

CHILD DEVELOPMENT

Dr Steve Koury
Specialty Doctor - Paediatrics

Learning objectives

1. To define the term development.
2. To list the developmental domains.
3. To outline the key developmental milestones and limits.
4. To outline the various tools available for assessing childhood development.

Outline

- Where does it all fit in?
- Definition of development
- Domains of development
 - Gross motor and posture
 - Fine motor and vision
 - Language and hearing
 - Social and behaviour
- Assessment of development

Where does it all fit in?

Cellular and molecular biology



Fertilisation and embryogenesis



Growth and development

What is development?

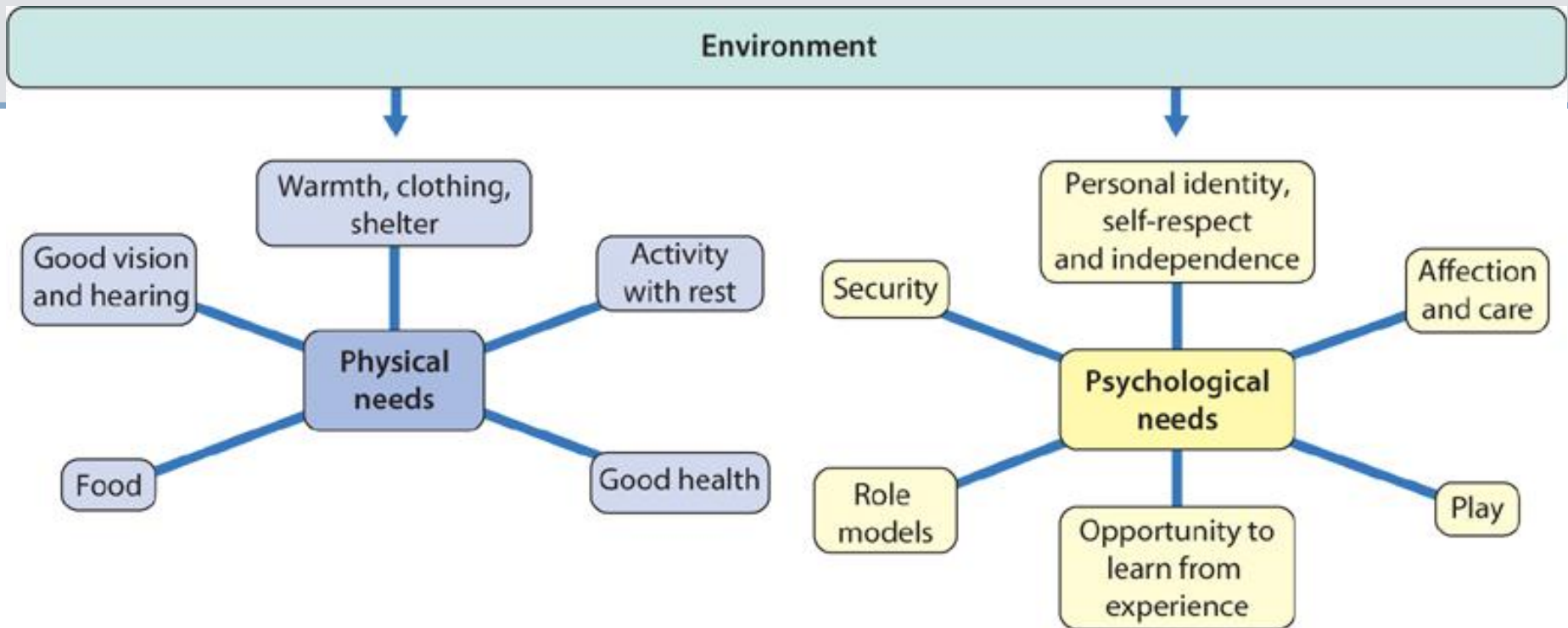
- Global impression of a child which encompasses growth, increase in understanding, acquisition of new skills and more sophisticated responses and behaviour
- It serves to endow the child with increasingly complex skills in order to function in society
- Acquisition of skills result in increasing sophistication of mobility, speech and language, communication, cognition and independence

Some key facts

- The acquisition of each field/domain follows a remarkably constant pattern between children, but may vary in rate.
- Should always be considered longitudinally
- Varies in rate between children
- The *median age* is the age when half of a standard population of children achieve that level
- *Limit ages* are the age by which they should have been achieved = 2 standard deviations from the mean.
- Correct for prematurity until age 2 years

What influences development

- genetic factors
- biochemical
- environmental influences
 - internal milieu
 - maternal illness
 - teratogens

