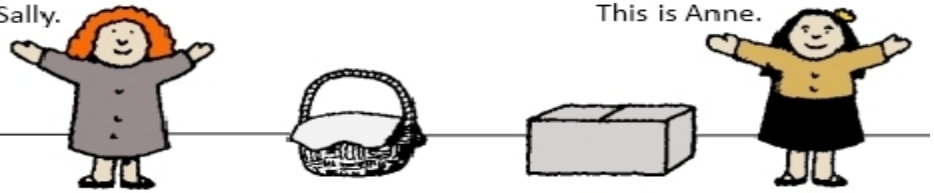
- **Social environment influences the rate of typical development of theory of mind:**
  - children show earlier awareness of mental states if their mothers talk about thoughts, wants and feelings, and provide reasons when correcting misbehaviour
  - children with brothers and/or sisters are aware of mental states sooner than only children
  - pretend play
  - experiences of story-book reading
  - talking with others about past experiences
- **Internal factors to the child that influence the rate of development:**
  - language abilities
  - Executive function - cognitive abilities that control and regulate behaviour

Theory of Mind

- **Theory-of-mind development has consequences for children's social functioning and school success**
  - better communicators and can resolve conflicts with their friends
  - pretend play is more complex
  - teachers rate them as more socially competent
  - are happier in school and more popular with peers
  - 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
- **Parents and caregivers can be made aware of signs of delayed theory of mind**
  - lack of pretend play
  - lack of shared attention and interest
  - Struggling to make and maintain friendships

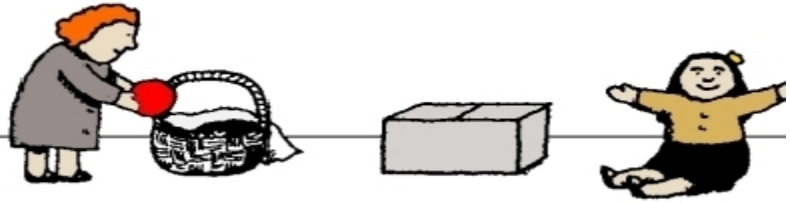
This is Sally.

This is Anne.

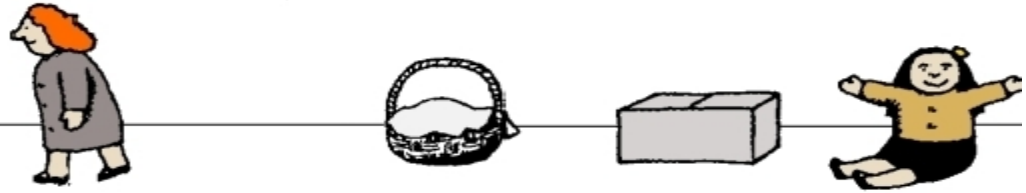


Sally has a basket.

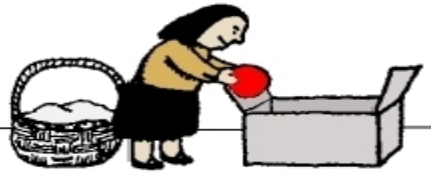
Anne has a box.



Sally has a marble. She puts the marble into her basket.



Sally goes out for a walk.



Anne takes the marble out of the basket and puts it into the box.

Now Sally comes back. She wants to play with her marble.

Where will Sally look for her marble?

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 behaviour
  - 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
  - monitoring others' reactions can also help children change course if things aren't going well
  - children who have trouble with social seeing often annoy others - they may do things that are inappropriate for the context

Social Skills

- **Thinking in social settings**
  - involves interpreting other children's behaviour 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
  - children who struggle socially often misinterpret others' intentions
    - aggressive children are more likely than other children to view a peers' behaviour as stemming from deliberate meanness
    - 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 way
  - some children know what they ought to do by have trouble actually doing it
    - 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 motor abilities
- Use imaginative play to help deal with their fears and identify with adult roles (playing house)
- Solitary and parallel play at age 2
- Understanding turn-taking at age 3
- Interactive and cooperative play at age 4
- Free play allows children to acquire basic competencies needed as they approach adulthood
  - problem solving
  - decision-making
  - self control – emotional regulation
- AAP recommends that parents limit screen time to 2 hours per day for preschool-age children

