

chapter

8

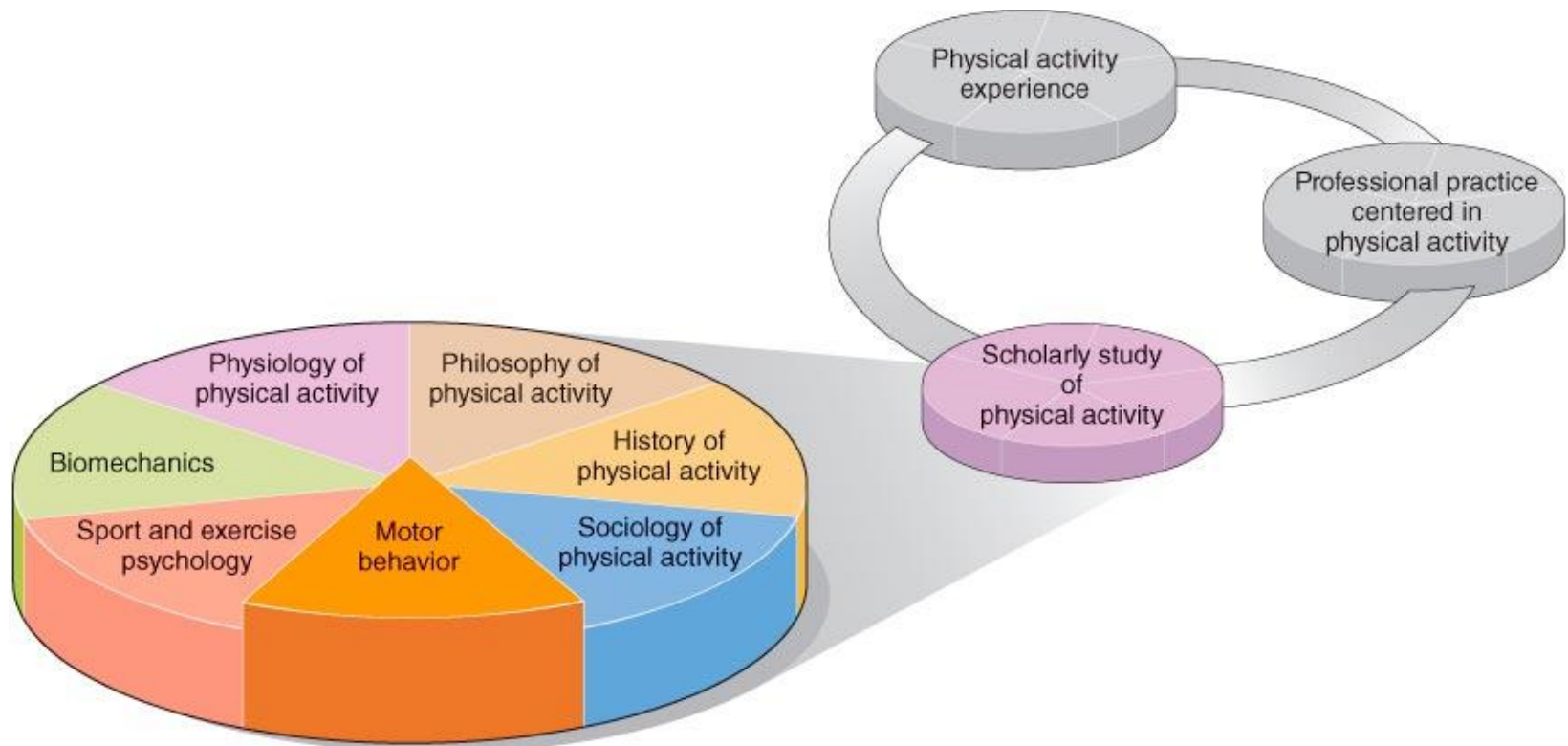
Motor Behavior

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What Is Motor Behavior?

- **Motor behavior is the study of how motor skills are *learned, controlled, and developed* to assist people as they practice and experience physical activity. Applications often focus on *what, how, and how much to practice*.**
- **Motor behavior guides us in providing better situations for learning and practice, as well as understanding why some cues and feedback are better than others.**
- **Motor behavior is valuable to all performers and those who teach motor skills, including the following:**
 - Physical education teachers
 - Adapted physical educators
 - Gerontologists
 - Physical therapists
 - Coaches

Figure 8.1



What Does a Motor Behaviorist Do?

