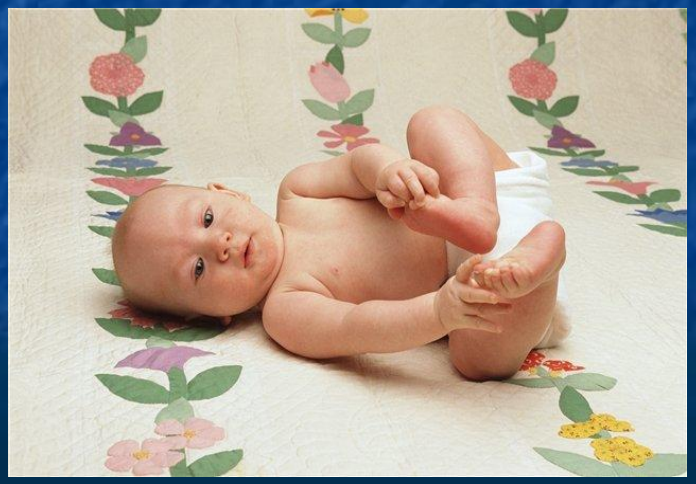
Psychology and human development.

Lecture 3. Infancy Development

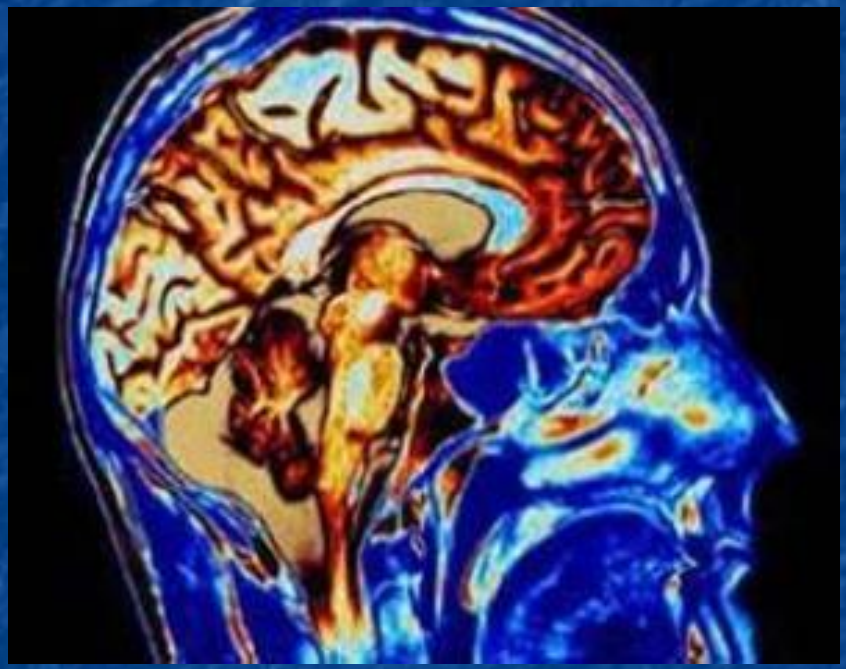
1. Brain growth
2. Growth in the body
3. Sensory-perceptual development
4. Sensory abilities.
5. Motor behavior abilities.



Infancy is defined as

- *First 2 years of life*
- *Development from a tiny and seemingly helpless being into a small, achieving child.*

Brain Growth



How mature is the human brain at birth?

The human newborn arrives in the world with a brain which is developed enough in some respects but relatively undeveloped in others.

Developed: brain systems and networks involved in the infant's ability to perceive many aspects of the sensory world ☐ competencies to learn and store information.

Immature: brain regions that control movement and produce language competence ☐ require months or years to develop.

WHY? This allows the infant to explore and learn about the world without being limited to rigid patterns of behavior.

Some characteristics of neonatal brain.

