





# Child Development


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- ▶ Introduction
  - ▶ Principles of development
  - ▶ Domains of development
  - ▶ Developmental assessment
  - ▶ Screening tools
  - ▶ Red flags

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- ▶ Development is the individual level of functioning, a child is capable of, as a result of maturation of the nervous system.
  - ▶ Developmental assessment, milestones acquisition occur at a specific rate and in an orderly and sequential manner

# Principles of development


- ▶ Development is continuous process from conception to maturity
- ▶ Sequence of development is same in all children but rate varies
- ▶ Development intimately related to maturation of CNS
- ▶ Proceeds in a cephalocaudal direction

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- ▶ Certain primitive reflexes, should be lost before corresponding voluntary movement occurred
  - ▶ Genetic and environmental factors contribute positively and negatively

# Milestones

Acquisition of a key skill

- Median age : age at which half population acquire the skill
- Limit : age at which a skill should have been achieved, - 2SD from the mean

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- ▶ Developmental milestones serve as the basis of most standardized assessment and screening tools
  - ▶ Developmental monitoring not only should be aimed at identifying children who have low function but at directing the focus of anticipatory guidance to help promote normal development


# Domains of development

- ▶ Gross motor
- ▶ Fine motor
- ▶ Language
- ▶ Social, cognitive

\*\*Vision and hearing developmental assessment

Delay in specific domain or global developmental delay



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- ▶ Developmental delay?
  - ▶ Developmental regression?
  - ▶ What is the value of developmental screening?

# Why is it necessary?

- Reassure if normal development pattern and timings
- Spot **regression**
- Any genetic disorder to make?
- Identify those with specific areas of impairment or global concerns
- ▶ Allows early support or interventions eg. hearing aids, physiotherapy

# When to suspect abnormalities in development

- ▶ Hx from parents, (majority of patients)
- ▶ Examination:
  - during routine examination and developmental screening
  - by follow up examination in high risk babies

# Risk factors for possible developmental problems in Hx

- ▶ Prenatal: use of drugs or alcohol, viral infections, ..
- ▶ Perinatal: prematurity, LBW, obstetric complications
- ▶ Neonatal: encephalopathy, infections, hyperbilirubinemia..
- ▶ Post natal: encephalitis, sever epilepsy..
- ▶ Family hx: consanguinity, inherited disorders..
- ▶ Social hx: ability to deal with a disabled child..

# Developmental screening

- ▶ The AAP recommends that all children be screened for developmental delay and disabilities at well child doctor visit at:
  1. 9 months
  2. 18 months
  3. 24 or 30 months
  4. Additional screening might be needed if a child is at high risk for developmental problem, eg: preterm, low birth weight and others

# Developmental screening

- ▶ Different tools, eg. Denver II scale, commonly used.
- ▶ Checked in regular well-child clinic visit
- ▶ Parents usually, not always, the first to pick up possible developmental delay

# Examination: observation and interactive assessment

- ▶ Should take in a place in a room with toys appropriate for child
- ▶ With one or both parents but with no helping
- ▶ Chair and table
- ▶ Child's behavior and interaction with parents during hx taking should be observed prior to p/e
- ▶ Hearing and vision assessment

# Prerequisites:

- ▶ Infant or child in a good temper
- ▶ Should not be hungry , tired, had convulsion prior or under effect of sedative drugs



# Examination

- ▶ General, growth parameters, (HC), dysmorphic features, neurologic exam
- ▶ child placed in different postures
- ▶ Hearing and vision
- ▶ Muscle tone, landau reflex
- ▶ Primitive reflexes
- ▶ Consider the corrected age in preterm babies