- **Colleges or universities**
 - Teaching
 - Research
 - Service
- **Other research facilities: hospitals, industrial, military**
 - Research with applications related to setting
 - Grant writing

Goals of Motor Behavior

- **To understand how motor skills are learned**
- **To understand how motor skills are controlled**
- **To understand how the learning and control of motor skills change across the life span**
- **Three subdisciplines:**
 - Motor learning
 - Motor control
 - Motor development

Goals of Motor Learning

- **To explain how processes such as feedback and practice improve the learning and performance of motor skills**
- **To explain how response selection and response execution become more efficient and effective**

Goals of Motor Control

- **To analyze how the mechanisms in response selection and response execution control the body's movement**
- **To explain how environmental and individual factors affect the mechanisms of response selection and response execution**

Goals of Motor Development

- **To explain how motor learning and control improve during childhood and adolescence**
- **To explain how motor learning and control deteriorate with aging**

Motor Movements Studied Beyond Sports

- **Babies learning to use a fork and spoon**
- **Dentists learning to control the drill while looking in a mirror**
- **Surgeons controlling a scalpel; microsurgeons using a laser**
- **Children learning to ride a bicycle or roller skate**
- **Teenagers learning to drive**
- **Dancers performing choreographed movements**
- **Pilots learning to control an airplane**
- **Young children learning to control a pencil when writing or type on a computer**

History of Motor Behavior

Five themes have persisted over the years in motor behavior research:

- Knowledge of results (feedback)
- Distribution of practice
- Transfer of training
- Retention
- Individual differences

(continued)

History of Motor Behavior (*continued*)

- **Late 1800s and early 1900s: Motor skills to understand cognition and neural control**
- **1939-1945: The World War II era was one of great interest in motor behavior research.**
- **1940s, 1950s, 1960s: Glassow, Rarick, and Espenschade—research focused on how children acquire motor skills**
- **1960s:**
 - Memory drum theory: Franklin Henry, father of motor behavior
 - Motor behavior as a subdiscipline of kinesiology
- **1970s to present:**
 - The influence of growth and maturation on motor performance
 - Developmental patterns of fundamental movements
 - Information processing theory
 - The study of motor learning and motor control in children

Focus of Motor Behavior Shifts

- **Initial focus was not actually on motor behavior itself; instead, it was on cognition, biology, military importance, and so on.**
- **Current focus has shifted to motor behavior itself.**
 - Neuromuscular system controls and movement repetition
 - Potential treatments for diseases and injuries such as Parkinson's disease and spinal cord injuries.
 - Performance improvement in sport and physical activity
 - Technological advances that allow for a focus on real-world movements instead of movement invented in the laboratory just for research purposes

Research Methods in Motor Behavior

- **Types of studies (experimental designs):**
 - Between-group
 - Within-group
 - Descriptive (participants receive no treatment)
- **Studying the early stages of learning (novice learning tasks)**
- **Studying expert performance**
- **Measuring movements**
- **Characteristics of movement tasks**
- **Measuring learning and transfer**