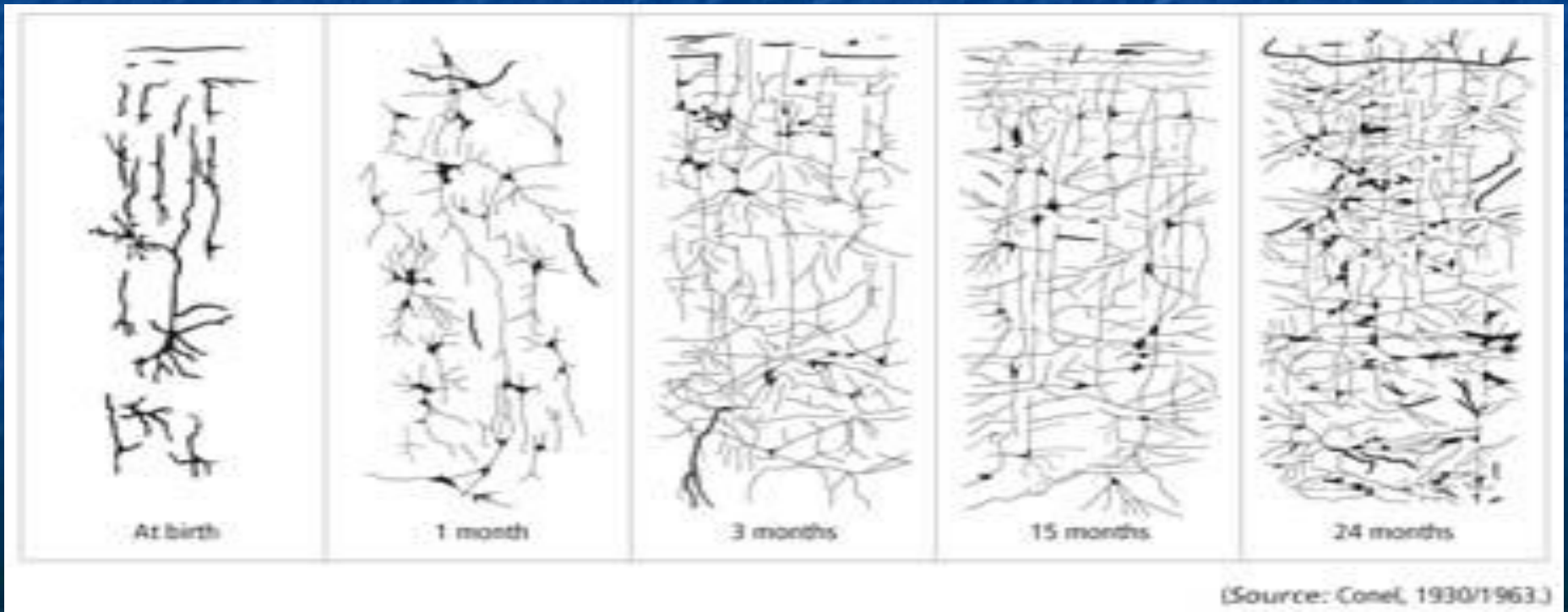
Similarities:

1. Weight – a quarter of an adult brain.
2. Looks – like an adult brain
3. Main structures – are present with all of the 100 billion neurons (no more neurons will be formed across the human lifetime)