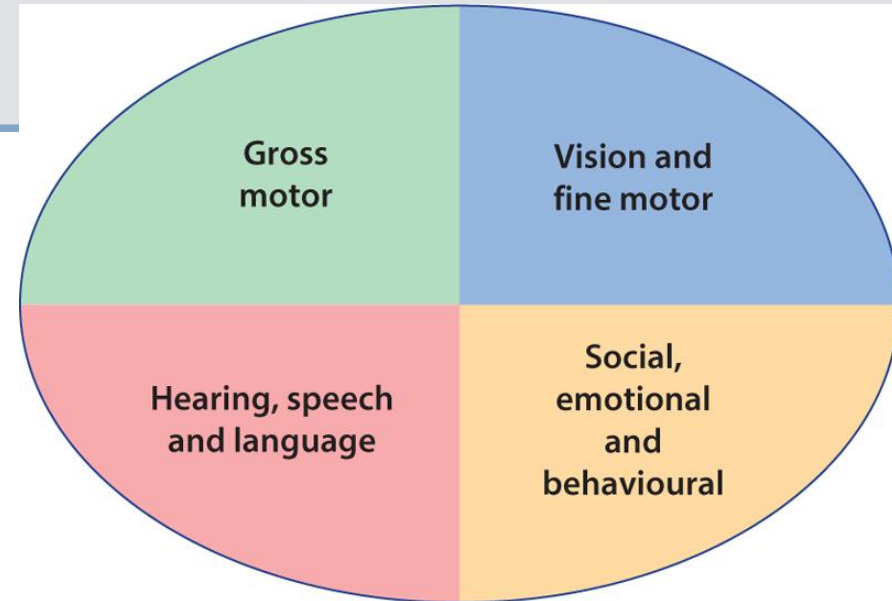


Tom Lissauer and Graham Clayden: Illustrated Textbook of Paediatrics, 4e.
Copyright © 2012 by Mosby, an imprint of Elsevier Ltd. All rights reserved.

- *Development can be impaired if the environment fails to meet the child's physical or psychological needs*

Domains of development

- Gross motor and posture
- Fine motor and vision
- Language and hearing
- Social and behaviour



Tom Lissauer and Graham Clayden: Illustrated Textbook of Paediatrics, 4e.
Copyright © 2012 by Mosby, an imprint of Elsevier Ltd. All rights reserved.

Developmental norms are called **milestones**-they describe recognised patterns of development that children are expected to follow

Gross motor and posture

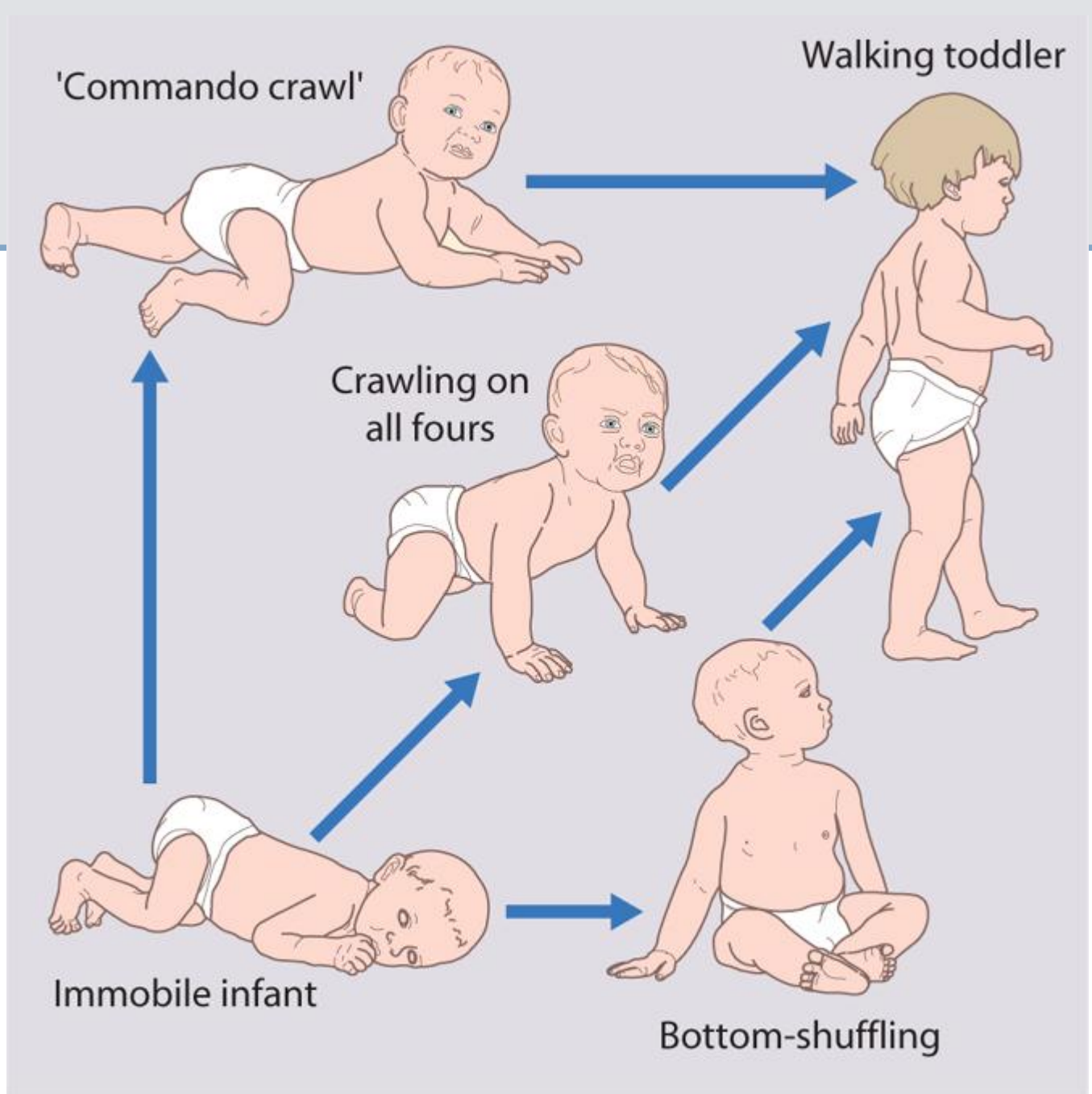
Looks at posture and execution of large movements