Play and Cognition

- Links between socially interactive pretense and cognitive development
  - theory of mind in play
  - mental representational ability in role play
- Social and linguistic competence
- Academic skill development
  - literacy/math embedded play
- Problem solving
  - narrative recall
  - rule understanding
  - self regulation

Development of Vision

- **Human visual system**
  - develops largely after birth
  - especially in the first few years of life
- The foetus responds to bright light flashed on the abdominal wall at 20 weeks with changes in heart rate and position
- **At birth**
  - visual structures are fully present yet immature
  - newborns can detect changes in brightness
  - distinguish between stationary and kinetic objects
  - follow kinetic objects in their visual fields
  - the acuity if newborn is around 20/300
  - fixed focus at about 20 cm

Development of 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**
  - development 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
  - critical period

Development of Vision

- **1month**
  - differentiate faces: preference shown for complex stimuli
- **2 months**
  - possesses depth perception
  - prefer 3 dimensional rather than 2 dimensional representations of a face
- **4 months**
  - colour vision and accommodation
- **6 months**
  - accurate acuity (6:6)

Motor Development

- Mothers usually detect foetal movements 16 - 20 weeks gestation
- 18 week foetus responds to loud noises with muscle contractions, movements, and an increased heart rate
- Grasp reflex appears in utero by 17 weeks
- The Moro reflex appears at 25 weeks
- The sucking reflex appears at about 28 weeks
  - A foetus can suck on thumb and fingers

Motor Development

- **Dynamical systems theory (1980s)**
  - 1980s perceptual, cognitive and social development are heavily mediated by the development of movement and posture
- **Motor developmental is strongly interactive**
  - children interact with the environment through the musculoskeletal system, extract information from it and affect changes
  - Perception-action cycles new actions new structures – more new actions etc