# Landau reflex



# Ventral suspension



# Traction response



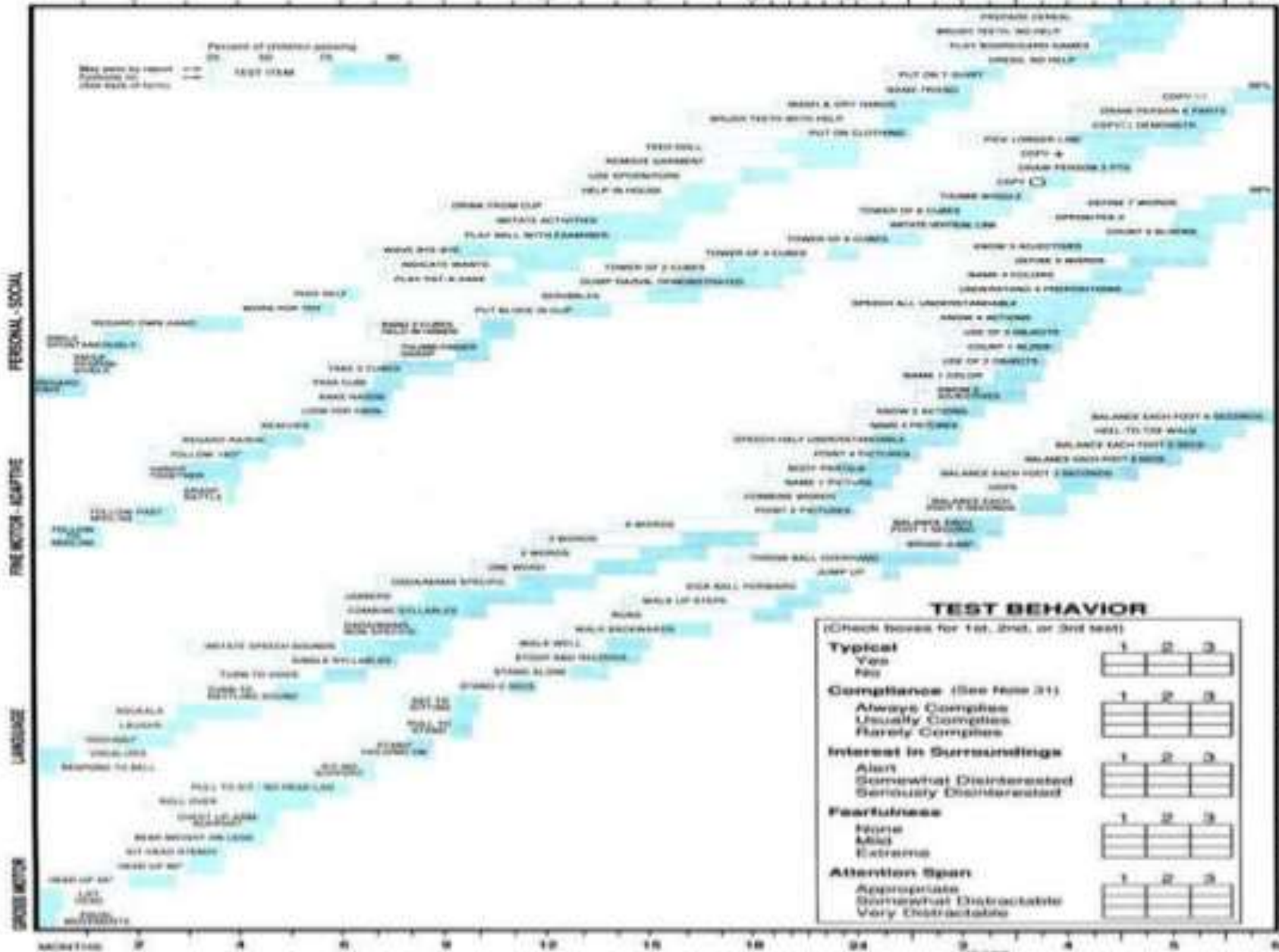
# Denver II