Figure 8.2

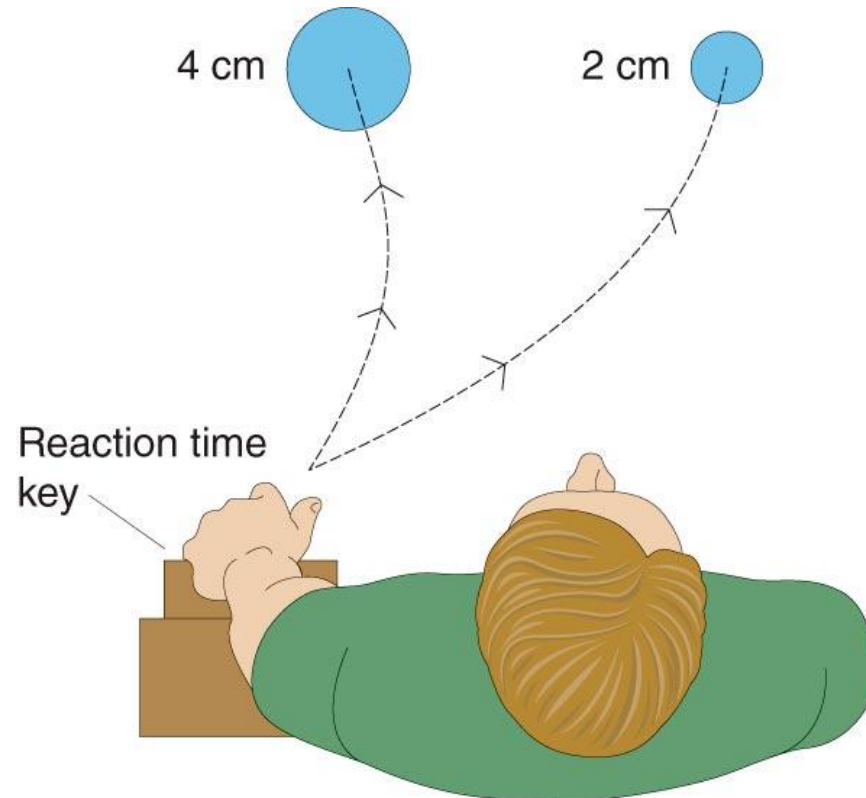


Figure 8.3



Research Themes in Motor Behavior

- **Practice**
- **Feedback: Knowledge of results and performance**
- **Transfer**
- **Individual differences**

Motor Learning

- **The goal is to understand the role of practice, feedback, and individual differences.**
 - Scheduling practice
 - Context of practice
- **Study has included the early stages of learning and expert performers.**
- **Typical studies have used average or typical performers doing novel tasks.**

(continued)

Motor Learning (*continued*)

Topics studied

- Practice
 - Before practice
 - Goal setting
 - Instructions
 - Demonstrations
 - Scheduling practice
 - Context of practice
- Feedback: Knowledge of results and performance
- Transfer
- Individual differences