- Standing
- Walking
- Running
- Kicking a ball
- Climbing stairs
- Peddling a tricycle



Gross motor

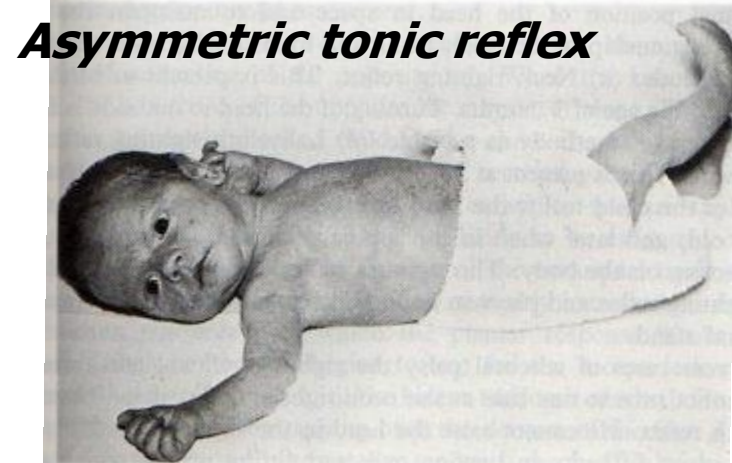
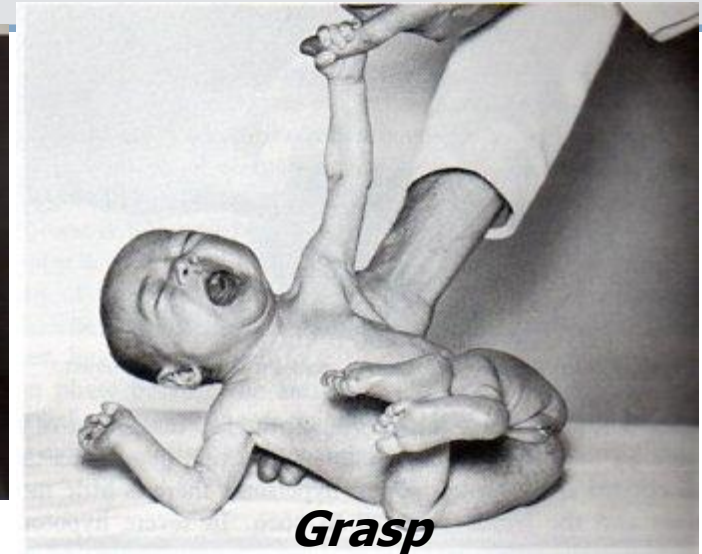
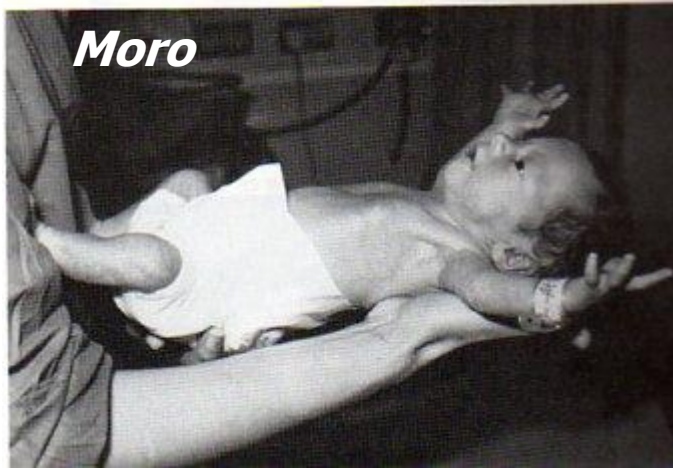
- Develops in a cephalo-caudal direction
- Lying mobile \Rightarrow standing/walking
- Flexion \Rightarrow extension
- Rolling \Rightarrow sitting \Rightarrow crawling \Rightarrow walking