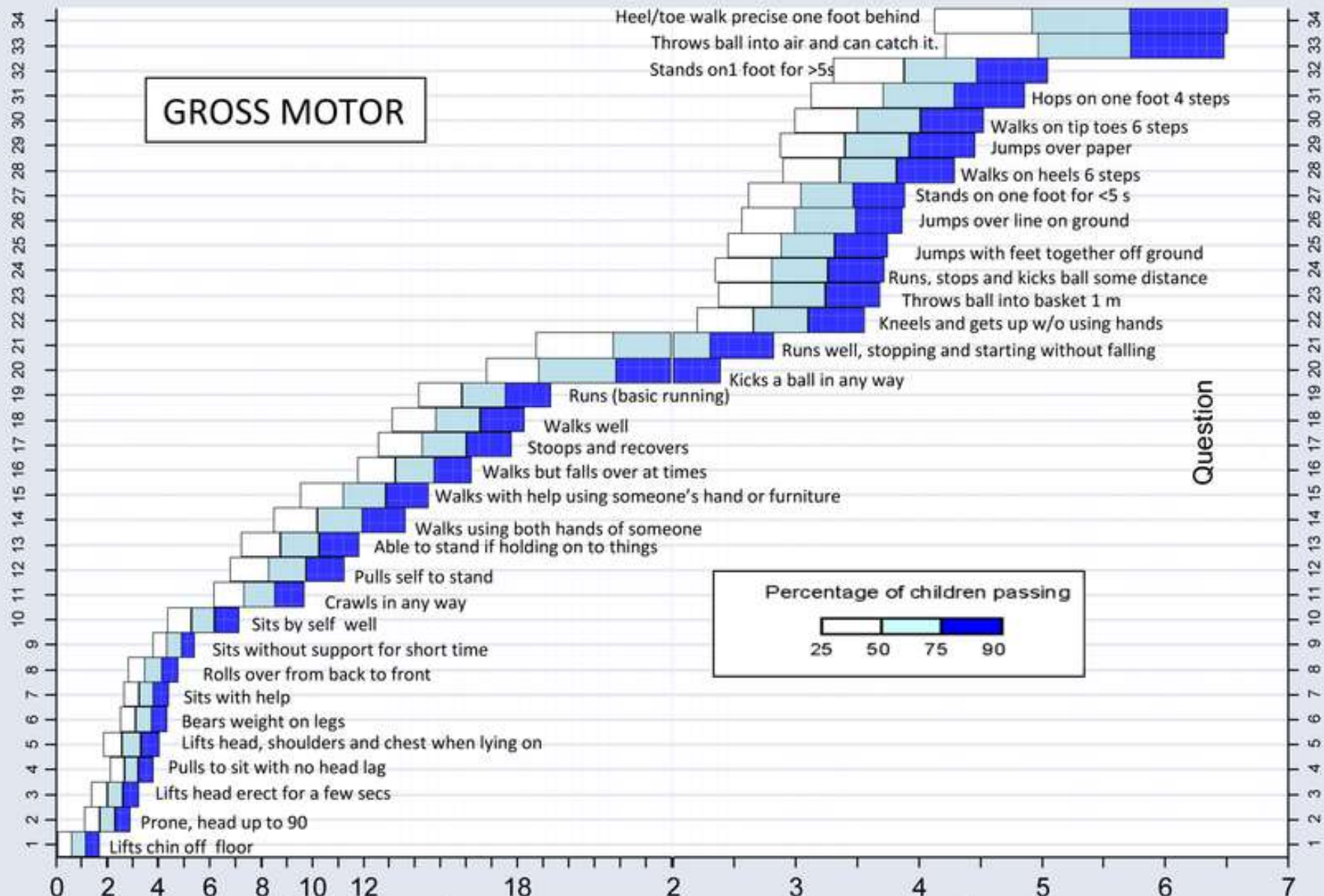
DDM, INC. 1-800-419-4729  
CATALOG #2115

Examiner:  
Date:

Name:  
Birthdate:  
ID No.:

MONTHS 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40





**Lift Head**

↓

**Sit**

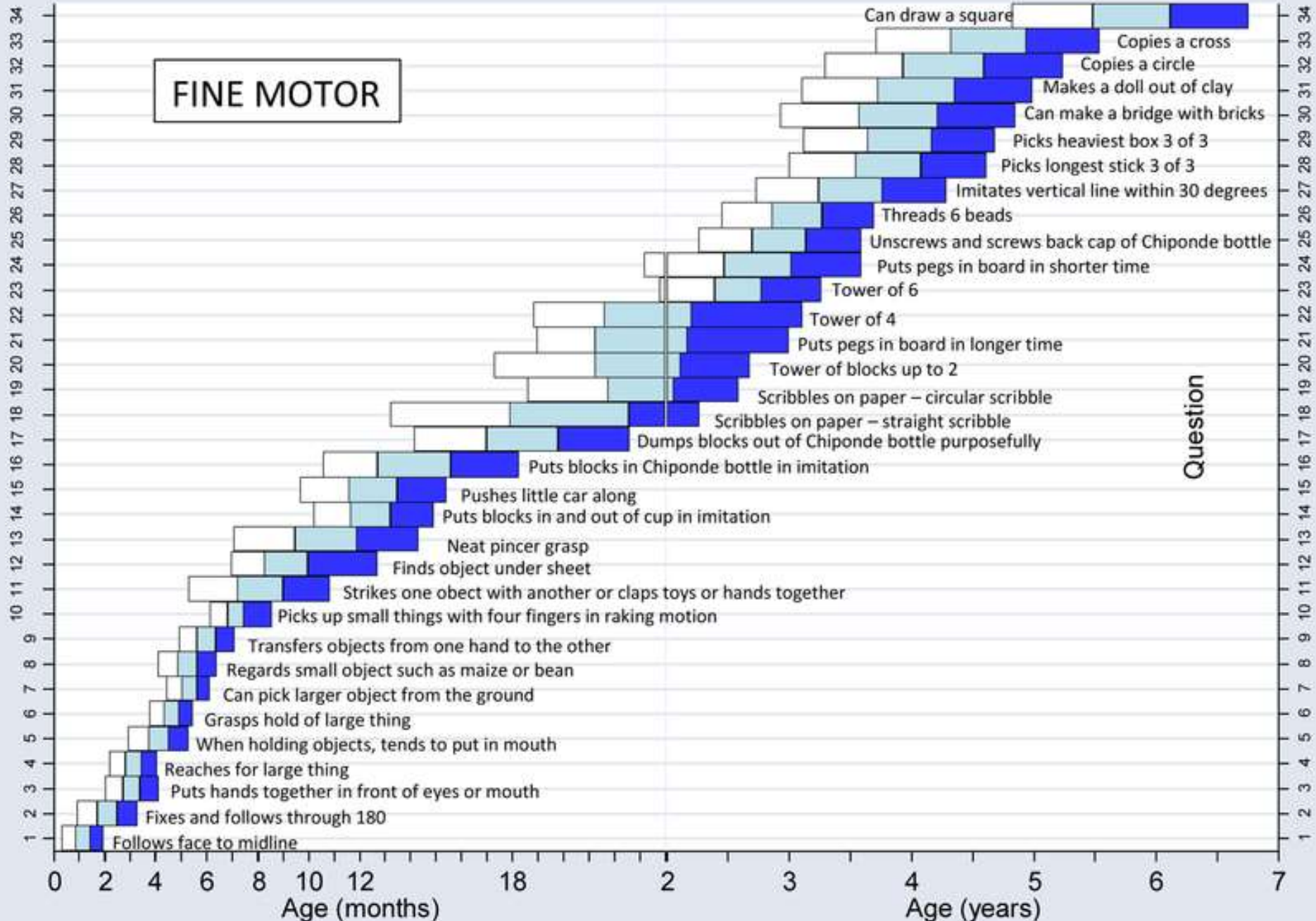
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**Crawl**