Figure 8.4

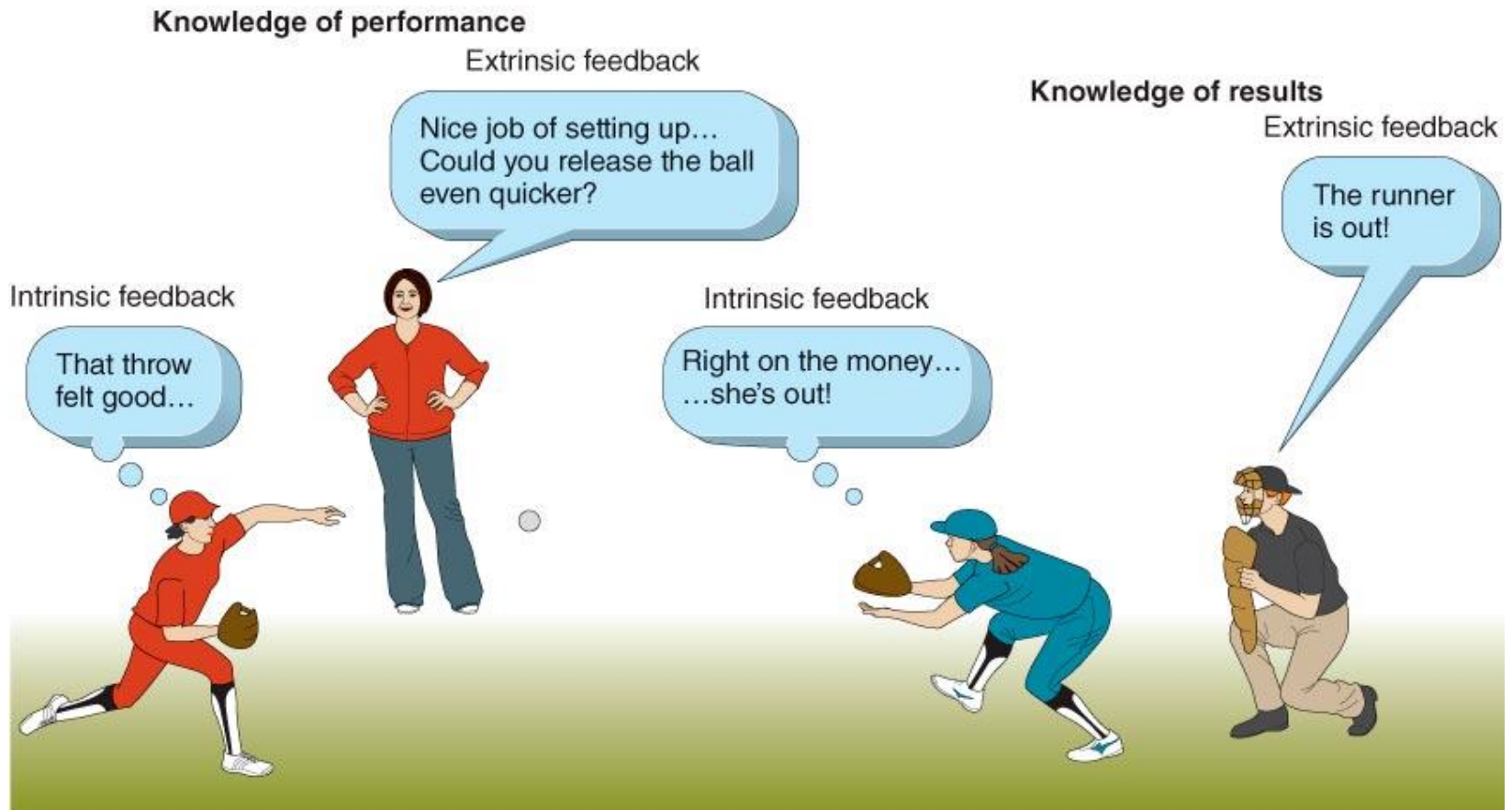
