Body Growth

Gain 50% in height from birth to age 1
- 75% by age 2

Grow in spurts
- gain "baby fat" until about 9 months, then get slimmer
- girls slightly shorter, lighter than boys

Growth Trends

Cephalocaudal
"Head to tail"
Lower part of body grows later than the head

Proximodistal
"Near to far"
Extremities grow later than head, chest, and trunk
Major Milestones of Brain Development

Regions of the Cerebral Cortex

Laterization of Cerebral Cortex

**Left Hemisphere**
- Sensory information and control of right side of body
- Verbal abilities
- Positive emotion
- Sequential, analytical processing

**Right Hemisphere**
- Sensory information and control of left side of body
- Spatial abilities
- Negative emotion
- Holistic, integrative processing

Brain Plasticity

In infants and young children, parts of brain are not yet specialized.

- Recover better from brain injury
  - language recovers better than spatial skills
  - still have some problems with complex mental skills

Older children, even adults, have some plasticity.
Plasticity

- The brain’s ability to change in response to experience

Changes in psychological functioning

- Tied to changes in the brain throughout the lifespan

---

Sensitive Periods in Brain Development

Stimulation is vital when brain growing rapidly

Experience-expectant growth

- ordinary experiences “expected” by brain to grow normally

Experience-dependent growth

- additional growth as a result of specific learning experiences

---

Evidence of Sensitive Periods

![Graph of evidence of sensitive periods](image)

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Changing States of Arousal

Sleep moves to an adult-like, night–day schedule during the first year.

Sleep needs decline from 18 to 12 hours a day by age 2.

Affected by social environment, cultural values
Influences on Early Growth

Heredity
Nutrition
  - breast vs. bottle-feeding
Malnutrition
Emotional well-being
  - problems can cause nonorganic failure to thrive

Malnutrition

<table>
<thead>
<tr>
<th>Types</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marasmus</td>
<td>Physical symptoms, learning problems</td>
</tr>
<tr>
<td>Kwashiorkor</td>
<td>Growth and weight problems</td>
</tr>
<tr>
<td>Food insecurity</td>
<td>Growth, learning problems</td>
</tr>
</tbody>
</table>

Emotional Well-Being

Nonorganic failure to thrive
  - symptoms similar to marasmus
  - non-biological cause
  - can be corrected if treated early

The Steps of Classical Conditioning
Operant Conditioning Terms

**Reinforcer**
*Increases probability of behavior occurring again*
- presenting desirable stimulus
- removing unpleasant stimulus

**Punishment**
*Reduces probability of behavior occurring again*
- presenting unpleasant stimulus
- removing desirable stimulus

Using Habituation to Study Infant Memory and Knowledge

Figure 4.8

Imitation

Newborns have ability to imitate
- reflex or voluntary capacity?

Mirror neurons offer biological explanation

Powerful means of learning
Helps facilitate positive relationships

Motor Development: Sequence and Trends

- Gross motor development
  - crawling, standing, and walking
- Fine motor development
  - reaching and grasping

Sequence is fairly uniform, though individual rate of motor progress differs
Cephalocaudal and proximodistal trends
Motor Skills as Dynamic Systems

Increasingly complex systems of action with each skill
Each new skill is joint product of:
- CNS development
- body’s movement capacity
- child’s goals
- environmental supports

Sensory Skills

- High-pitched noises need to be loud to be heard.
- Infants can locate the direction of some sounds at birth.

Touch and Motion
- Best developed of all senses

Smelling and Tasting
- Newborns react differently to each basic taste as early as birth.
- Smell has nearly unlimited variations.

Developments in Hearing

<table>
<thead>
<tr>
<th>4–7 months</th>
<th>6–8 months</th>
<th>7–9 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense of musical phrasing</td>
<td>“Screen out” sounds from non-native languages</td>
<td>Recognize familiar words, natural phrasing in native language</td>
</tr>
</tbody>
</table>
Discriminating Speech Sounds

- At 1 month, can discriminate between *pa* and *ba*
- At 6 months, can discriminate between two-syllable words
- By 3 months, respond to male, female, and children's voices similarly
- At 6 months, distinguish sound contrasts in any language; by 1 year old, this ability fades
- Prefer the mother's voice above all others

Combining Information from Several Senses

- **Intersensory Integration**
  - Integrate information from several senses
- **Cross-modal Transfer**
  - Learning from one sense and transferring it to another sense

Discriminating Other Sounds

- At 6 months, babies listen to melodies and recognize patterns.

Milestones in Depth Perception

<table>
<thead>
<tr>
<th>Time</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–4 weeks</td>
<td>Sensitivity to motion cues</td>
</tr>
<tr>
<td>2–3 months</td>
<td>Sensitivity to binocular cues</td>
</tr>
<tr>
<td>6–7 months</td>
<td>Sensitivity to pictorial cues, wariness of heights</td>
</tr>
</tbody>
</table>

Improvements in Vision

Supported by rapid maturation of eyes and visual centers in brain

- 2 months: focus and color vision
- 6 months: acuity, scanning, and tracking
- 6–7 months: depth perception

FamilyLife
### Milestones in Pattern Perception

<table>
<thead>
<tr>
<th>Age</th>
<th>Abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month</td>
<td>Poor contrast sensitivity; prefer single, large simple patterns with high contrast</td>
</tr>
</tbody>
</table>
| 2–3 months | Can detect detail in complex patterns  
Scan internal features of patterns |
| 4 months | Can detect patterns even if boundaries are not really present |
| 12 months | Can detect objects even if two-thirds of drawing is missing |

### The Visual Cliff

![Image of the Visual Cliff](image)

### Contrast Sensitivity

![Contrast Sensitivity](image)

### Subjective Boundaries in Visual Patterns

![Subjective Boundaries in Visual Patterns](image)
Babies initially scan for light/dark contrast.

At 2 months, babies scan entire objects to identify things.

Caron and Caron (1981) suggest that by 3 – 4 months babies can find and pay attention to patterns.

Faces
- Clearly prefer attractive faces
- Prefer the mother’s face from the earliest hours of life

What Babies Look At

Scanning Human Face Patterns

1-Month-Old

2-Month-Old

Milestones in Face Perception

<table>
<thead>
<tr>
<th>Age</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth–1 month</td>
<td>Prefer simple, facelike pattern</td>
</tr>
<tr>
<td>2–4 months</td>
<td>- Prefer complex facial pattern to other complex patterns</td>
</tr>
<tr>
<td></td>
<td>- Can distinguish strange from familiar faces</td>
</tr>
<tr>
<td></td>
<td>- Prefer mother’s face over stranger</td>
</tr>
<tr>
<td>5–12 months</td>
<td>Can perceive emotional expressions on faces</td>
</tr>
</tbody>
</table>

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Milestones in Intermodal Perception

<table>
<thead>
<tr>
<th>Age</th>
<th>Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Detect amodal sensory properties</td>
</tr>
<tr>
<td>3–4 months</td>
<td>Relate speech sounds to lip movement</td>
</tr>
<tr>
<td>4–6 months</td>
<td>Perceive unique face-voice pairings of unfamiliar adults</td>
</tr>
</tbody>
</table>

Differentiation Theory

Infants:
- search for invariant features of the environment
- note stable relationships between features
- visual patterns, intermodal relationships
- gradually detect finer and finer features
- differentiation