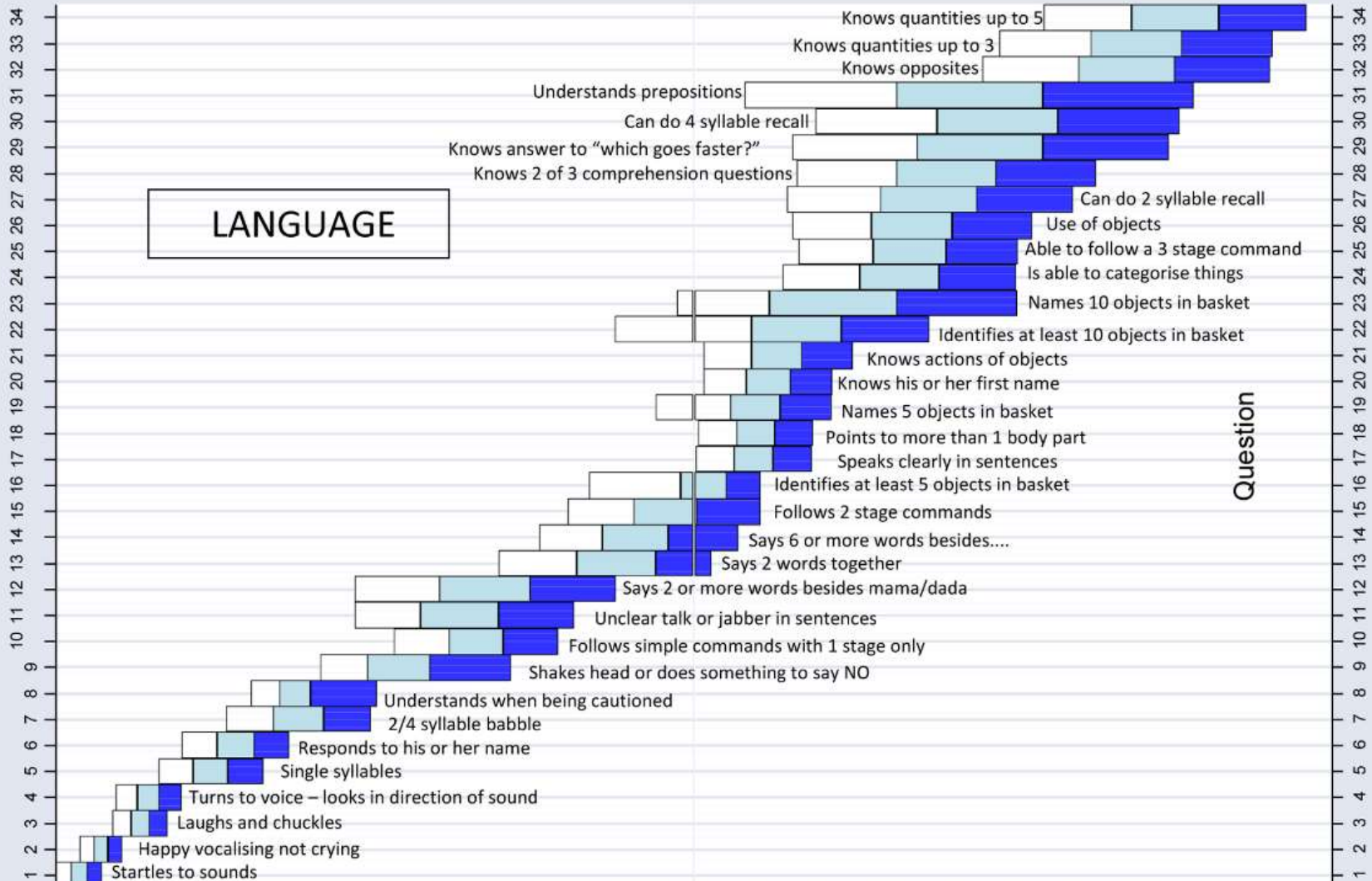
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**Walk**