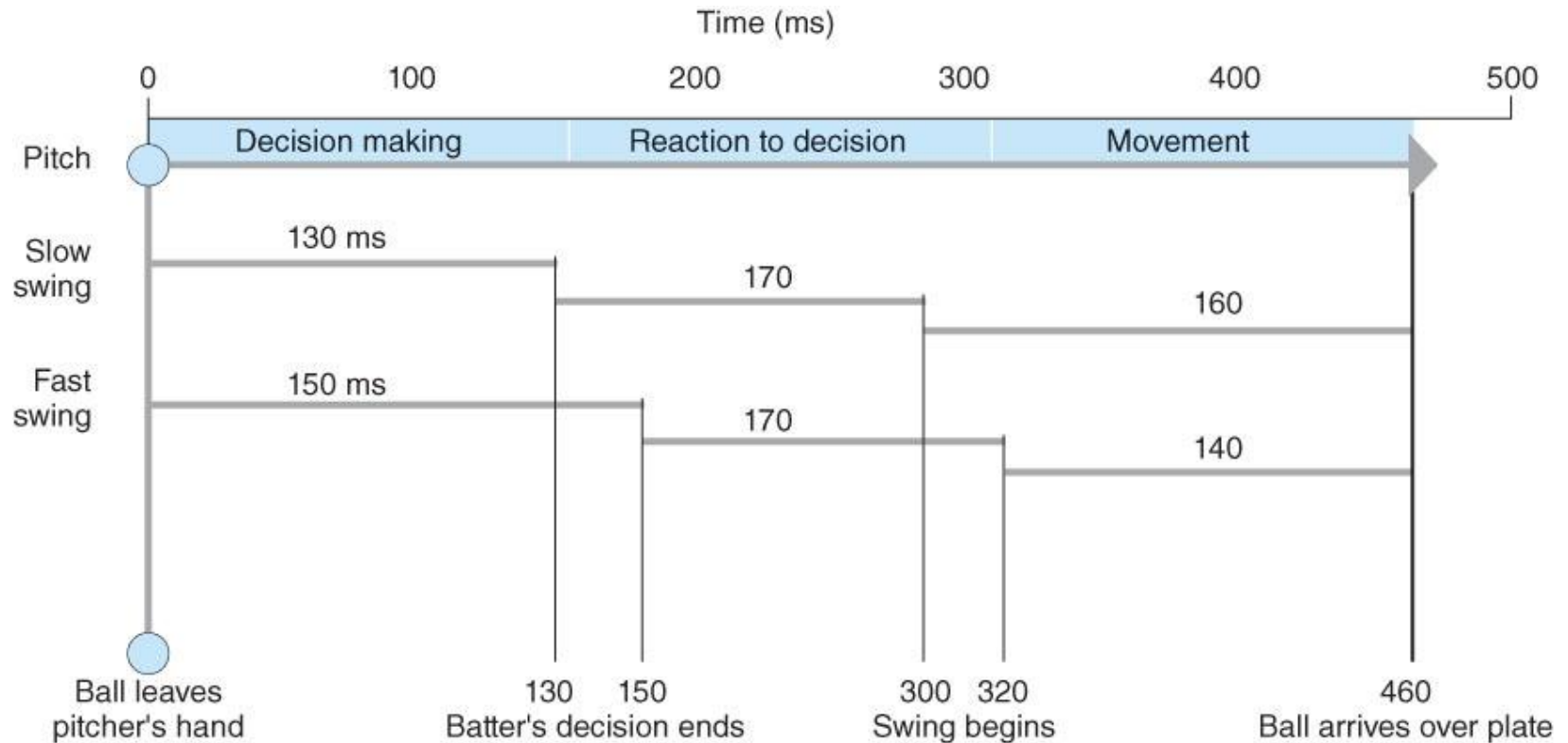