How brains grow

Birth:
– 100-200 billion Neurons
– Relatively few neuron-to-neuron connections

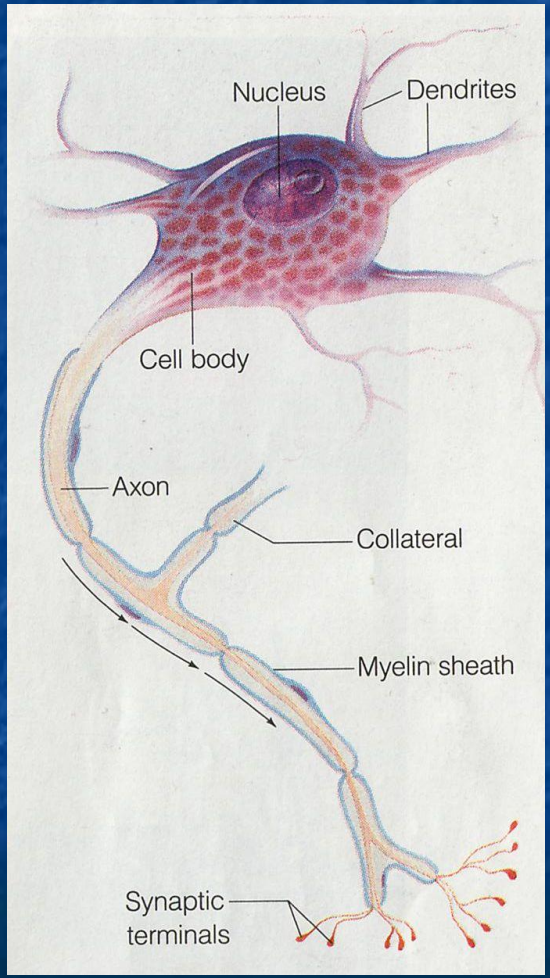
During first two years:– Billions of new connections established and become more complex



Differences:

1. **Synaptogenesis. Massive overproduction of synapses (connections amongst the neurons). Newborn – 1/6 of the number of an adult brain. 1 year old – twice as many as an adult.**

2. **Myelinisation. An increase in the number of neurons that have a coating of myelin (a fatty sheath that makes the impulse travel faster along the neuron and helps the brain to function more efficiently)**



Use it or lose it

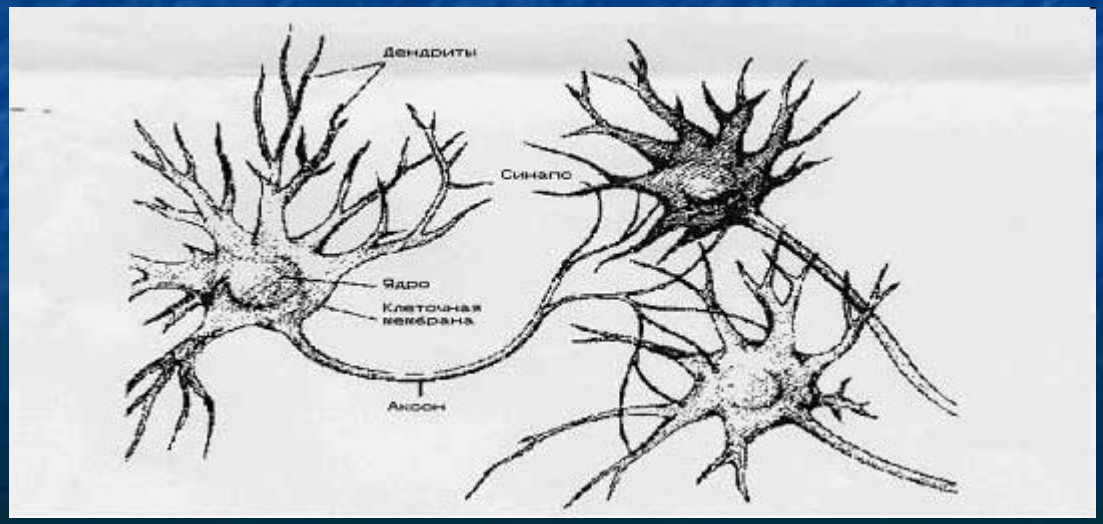
- **Synaptic pruning**
  - Unused neurons are eliminated
  - Allows established neurons to build more elaborate communication networks with other neurons
  - Development of nervous system proceeds most effectively through loss of cells
- ***But also note the importance of myelin***

Brain functioning

Lateralization of brain function begins after birth. Left hemisphere: speech perception and control of some movement. Right hemisphere: response to the spatial configuration of facial patterns.

Communication between these two continues to develop in the childhood.

Maturation: the growth and the use of the brain are tightly intertwined. Example: genes have been found that directly affect the growth of dendrites, but also experience promotes growth and strengthening of dendrites.



Don’t shake the baby!

- Shaken Baby Syndrome
- Brain sensitive to injury
- Shaking can lead to brain rotation within skull
- Blood vessels tear - severe medical problems, long-term disabilities, and sometimes death

Growth in the body

Growth occurs because of increases in both the number of body cells and size of existing cells.