Primitive reflexes

- Are protective and have a survival value
- Promote proper orientation
- Promote postural support and balance

Primitive reflexes



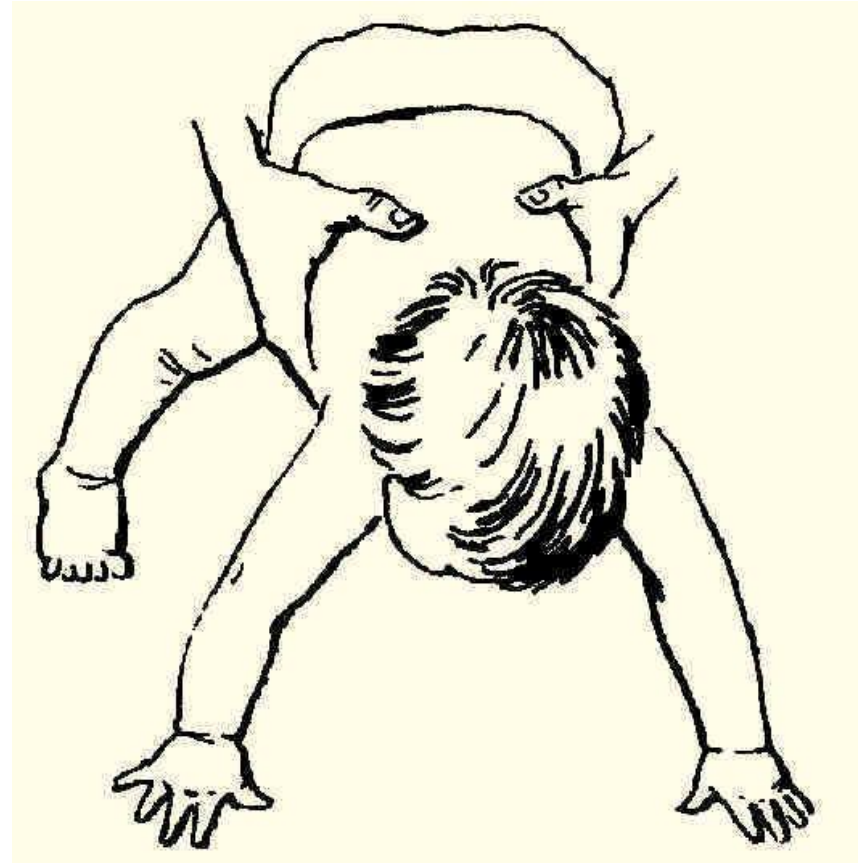
*These should
disappear by 4-
6 months*





Protective or righting responses

- Have to develop before can attain motor development
- Head righting
- Downward parachute by 4-6 months
- Forward parachute by 7-9 months



Forward parachute



Gross motor development (median ages)

newborn



Limbs flexed, symmetrical posture

newborn



Marked head lag on pulling up

6-8 weeks



Raises head to 45° in prone

6-8 months



Sits without support
- at 6 months: with round back
- at 8 months: with straight back (shown)

8-9 months



Crawling

10 months



Cruises around furniture

12 months



Walks unsteadily,
broad gait, hands apart

15 months



Walks steadily

Fine motor and vision

- Looks at hand function and hand-eye coordination
- Can also give some information of cognitive function
 - Holding objects
 - Picking up objects
 - Pointing
 - Waving
 - Throwing/catching



Vision and fine motor (median ages)

6 weeks



Follows moving object or face by turning the head (illustrated).

