Guideposts for Study

1. What Principles Govern Early Growth and Physical Development?

2. How and What Should Babies be Fed?

3. How Does the Brain Develop, and How Do Environmental Factors affect Its Early Growth?

4. How Do the Senses Develop During Infancy?
Guideposts for Study

- 5. What Are the Early Milestones in Motor Development, and What Are Some Influences On It?
- 6. How Can We Enhance Babies’ Chances of Survival and Health?
- 7. What Are the Causes and Consequences of Child Abuse and Neglect, and What Can Be Done About It?
Growth and Nutrition

- **Patterns of Growth**
  - By 5 months average baby boy will double weight to 16 lbs.
  - By 1 year will triple to 23 lbs.
  - Cephalocaudal principle
    - Growth occurs from top down
  - Proximodistal principle
    - Growth occurs from the center of the body outward
Changes in proportions of the human body during growth

2 months  5 months  Newborn  2  6  12  25
Fetal age  Years
Growth and Nutrition

- **Nourishment**
  - Breastfeeding: Benefits and Cautions
  - Encouraging Breastfeeding
  - Nutritional concerns
    - Many parents do not follow the guidelines given by pediatric experts
    - Overweight infants are an increasing concern
The Brain and Reflex Behavior

- **Central Nervous System**
  - Brain and spinal cord
  - Sensory messages travel to the brain and motor commands travel back
The Brain and Reflex Behavior

- Building the Brain
  - Major parts of the brain
    - Brain stem
    - Cerebellum
      - Lateralization
      - Corpus callosum
The Brain and Reflex Behavior

- **Building the Brain**
  - Cerebral hemisphere
    - Occipital lobe
    - Parietal lobe
    - Temporal lobe
    - Frontal lobe
  - Cerebral cortex
    - Regions govern vision, hearing, and other sensory information
The Brain and Reflex Behavior

- Building the Brain
  - Brain cells
    - Neurons
      - Axons
      - Dendrites
      - Synapses
      - Neurotransmitters
  - Glia cells
The Brain and Reflex Behavior

- Building the Brain
  - As neurons multiply, migrate, and develop connections they undergo
    - Integration
    - Differentiation
    - Cell death
  - Myelination
1. An embryo’s brain produces many more neurons, or nerve cells, than it needs, then eliminates the excess.

2. The surviving neurons spin out axons, the long-distance transmission lines of the nervous system. At their ends, the axons spin out multiple branches that temporarily connect with many targets.

3. Spontaneous bursts of electrical activity strengthen some of these connections, while others (the connections that are not reinforced by activity) atrophy.

4. After birth, the brain experiences a second growth spurt, as the axons (which send signals) and dendrites (which receive them) explode with new connections. Electrical activity, triggered by a flood of sensory experiences, fine-tunes the brain’s circuitry—determining which connections will be retained and which will be pruned.
The Brain and Reflex Behavior

- **Early Reflexes**
  - Automatic, innate responses to stimulation
    - Primitive
      - Sucking, rooting, and Moro
    - Postural
    - Locomotor
      - Walking, swimming
<table>
<thead>
<tr>
<th>Reflex</th>
<th>Stimulation</th>
<th>Baby’s Behavior</th>
<th>Typical Age of Appearance</th>
<th>Typical Age of Disappearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moro</td>
<td>Baby is dropped or hears loud noise.</td>
<td>Extends legs, arms, and fingers; arches back, draws back head.</td>
<td>7th month of gestation</td>
<td>3 months</td>
</tr>
<tr>
<td>Darwinian (grasping)</td>
<td>Palm of baby’s hand is stroked.</td>
<td>Makes strong fist, can be raised to standing position if both fists are closed around a stick.</td>
<td>7th month of gestation</td>
<td>4 months</td>
</tr>
<tr>
<td>Tonic neck</td>
<td>Baby is laid down on back.</td>
<td>Turns head to one side, assumes &quot;fencer&quot; position, extends arms and legs on preferred side, flexes opposite limbs.</td>
<td>7th month of gestation</td>
<td>5 months</td>
</tr>
<tr>
<td>Babkin</td>
<td>Both of baby’s palms are stroked at once.</td>
<td>Mouth opens, eyes close, neck flexes, head tilts forward.</td>
<td>Birth</td>
<td>3 months</td>
</tr>
<tr>
<td>Babinski</td>
<td>Sole of baby’s foot is stroked.</td>
<td>Tosses fan out, foot twists in.</td>
<td>Birth</td>
<td>4 months</td>
</tr>
<tr>
<td>Rooting</td>
<td>Baby’s cheek or lower lip is stroked with finger or nipple.</td>
<td>Head turns, mouth opens, sucking movements begin.</td>
<td>Birth</td>
<td>9 months</td>
</tr>
<tr>
<td>Walking</td>
<td>Baby is held under arms, with bare feet touching flat surface.</td>
<td>Makes stepping motions that look like well-coordinated walking.</td>
<td>1 month</td>
<td>4 months</td>
</tr>
<tr>
<td>Swimming</td>
<td>Baby is put into water face down.</td>
<td>Makes well-coordinated swimming movements.</td>
<td>1 month</td>
<td>4 months</td>
</tr>
</tbody>
</table>
The Brain and Reflex Behavior

- Molding the Brain: The Role of Experience
  - Plasticity
  - Formative period vulnerability
    - Hazardous drugs
    - Environmental toxins
    - Maternal stress
The Bucharest Early Intervention Project

- Romanian Orphans
- Deprived Settings and Early Intervention
Early Sensory Capacities