Height and weight

Birth app 50 cm 1 year old app 50 % taller 2 year old app 75 % taller	Is rapid over early childhood	Birth app 3 kg 1 year old app 3 times heavier 2 year old app 4 times heavier

Girls are taller and heavier than boys.

Changes in Proportions of the body.

Head:

Infant app ¼ of the body length

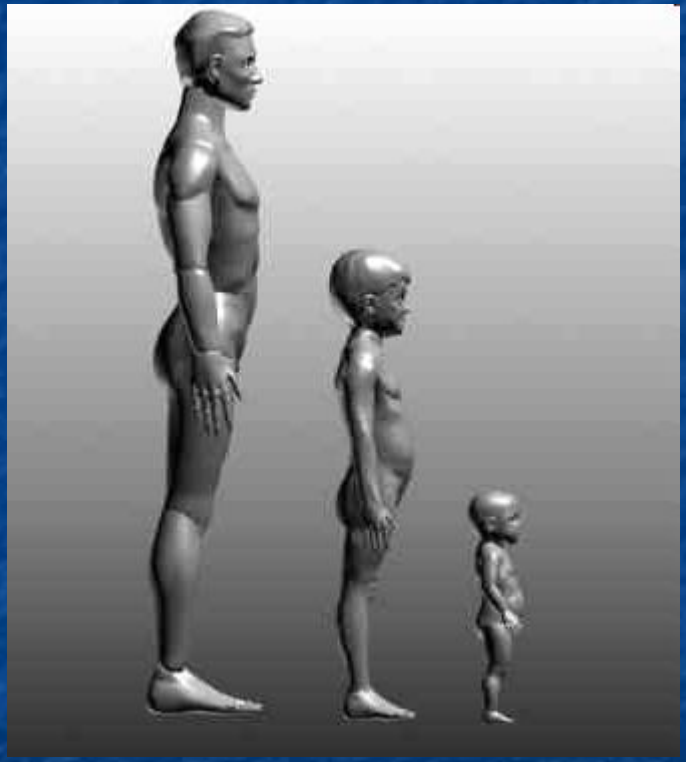
1 year old app 1/5 of the body length

Adult app 1/8 of the body length

Legs:

Infant app ¼

Adult app ½ (contributing to the balance



Changes in the muscle -to-fat- ratio of the body.

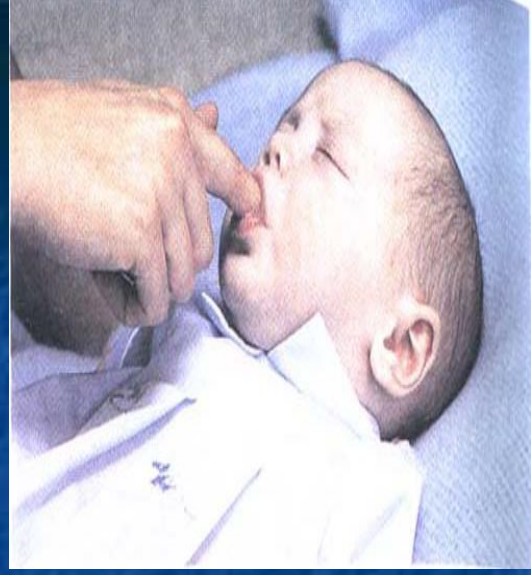
Muscles grow gradually across childhood.

However, newborns have a high % of body fat and this continues to accumulate until app 9 months.

Then, children become slimmer until middle childhood (though girls have slightly higher body fat ratio).

Both nature and nurture influence the process of growth. For example identical twins show similar weights and heights across childhood.