4 months



Reaches out for toys

4-6 months



Palmar grasp

7 months



Transfers toys from one hand to another

10 months



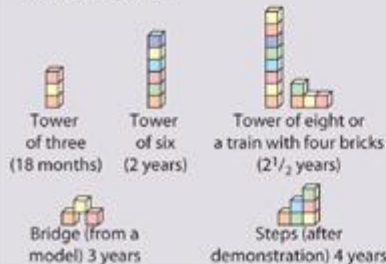
Mature pincer grip

16-18 months

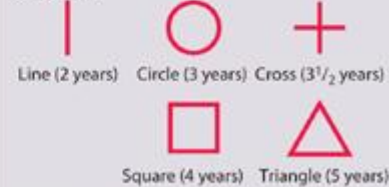


Makes marks with a crayon

14 months-4 years



2-5 years



Ability to draw without seeing how it is done.
Can copy (draw after seeing it done) 6 months earlier.

6 Months
Rake

Thumb adducted, proximal and distal thumb joints flexed, fingers extended



7 Months
Inferior-scissors grasp

Raking object into palm with flexed fingers and proximal and distal thumb joints flexed



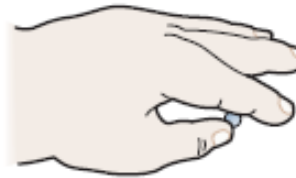
8 Months
Scissors grasp

Between thumb and side of curled index finger, distal thumb joint slightly flexed, proximal thumb joint extended



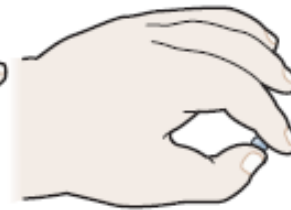
9 Months
Inferior-pincer grasp

Between ventral surfaces of thumb and index finger, proximal and distal thumb joints extended, beginning opposition



10 Months
Pincer grasp

Between distal pads of thumb and index finger, proximal thumb joint extended, distal thumb joint slightly flexed, thumb opposed to index finger



12 Months
Fine pincer grasp

Between fingertips or fingernails, distal thumb joint flexed, proximal thumb joint slightly flexed











Language and hearing

Normal hearing is needed for normal speech

- Babbling
- Words
- Sentences
- Social communication

Hearing, speech and language (median ages)

<p>NEWBORN</p>  <p>(a) Startles to loud noises</p>	<p>3-4 MONTHS</p>  <p>(b) Vocalises alone or when spoken to, coos and laughs</p>
<p>7 MONTHS</p>  <p>(c) Turns to soft sounds out of sight</p>	<p>7-10 MONTHS</p>  <p>(d) At 7 months, sounds used indiscriminately. At 10 months, sounds used discriminately to parents</p>
<p>12 MONTHS</p>  <p>(e) Two to three words other than 'dada' or 'mama'</p>	<p>18 MONTHS</p>  <p>(f) 6-10 words. Shows two parts of the body</p>
<p>20-24 MONTHS</p>  <p>(g) Uses two or more words to make simple phrases</p>	<p>2½-3 YEARS</p>  <p>(h) Talks constantly in 3-4 word sentences</p>

Social, behaviour and play

- Looks at interaction with others and self care skills
- Stranger awareness
- Play
- Feeding
- Toileting
- Dressing



Social, emotional and behavioural development (median ages)

- (a) **6 WEEKS**

Smiles responsively
- (b) **6-8 MONTHS**

Puts food in mouth
- (c) **10-12 MONTHS**

Waves bye-bye, plays peek-a-boo
- (d) **12 MONTHS**

Drinks from a cup with two hands
- (e) **18 MONTHS**

Holds spoon and gets food safely to mouth
- (f) **18-24 MONTHS**

Symbolic play
- (g) **2 YEARS**

Dry by day. Pulls off some clothing
- (h) **2.5-3 YEARS**

Parallel play. Interactive play evolving. Takes turn

Age	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
2-4 months	Head steady in sitting	Follows object through 180°	Squeals with pleasure	Smiles
5-8 months	Sits without support	Passes cube from hand to hand	Turns to soft voice Baba/Gaga babble (to 10 months)	Feeds self biscuit
9-14 months	Stands with support	Neat pincer grasp of raisin	Mama or Dada specifically	Indicates needs by gesture
12-16 months	Walks well alone	Stacks two cubes (to 21 months)	Three words (to 21 months)	Drinks from a cup
15-24 months	Walks up steps	Scribbles spontaneously	Points to one body part	Removes garment
21-36 months	Jumps on the spot	Draws vertical line in imitation	Uses plurals and phrases	Puts on clothing Plays tag with other children
3-4½ years	Balances on one foot for 5 seconds	Copies a ladder Draws a face	Understands cold, tired and hungry Asks 'Wh' questions	Separates from mother