Motor Development

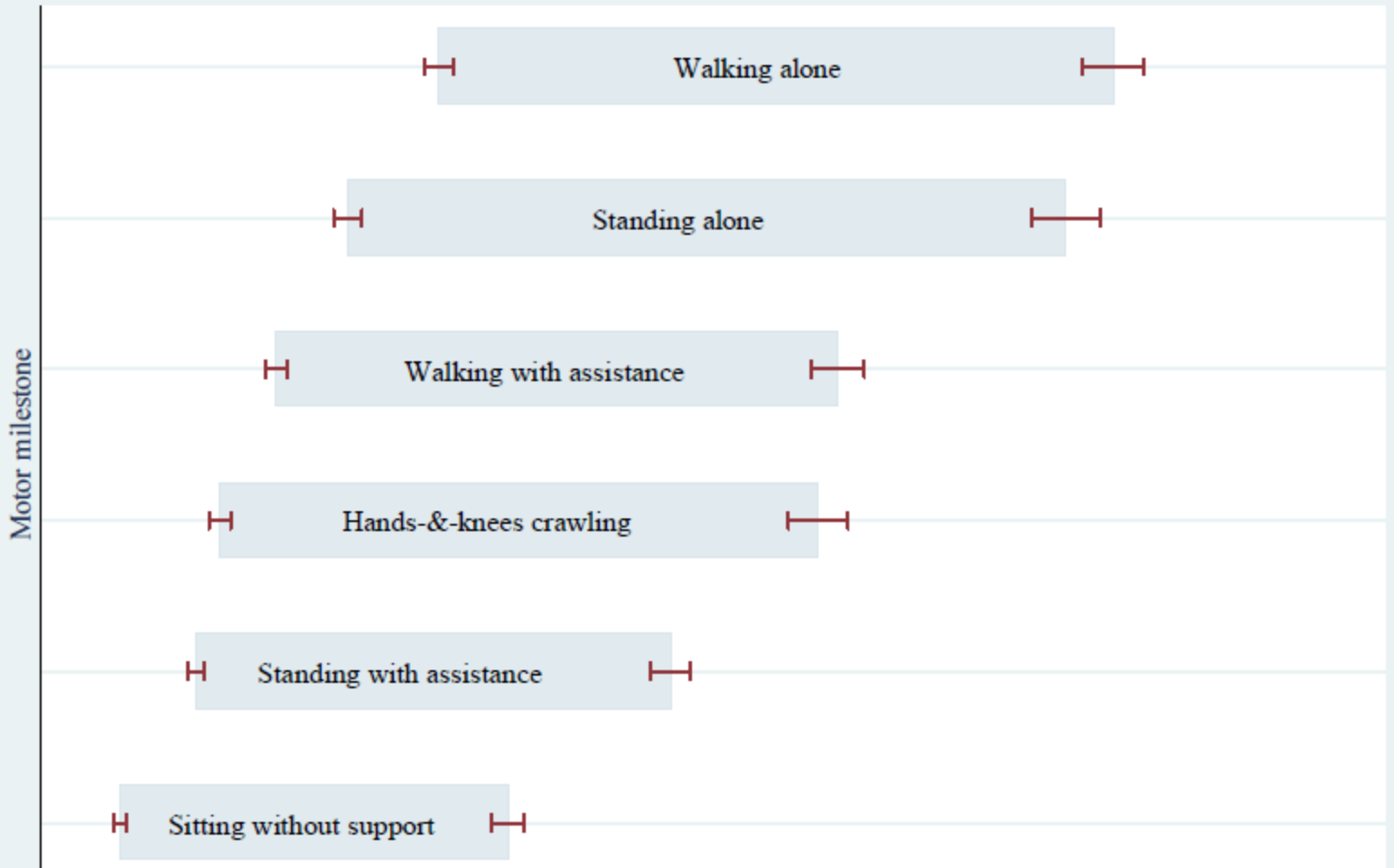
- **By manipulating objects learn about form, texture, taste and rigidity**
  - motor development aids development of other domains
  - By being able to follow a ball that rolls away – learn it hasn't disappeared
- **Early memory development is context dependent**
  - infants learn jiggling leads to mobile movement only if context remains constant