Reflexes



- Neonates are born with a number of reflexes that help them to adapt to their environment:

1) The rooting reflex occurs when you touch a baby's cheek and he turns his head to search for the source (adaptive for survival)
2) The sucking reflex – when you touch the baby's lips, he immediately begins to show it.
3) The swallowing reflex occurs automatically when something is in the baby's mouth.
4) The Moro reflex (startle reflex) occurs when something in the environment changes quickly (loud noise□ extends both arms and brings the feet close to the body)
5) The Babinski reflex – when the bottom of the baby's foot is stroked (spreads out the toes and then curls them)

Sensory abilities

Characteristics:

- Hearing. After birth ear canals are filled with amniotic fluid, but in a few days hearing is fairly normal. Prefer mother's voice to other sounds; turn their heads toward all sounds.
- Visual sense. Neonates are nearsighted and see best at about 9 inches. They perceive objects in motion and prefer complex visual stimuli, especially when they resemble a human face.
- Taste : Neonates can discriminate different tastes and odors. Reaction to sweet solutions – smile, and suck, whereas to bitter solutions – spit.
- Smell sense- prefer the smell of their mother's milk, underarm odor (leading to attachment formation), whereas they wrinkle their noses and stick out their tongues when given a substance with rotten eggs odor under their noses.

Sensory Capabilities: Experiencing the World

- Seeing
- Visual acuity not fully developed but can see to some extent
- Attend to visual field highest in information and brightness
- Possess some sense of size constancy
- Distinguish and show preference for different colors

Auditory Perception: The World of Sound

- Infants
  - Are more sensitive to certain frequencies
  - Reach adult accuracy in sound localization by age 1
  - Can discriminate groups of different sounds
  - React to changes in musical key and rhythm
  - Can discriminate many language related sounds

Sensory-perceptual development.

Sensation	Perception
Is the reaction of special cells in the body to stimulation from environment (light, sound, waves) it alerts us that 'something's out there'.	Is the additional response in the neural pathways and in religions of the brain that gives a more complete or coherent impression of what that 'something' is.

Inter-modal perception

Adults expect different sensory impressions from the same object to be synchronous or coordinated.

So, do infants and children!

For example, four-month-olds prefer to look at synchronized puppet displays (where the puppets were jumping in rhythm with a sound track) than those that were out of synch. The same was observed with faces of people speaking (matching lips and sounds) rather than the mismatch.

5 main sensory – perceptual systems

- *Visual*
- *Auditory (hearing)*
- *Tactile- haptic (touch)*
- *Olfactory (smell)*
- *Gustatory (taste)*

Perception is coherent because it provides structure to the flow of stimulation from outside world. It does this by keeping different sensations separate from each other but also binding them together where necessary.

Habituation and Familiarization.

These methods involve repeatedly presenting infants with a stimulus and then observing any change in response (fixation duration) when a novel stimulus is presented. Increase in fixation to the novel stimulus is taken as indicative of discrimination of the old and new stimuli.

These approaches have been used for over 30 years to assess whether infant perception works in a coherent way – that's if infants can distinguish between different perceptual features as well as being able to bind these together when needed.