Warning signs - be concerned if the child is not doing this; but items marked with an asterisk () are a worry if they are present)*

Age (months)	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
3	Complete head lag*	Following with eyes	Searching for sounds with eyes	Smiling
6	Persistent Moro reflex*	Preference for one hand* Squint*	Head turn to soft voice	Interest in people
9	Sitting with support	Persistent hand regard*	Ba-ba-ba babble	Awareness of strangers
12	Pulling to stand Standing with support	Pincer grasp	Trying one or two words	Constant mouthing*
18	Walking alone	Constructive play with blocks Casting toys*	Six words Constant dribbling*	Pointing at items Finger-feeding
24	Running	Turning book pages	Fifty single words	Interested in other children Helps with dressing
36	Kicking a ball	Drawing lines Preference for one hand	2-3-word phrases Echolalia*	Interactive play with peers
48	Pedalling and hopping	Drawing a face	Sentences and 'Wh' questions	Imaginative role play Toilet-trained by day

Fields of development with limit ages

Gross motor development



- Acquisition of tone and head control
- Primitive reflexes disappear
- Sitting
- Locomotor patterns
- Standing, walking, running
- Hopping, jumping, peddling

Gross motor	Limit ages
Head control	4 months
Sits unsupported	9 months
Stands independently	12 months
Walks independently	18 months



Vision and fine motor development



- Visual alertness, fixing and following
- Grasp reflex, hand regard
- Voluntary grasping, pincer, points
- Handles objects with both hands, transfers from hand to hand
- Writing, cutting, dressing

Vision and fine motor	Limit ages
Fixes and follows visually	3 months
Reaches for objects	6 months
Transfers	9 months
Pincer grip	12 months



Hearing, speech and language development



- Sound recognition, vocalisation
- Babbling
- Single words, understands simple requests
- Joining words, phrases
- Simple and complex conversation

Hearing, speech and language	Limit ages
Polysyllabic babble	7 months
Consonant babble	10 months
Saying 6 words with meaning	18 months
Joins words	2 years
3-word sentences	2.5 years



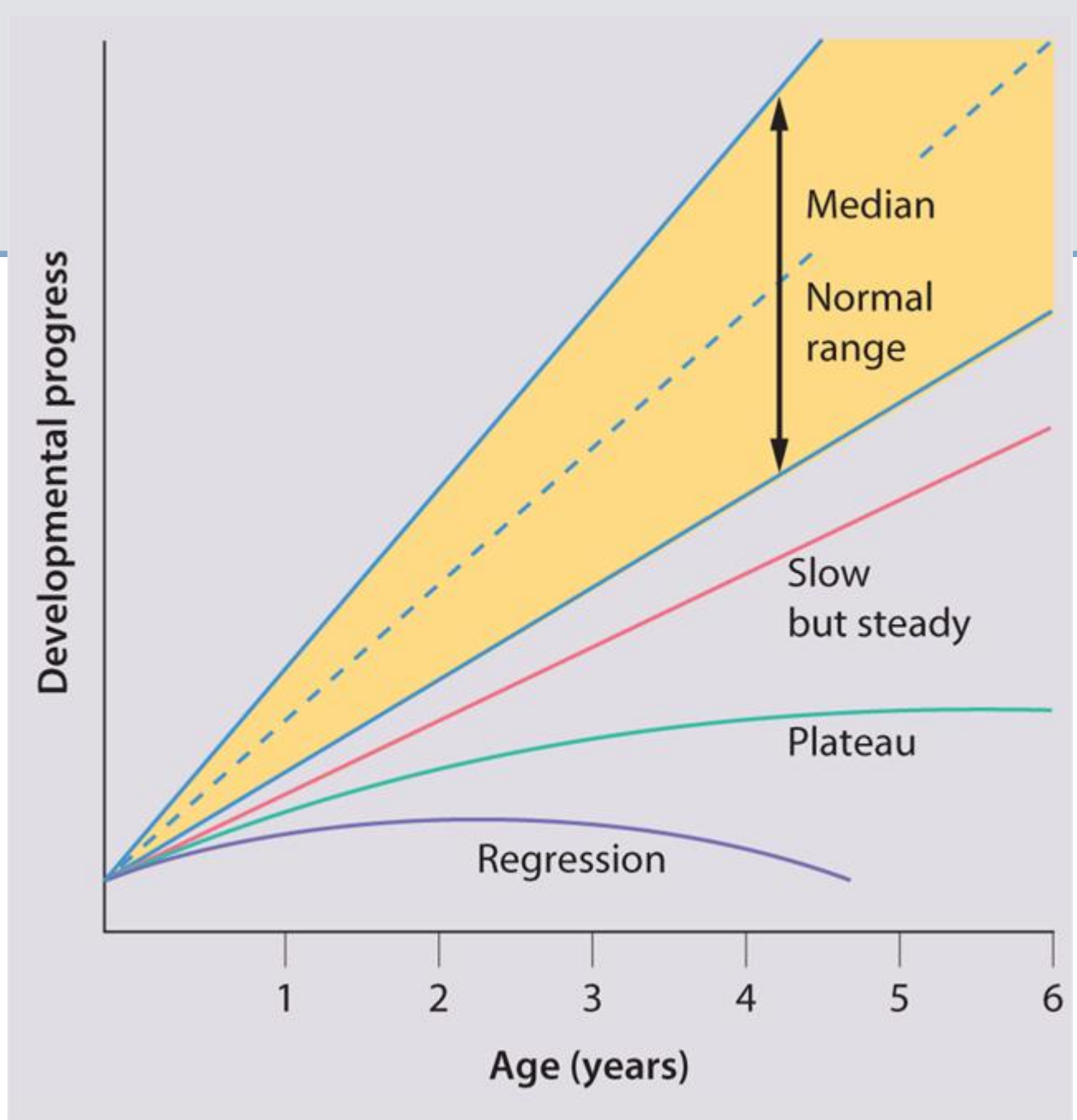
Social, emotional, behaviour development