Origins of Motor Development

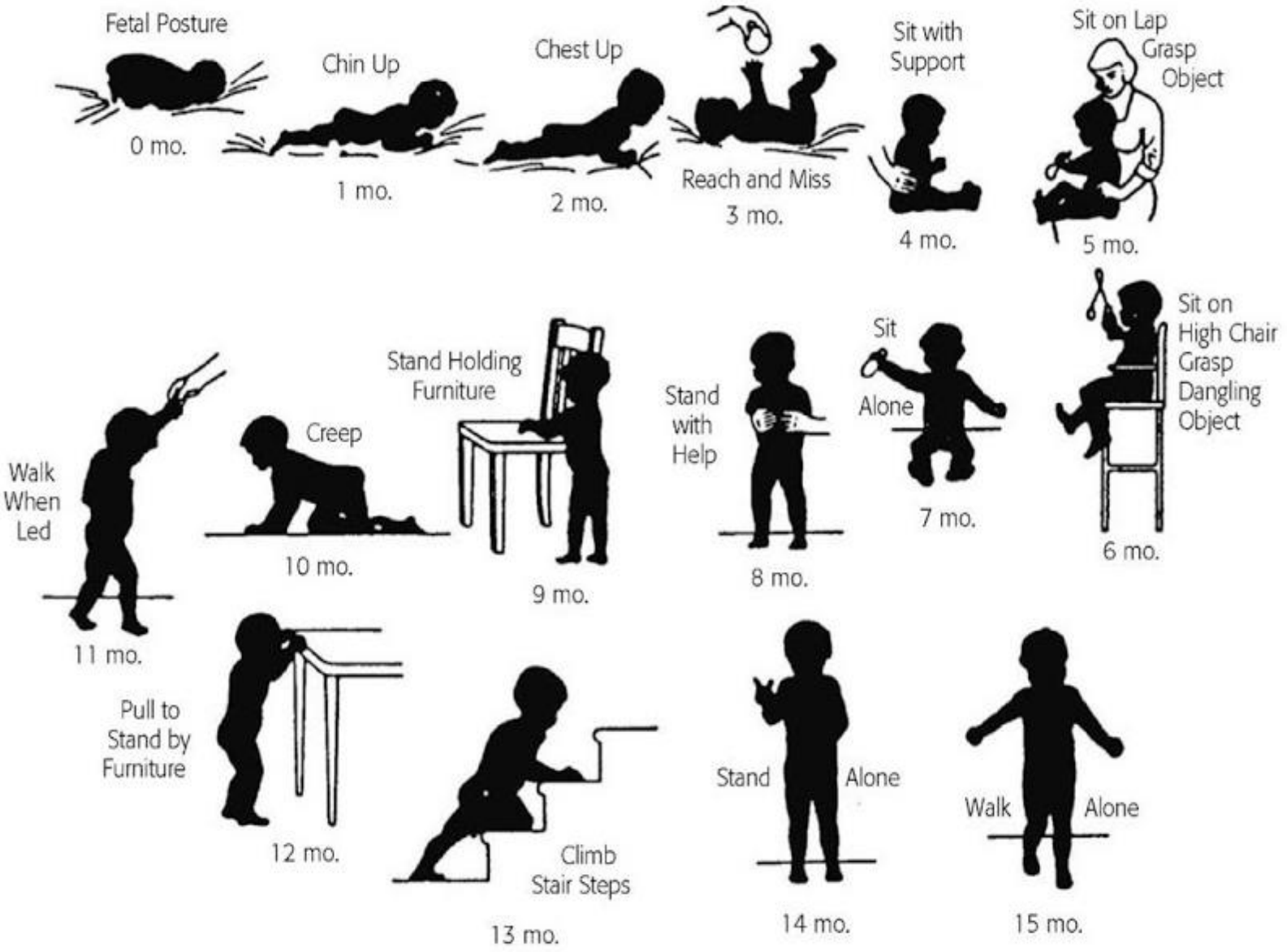
- **Emerge gradually by a process of sequential changes in structure and function**
  - not predetermined
- **Emergence of a new milestone requires functional readiness of many variables**
  - small changes in anatomy, motivation or environment can lead to different outcomes
  - each variable has its only trajectory and exert control at different times
  - probablism
- **Practiced motor skills non transferrable**
  - Jimmy and Johnny experiments

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

- **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

Fine Motor Skills

- **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

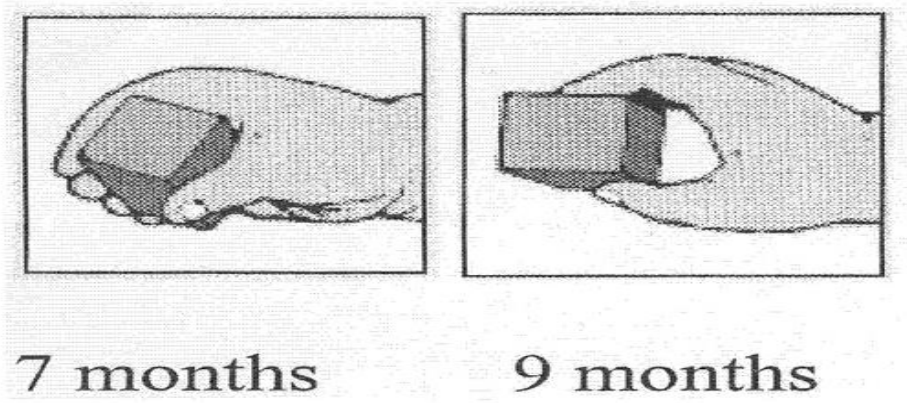
- **9-12 month**
- Puts small objects in cup or other container
- Turns book pages a few at a time
- Attempts to imitate new gestures
- Pokes and points at things using index finger
- Grabs crayons in fist
- Uses both hands and begins to show preference for one

Fine Motor Skills

- **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

Fine Motor Skills



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