# FINE MOTOR

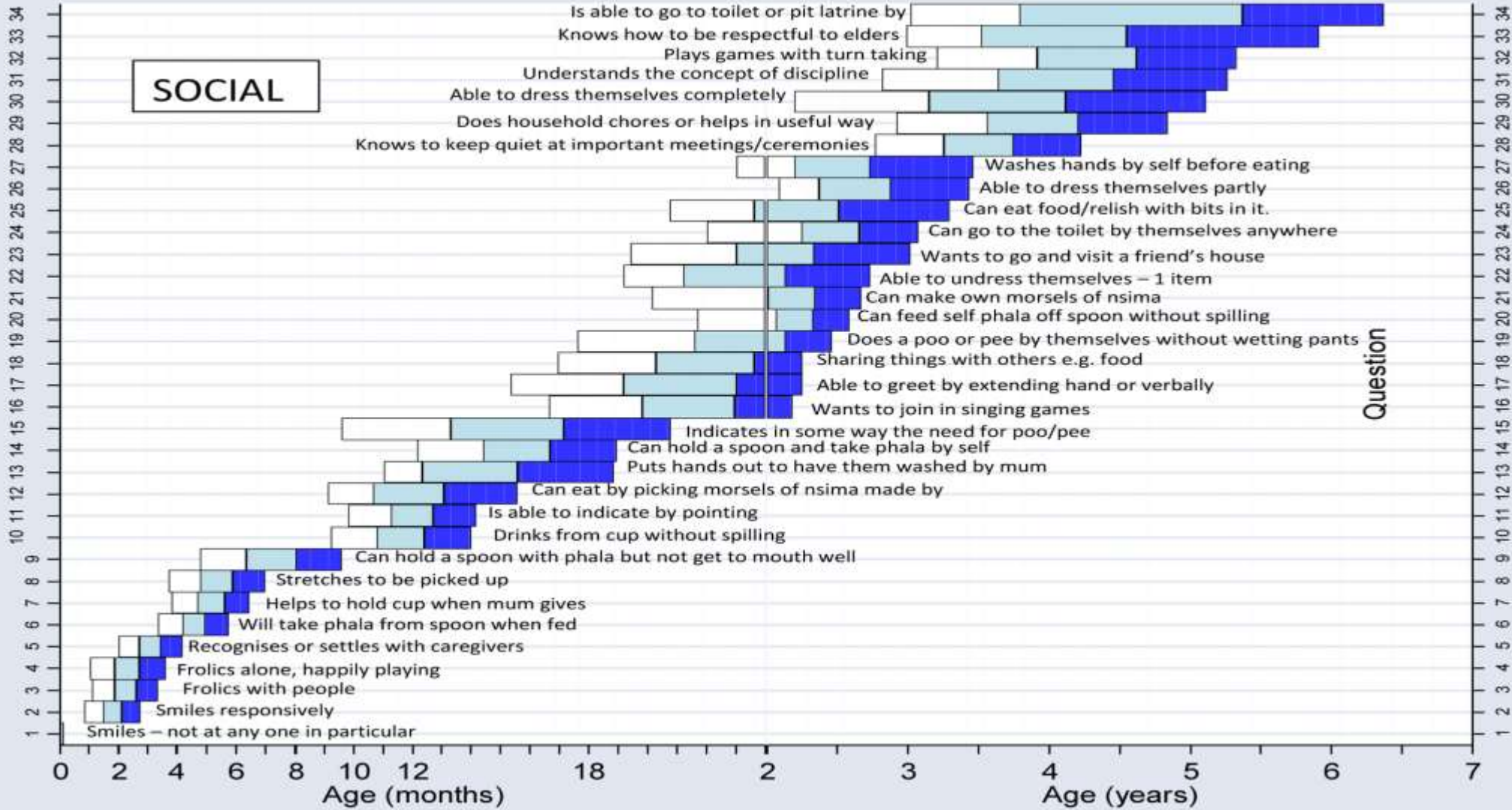


# LANGUAGE





# SOCIAL



# First year

**Table 10-2** | Emerging Patterns of Behavior During the 1st Yr of Life\*

## NEONATAL PERIOD (1ST 4 WK)

Prone:	Lies in flexed attitude; turns head from side to side; head sags on ventral suspension
Supine:	Generally flexed and a little stiff
Visual:	May fixate face on light in line of vision; "doll's-eye" movement of eyes on turning of the body
Reflex:	Moro response active; stepping and placing reflexes; grasp reflex active
Social:	Visual preference for human face

## AT 1 MO

Prone:	Legs more extended; holds chin up; turns head; head lifted momentarily to plane of body on ventral suspension
Supine:	Tonic neck posture predominates; supple and relaxed; head lags when pulled to sitting position
Visual:	Watches person; follows moving object
Social:	Body movements in cadence with voice of other in social contact; beginning to smile

## AT 2 MO

Prone:	Raises head slightly farther; head sustained in plane of body on ventral suspension
Supine:	Tonic neck posture predominates; head lags when pulled to sitting position
Visual:	Follows moving object 180 degrees
Social:	Smiles on social contact; listens to voice and coos