Habituation/ Dishabituation

- Habituation: baby's response will decrease to "new" stimuli over time

Can use variety of stimuli types and use baby's ability to discriminate to

infer learning/ perception

- Dishabituation: recovery in responses

infant can discriminate between "old" and "new" stimuli

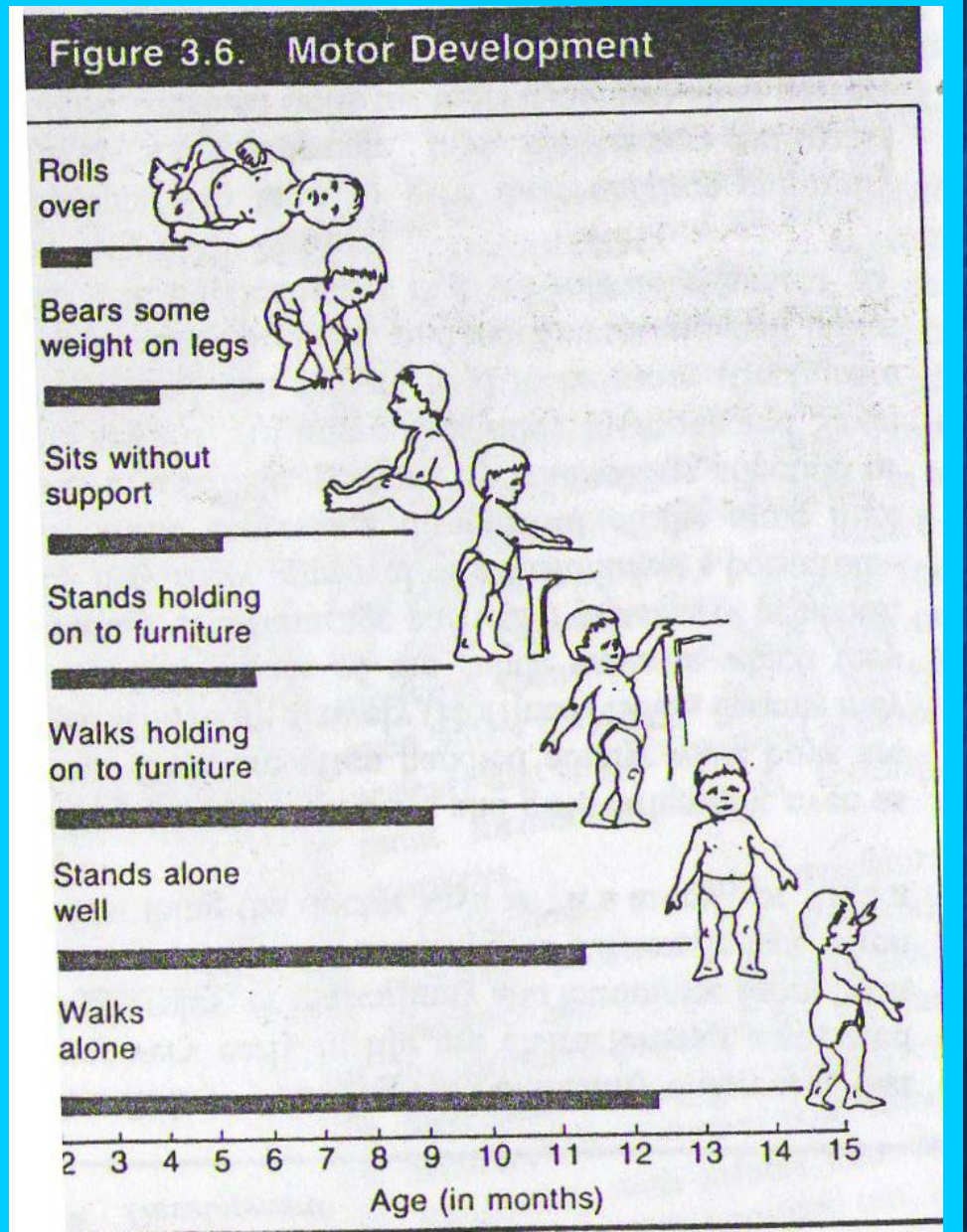
High Amplitude Sucking

□ - Infant sucking brings about sound stimuli

☐ - When bored (habituated), they slow sucking

☐ - Experimenter changes sound, baby becomes interested again (dishabituates) and increases sucking speed

Motor Development



Motor Development in Infancy

Table 2-4 MILESTONES OF FINE MOTOR DEVELOPMENT

Age (months)	Skill
3	Opens hand prominently
3	Grasps rattle
8	Grasps with thumb and finger
11	Holds crayon adaptively
14	Builds tower of two cubes
16	Places pegs in board
24	Imitates strokes on paper
33	Copies circle

(Source: Adapted from Frankenburg et al., 1992.)

Nutrition in Infancy

- *Fueling Motor Development*

Without proper nutrition, infants cannot reach physical potential and may suffer cognitive and social consequences

Slower growth rate / Chronically malnourished during infancy = later lower IQ score

- Infants differ in growth rates, body composition, metabolism, and activity levels

If are allowed consume as much they seem to want, and not pressured to eat more, they will be healthy

Home-assignment.

Reports:

1. The development of motor control across childhood.
2. The development of visual and auditory perception.
3. The development of tactile-haptic perception and taste and smell.