- Smiling, socially responsive
- Separation anxiety
- Self-help skills, feeding, dressing, toileting
- Peer group relationships
- Symbolic play
- Social/communication behaviour

Social behaviour	Limit ages
Smiles	8 weeks
Fear of strangers	10 months
Feeds self/spoon	18 months
Symbolic play	2-2.5 years
Interactive play	3-3.5 years





The clinical approach....history

Antenatal

- Illnesses/Infections
- Medications
- Drugs
- Environmental exposures

Birth

- Prematurity
- Prolonged/complicated labour

Postnatal

- Illnesses/infections
- Trauma

Consanguinity

Developmental
milestones from
parent

The clinical approach.....examination

Auxology	Height, weight and head circumference
Dysmorphic features	Face, limb, body proportions
Skin	Neurocutaneous stigmata, injuries,
Central nervous examination	Power, tone, reflexes and any asymmetry
Systems examination, e.g., cardiac	Associated with many syndromes/chromosomal abnormalities
Formal developmental assessment	SOGSII, Griffiths

Developmental assessment

Observe the child

- Gross motor
- Fine motor
- Speech
- Social & play

Use play

Do not force your agenda

Give the child appropriate props

- Bricks & 'thousands'
- Pencil & paper & crayons
- Ball
- Doll
- Pictures

Developmental screening and assessment

Developmental screening

- is a formal process within the child health surveillance and promotion programme
- checks of whole populations of children at set ages by trained professionals

Developmental assessment

- is the detailed analysis of a of development
- Standardised tests
 - Schedule of Growing Skills (SOGS)
 - Denver Developmental Screening Test (DDST)
 - Griffiths
 - Bailey Infant Development Scales
 - Reynell language scale,
 - Gross Motor Function Measure (GMFM)
 - Autism Diagnostic Interview

SOGS II

The Schedule of Growing Skills II – Record Form

Screening Dates				
PASSIVE POSTURAL SKILLS				
Supine Position				
1. Head in midline	1			
2. Lifts legs into vertical position and grasps foot (foot regard)	2			
Ventral Suspension				
3. Head in line with body, hips semi-extended	1			
4. Head above line of body, hips and shoulders extended	2			
Pull to Sit				
5. Head lag on pulling, when body vertical; head held momentarily erect before falling forwards	1			
6. Little or no head lag	2			
7. Braces shoulders and pulls self up	3			
Sitting Position (supported by adult)				
8. Back curved	1			
9. Back straight	2			
PASSIVE POSTURAL SKILLS SCORE				

ACTIVE POSTURAL SKILLS				
Prone Position				
10. Head sideways, resting on cheeks, buttocks high with knees flexed under abdomen, arms close to chest with elbows flexed	1			
11. Lifts head momentarily, buttocks high	2			
12. Holds up head and upper chest on forearms, with buttocks flat	3			
13. Supports weight on flattened palms and extended arms	4			
14. Gets into crawling position	5			
Sitting Position (unsupported)				
15. Sits alone momentarily without support	1			
16. Sits alone for prolonged periods (at least to the count of 10)	2			
17. Gets into sitting position from either prone or supine	3			
Standing				
18. Held standing, bears some weight on feet	1			
19. Held standing, takes full weight on feet	2			
20. Stands holding on	3			
21. Pulls self to stand	4			
ACTIVE POSTURAL SKILLS SCORE				

KEY

- Stimulus material needed for this item.
- Ⓞ This item contains a cognitive element.
- Q Use when quality of performance is questioned.
- Still score item.