## AT 3 MO

Prone:	Lifts head and chest with arms extended; head above plane of body on ventral suspension
Supine:	Tonic neck posture predominates; reaches toward and misses objects; waves at toy
Sitting:	Head lag partially compensated when pulled to sitting position; early head control with bobbing motion; back rounded
Reflex:	Typical Moro response has not persisted; makes defensive movements or selective withdrawal reactions
Social:	Sustained social contact; listens to music; says "aah, ngah"

# First year, cont..

## AT 4 MO

- Prone:** Lifts head and chest, with head in approximately vertical axis; legs extended
- Supine:** Symmetric posture predominates, hands in midline; reaches and grasps objects and brings them to mouth
- Sitting:** No head lag when pulled to sitting position; head steady, tipped forward; enjoys sitting with full truncal support
- Standing:** When held erect, pushes with feet
- Adaptive:** Sees raisin, but makes no move to reach for it
- Social:** Laughs out loud; may show displeasure if social contact is broken; excited at sight of food

## AT 7 MO

- Prone:** Rolls over; pivots; crawls or creep-crawls (Knobloch)
- Supine:** Lifts head; rolls over; squirms
- Sitting:** Sits briefly, with support of pelvis; leans forward on hands; back rounded
- Standing:** May support most of weight; bounces actively
- Adaptive:** Reaches out for and grasps large object; transfers objects from hand to hand; grasp uses radial palm; rakes at raisin
- Language:** Forms polysyllabic vowel sounds
- Social:** Prefers mother; babbles; enjoys mirror; responds to changes in emotional content of social contact

## AT 10 MO

- Sitting:** Sits up alone and indefinitely without support, with back straight
- Standing:** Pulls to standing position; "cruises" or walks holding on to furniture
- Motor:** Creeps or crawls
- Adaptive:** Grasps objects with thumb and forefinger; pokes at things with forefinger; picks up pellet with assisted pincer movement; uncovers hidden toy; attempts to retrieve dropped object; releases object grasped by other person
- Language:** Repetitive consonant sounds ("mama," "dada")
- Social:** Responds to sound of name; plays peek-a-boo or pat-a-cake; waves bye-bye

## AT 1 YR

- Motor:** Walks with one hand held; rises independently, takes several steps (Knobloch)
- Adaptive:** Picks up raisin with unassisted pincer movement of forefinger and thumb; releases object to other person on request or gesture
- Language:** Says a few words besides "mama," "dada"
- Social:** Plays simple ball game; makes postural adjustment to dressing

# 1-5 years

**Table 11-1** Emerging Patterns of Behavior from 1-5 Yr of Age\*

<b>15 MO</b>	
<b>Motor:</b>	Walks alone; crawls up stairs
<b>Adaptive:</b>	Makes tower of 3 cubes; makes a line with crayon; inserts raisin in bottle
<b>Language:</b>	Jargon; follows simple commands; may name a familiar object (e.g., ball); responds to his/her name
<b>Social:</b>	Indicates some desires or needs by pointing; hugs parents
<b>18 MO</b>	
<b>Motor:</b>	Runs stiffly; sits on small chair; walks up stairs with 1 hand held; explores drawers and wastebaskets
<b>Adaptive:</b>	Makes tower of 4 cubes; imitates scribbling; imitates vertical stroke; dumps raisin from bottle
<b>Language:</b>	10 words (average); names pictures; identifies 1 or more parts of body
<b>Social:</b>	Feeds self; seeks help when in trouble; may complain when wet or soiled; kisses parent with pucker
<b>24 MO</b>	
<b>Motor:</b>	Runs well, walks up and down stairs, 1 step at a time; opens doors; climbs on furniture; jumps
<b>Adaptive:</b>	Makes tower of 7 cubes (6 at 21 mo); scribbles in circular pattern; imitates horizontal stroke; folds paper once imitatively
<b>Language:</b>	Puts 3 words together (subject, verb, object)
<b>Social:</b>	Handles spoon well; often tells about immediate experiences; helps to undress; listens to stories when shown pictures