- **Touch and Pain**
  - First sense to develop
  - Develops in the womb

- **Smell and Taste**
  - Preference of pleasant odors in utero
  - “Sweet tooth”
Early Sensory Capacities

- **Hearing**
  - Functional before birth
  - Recognition of voices and language can occur in the womb

- **Sight**
  - Least developed at birth
  - Underdeveloped structures
  - Binocular vision develops at 4 to 5 months
Motor Development

- Milestones of Motor Development
  - Simple skills → Systems of action
  - Pincer grip
  - Denver Developmental Screening Test
    - Gross motor skills
    - Fine motor skills
<table>
<thead>
<tr>
<th>Skill</th>
<th>50 percent</th>
<th>90 percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling over</td>
<td>3.2 months</td>
<td>5.4 months</td>
</tr>
<tr>
<td>Grasping rattle</td>
<td>3.3 months</td>
<td>3.9 months</td>
</tr>
<tr>
<td>Sitting without support</td>
<td>6.9 months</td>
<td>6.8 months</td>
</tr>
<tr>
<td>Standing while holding on</td>
<td>7.2 months</td>
<td>8.5 months</td>
</tr>
<tr>
<td>Grasping with thumb and finger</td>
<td>8.2 months</td>
<td>10.2 months</td>
</tr>
<tr>
<td>Standing alone well</td>
<td>11.5 months</td>
<td>13.7 months</td>
</tr>
<tr>
<td>Walking well</td>
<td>12.3 months</td>
<td>14.9 months</td>
</tr>
<tr>
<td>Building tower of two cubes</td>
<td>14.8 months</td>
<td>20.6 months</td>
</tr>
<tr>
<td>Walking up steps</td>
<td>16.6 months</td>
<td>21.6 months</td>
</tr>
<tr>
<td>Jumping in place</td>
<td>23.8 months</td>
<td>2.4 years</td>
</tr>
<tr>
<td>Copying circle</td>
<td>3.4 years</td>
<td>4.0 years</td>
</tr>
</tbody>
</table>

*Note: This table shows the approximate ages when 50 percent and 90 percent of children can perform each skill, according to the Denver Training Manual II.

*Source: Adapted from Frankenburg et al., 1992.*
Motor Development

- **Milestones of Motor Development**
  - **Head control**
    - Fully controllable at 4 months
  - **Hand control**
    - At 7 to 11 months can pick up a tiny object
  - **Locomotion**
    - Self-locomotion
Motor Development

- Motor Development and Perception
  - Visual guidance
  - Depth Perception
    - Three dimensions
  - Haptic perception
    - Ability to acquire information by handling objects rather than just looking at them
Motor Development

- Eleanor and James Gibson’s Ecological Theory of Perception
  - Visual cliff
  - Ecological Theory of Perception
  - “Learning to Learn”
Motor Development

  - Element of time
  - Interaction of multiple causes or subsystems
  - Integration of perception and cognition with action
  - Differing developmental pathways of individual children
Motor Development

- **Cultural Influences on Motor Development**
  - Some cultures actively encourage early development of motor skills while others inhibit them
  - Handling routines in African and West Indian cultures
Health

- **Infant Mortality Rate**
  - Proportion of babies who die within the first year
  - Birth defects are the leading cause
Health

- Reducing Infant Mortality
  - Preventable deaths
    - Poverty
    - Poor maternal health and nutrition
    - Infection
    - Poor medical care
    - SIDS
Racial/Ethnic Disparities in Infant Mortality
Health

- Reducing Infant Mortality
  - Sudden Infant Death Syndrome (SIDS)
    - Low birth weight babies are more susceptible
    - Gene mutations affecting the heart have been linked
    - Defects in the brain’s ability to use serotonin
Health

- Reducing Infant Mortality
  - Deaths from injuries
    - Traffic accidents
    - Falls
    - Drowning
    - Burns
Health

- Immunization for Better Health
  - Measles, pertussis, and polio
  - Worldwide, more than 78% of Children receive Routine 1st Year Vaccinations
  - In 2007, 90% of U.S. Children Received Most of the Recommended Vaccines
  - Hesitancy of Some Parents to Vaccinate
    - Unsubstantiated concern about Autism
Maltreatment: Abuse and Neglect

- **Failure to Thrive**
  - Inadequate nutrition
  - Disturbed interactions with parents
  - Disease
  - Difficulties in breastfeeding
  - Poverty
Maltreatment: Abuse and Neglect

- Maltreatment: Facts and Figures
  - Physical abuse
  - Neglect
  - Sexual abuse
  - Emotional maltreatment
Maltreatment: Abuse and Neglect

- **Contributing Factors: An Ecological View**
  - Characteristics of abusive and neglectful parents and families
    - Poverty
    - Lack of education
    - Single-parent families
    - Chaotic atmosphere
    - Substance abuse
Maltreatment: Abuse and Neglect

- Helping Families In Trouble
  - State and local child protective services
    - Foster care
  - Education in parenting skills, and therapy
  - Parents Anonymous
Maltreatment: Abuse and Neglect

- Long-Term Effects of Maltreatment
  - Poor physical, mental, and emotional health
  - Impaired brain development
  - Cognitive, language, and academic difficulties
  - Problems in attachment and social relationships
  - Memory problems
  - Drug and alcohol abuse in adolescence
Maltreatment: Abuse and Neglect

- Many Maltreated Children Show Remarkable Resilience
- 1/3 of Adults Abused or Maltreated as Children Victimize their Children