Screening Dates				
LOCOMOTOR SKILLS				
Movement and Balance				
22. Rolls and squirms to move about	1			
23. Attempts to crawl, creep or shuffle	2			
24. Walks with hands held, taking full weight on feet	3			
25. Walks around furniture (or pushing wheeled toy)	4			
26. Walks alone, feet wide apart, arms up for balance	5			
27. Walks well, feet only slightly apart, can turn corners and stop suddenly	6			
28. Picks up objects from floor without falling	7			
29. Runs confidently, stopping and starting with care and avoiding obstacles	8			
30. Jumps taking both feet off the ground	9			
31. Walks tiptoe	10			
32. Runs tiptoe	11			
33. Hops on one foot for 3 steps	12			
34. Heel-to-toe walking forwards (for a minimum of 4 steps)	13			
35. Stands on each foot separately for a count of 8 seconds	14			
Stairs				
36. Crawls upstairs	1			
37. Walks upstairs with hand held, two feet to a step	2			
38. Walks up and down stairs confidently, two feet to a step	3			
39. Walks alone upstairs (with alternating feet) and downstairs (two feet to a step)	4			
40. Walks alone upstairs and downstairs – one foot per step (adult fashion)	5			
41. Runs upstairs	6			
LOCOMOTOR SKILLS SCORE				

MANIPULATIVE SKILLS				
Hand Skills				
42. Hands closed and thumb turned in	1			
43. Hand regard and finger play	2			
44. Claps hands and presses palms together	3			
45. ■ Palmar grasp	4			
46. ■ Passes toy from one hand to another	5			
47. ■ Holds two cubes – one in each hand, bringing them together	6			
48. ■ Inferior pincer grasp	7			
49. ■ Neat pincer grasp	8			
50. ■ Throws toys to the floor deliberately (casting)	9			
51. ■ Turns pages of a book, several at a time	10			
52. ■ Turns pages of a book, one at a time	11			
53. ■ Puts 10 pegs into the cup in 30 seconds	12			
54. ■ Puts 8 pegs into the pegboard in 30 seconds	13			

Subscale A Locomotor		Response	Subscale B Personal-Social		Response	Subscale C Language		Response
1	Jumps off 1 step D; Tx2		1	Puts away toys when encouraged to do so R		1	Names 12 objects in box	
2	Static balance 1: can stand on one foot for 3+ seconds D; Tx2; C		2	Gives first name		2	Picture vocabulary (12) (NB: Administer after item FIII.10)	
3	Can rise from kneeling without using hands D; C; Tx2		3	Assists with small household tasks on request R		3	Defines by use (2+)	
4	Can run fast indoors or in a small outside space		4	Uses spoon and fork together, without help R		4	Picture description: names 6+ objects in large picture	
5	Can stand and walk tip-toe: 6+ steps D; C; Tx2		5	Knows own gender		5	Uses 2 or more descriptive words	

Subscale D Eye and Hand Co-ordination		Response	Subscale E Performance		Response	Subscale F Practical Reasoning		Response
1	Builds a tower of 8+ bricks D; C; Tx2		1	4-squares board: 50 secs C; Tx2		1	Knows 'penny' or 'money'	
2	Copies a horizontal stroke D		2	6-hole board: 50 secs Tx2; C		2	Repeats one digit (8; 2; 7) D	
3	Handles scissors: tries to cut D; C		3	Returns 9 bricks to box and puts lid on: 50 secs Tx2; C		3	Compares two insets for size	
4	Threads 6 beads D; C		4	Reassembles screw toy D; C; Tx2		4	Repeats 2 digits (1-6; 5-3; 9-4) D	
5	Copies a circle: Stage 1 Tx2		5	4-squares board: 40 secs Tx2; C		5	Knows 'big' and 'little'	

	A	B	C
Gross motor			
Vision and fine motor			
Hearing and language			
Social, emotional and behaviour			

Any questions?

Summary

- Definition of development
- Domains of development
 - Gross motor and posture
 - Fine motor and vision
 - Language and hearing
 - Social and behaviour
- Assessment of development

- **Next year.....abnormal development**

End of session