30 MO

### **30 MO**

**Motor:** Goes up stairs alternating feet  
**Adaptive:** Makes tower of 9 cubes; makes vertical and horizontal strokes, but generally will not join them to make cross; imitates circular stroke, forming closed figure  
**Language:** Refers to self by pronoun "I"; knows full name  
**Social:** Helps put things away; pretends in play

### **36 MO**

**Motor:** Rides tricycle; stands momentarily on 1 foot  
**Adaptive:** Makes tower of 10 cubes; imitates construction of "bridge" of 3 cubes; copies circle; imitates cross  
**Language:** Knows age and 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 and puts on shoes); washes hands

### **48 MO**

**Motor:** Hops on 1 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 and square; draws man with 2-4 parts besides head; identifies longer of 2 lines  
**Language:** Counts 4 pennies accurately; tells story  
**Social:** Plays with several children, with beginning of social interaction and role-playing; goes to toilet alone

### **60 MO**

**Motor:** 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 and undresses; asks questions about meaning

# Red flags

Any loss of skills at any age.


▶ 0-3m,

- persistent fisting after 3m - failure to respond to environmental stimuli, evaluate for hearing loss

▶ 4-6m


- poor head control, evaluate for hypotonia

- failure to reach for objects by 5m, evaluate for motor or visual deficit



▶ 6-12m

- Persistent of primitive reflexes
- Absent babbling by 6m
- Inability to recognize sounds by 10m



▶ 12-24m

-Hand preference before 18 m

-Inability to walk up and down stairs by 24m

-Advanced non communicative speech, eg. Echolalia, evaluate for pervasive developmental disorders

▶ Delayed language development require hearing assessment in all ages



# Approach

Absent

History and examination  
- Check for age appropriate milestone

Check for milestones achieved in the past- what and when

Check for milestones in the other domains

Global Developmental Delay

Delay in specific domain

# Cerebral palsy

# Cerebral palsy

- ▶ Non progressive (static) disorder of motor function and movement, usually manifest early in life as a result of CNS damage to the developing brain

# Risk factors

- ▶ Prenatal: infection, multiple births, placental thrombosis, maternal metabolic dis. Eg. DM, intrauterine exposure to toxins
- ▶ Perinatal: hypoxic ischemic encephalopathy, periventricular leukomalacia, stroke, hyperbilirubinemia
- ▶ Postnatal: stroke, trauma, infection

# Classification

- ▶ According to extremity involved:  
Monoplegic, hemiplegic, diplegic, quadriplegic
- ▶ According to neurological dysfunction:  
Spastic (most common), ataxic, dyskinetic (dystonic, chorioathetoid), mixed

# Diagnosis: Hx + P/E

- ▶ The usual presentation is delay in motor milestones
- ▶ No loss of function by hx, disease is not progressive
- ▶ On exam: hypotonia, spasticity, persistent primitive reflexes, underdevelopment of parachute reflex
- ▶ Serial examinations may be necessary to assure the diagnosis of CP, esp. when hx is not reliable.

# Associated conditions

- ▶ MR
- ▶ epilepsy
- ▶ Ophthalmological defects
- ▶ Hearing impairments
- ▶ Speech and language disorders

# Evaluation

- ▶ Detailed hx and p/e
- ▶ Neuroimaging , MRI preferred
- ▶ Screen for associated conditions
- ▶ Monitor for nutrition, growth swallowing problems
- ▶ Testing for coagulation disorders considered in hemiplegic CP
- ▶ Genetic and metabolic testing, not routinely, in atypical cases
- ▶ EEG, if convulsion



# Management

- ▶ Multidisciplinary team:
  - physiotherapy, occupational therapy, speech therapy, special education, orthopedic, psychological counselling, nutrition
- ▶ Goal of trt: to maximize function and optimize development

# Complications

- ▶ Dental caries, GER with aspiration pneumonia, constipation, bronchial dysplasia, skin ulcers and bed sores, joint contractures hip dislocation and scoliosis, strabismus and decrease visual acuity, hearing loss

Increase incidence of ADHD, depression



Thank you