Figure 8.5



Motor Control

***Motor programs* are proposed memory mechanisms that allow movements to be controlled. As motor programs are developed, they become more automatic, allowing the performer to concentrate on the use of the movement in performance situations.**

(continued)

Motor Control (*continued*)

***Dynamical systems* theory has challenged the motor program theory. Dynamical systems theorists believe that a more direct link exists between perception and action, bypassing the need for motor programs.**

Motor Control: Five Areas of Research

- **Degrees of freedom: coordination of movement**
- **Motor equivalency**
- **Serial order of movements: coarticulation**
- **Perceptual integration during movement**
- **Skill acquisition**

Developmental Motor Learning and Control

- **The goal is to understand skill acquisition across the life span.**
- **Descriptive research includes baby biographies.**

(continued)

Developmental Motor Learning and Control (*continued*)

Topics studied

- Developmental changes in the mechanics of movement
- Life span development
- Experience
- Changing neuromuscular systems across the life span
- Growth and gender in the development of overhand throwing

Figure 8.6

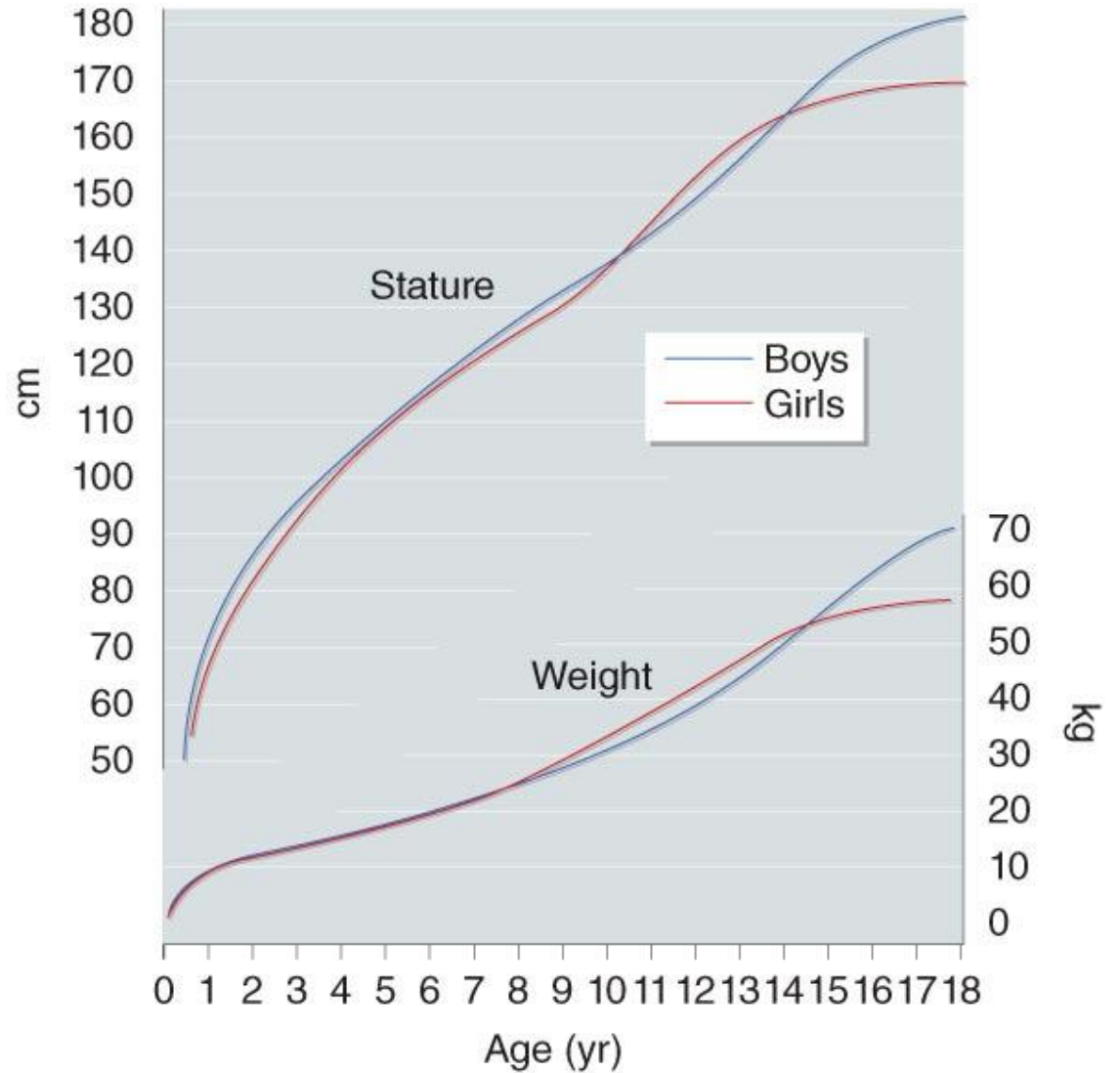
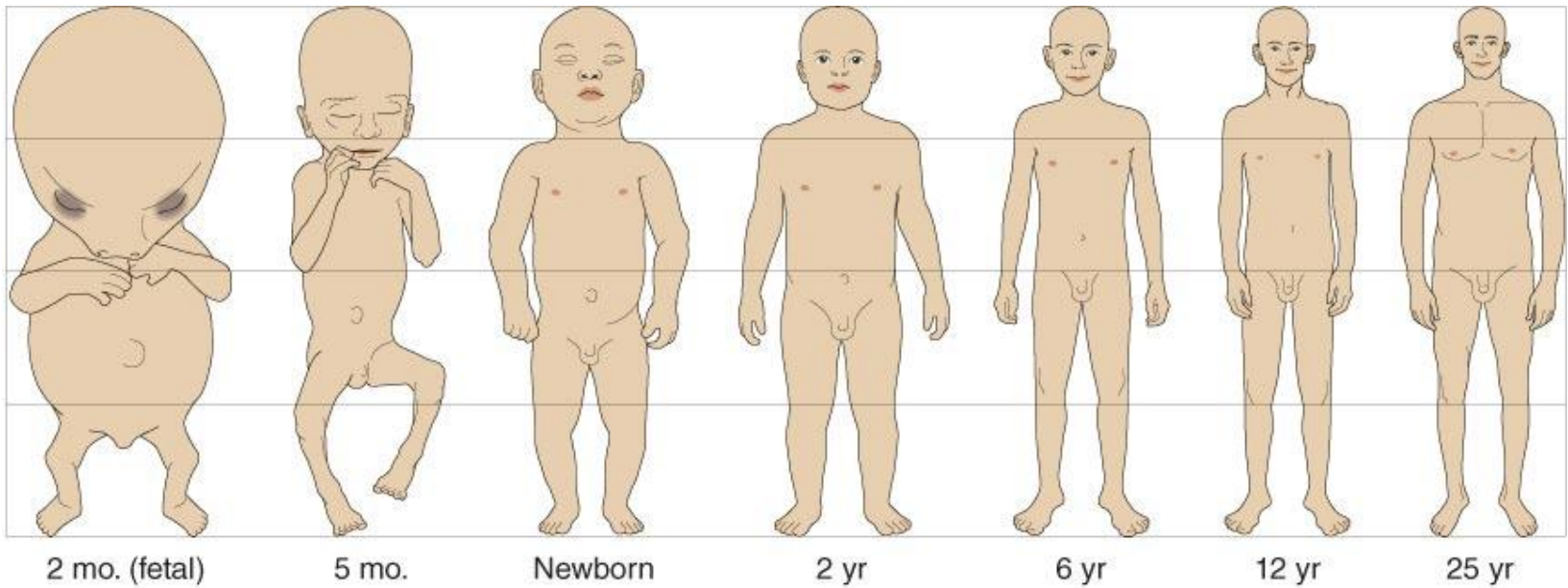
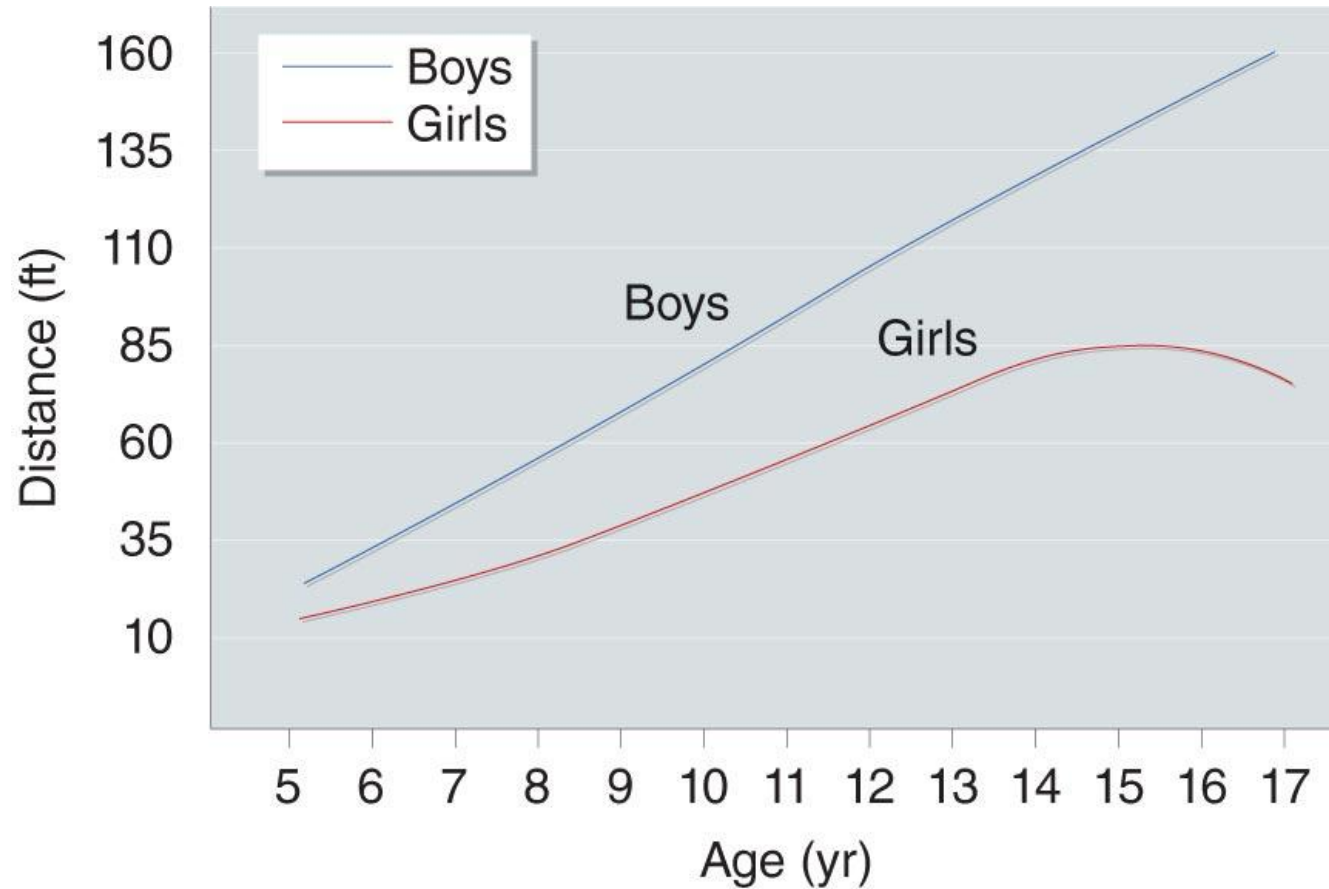


Figure 8.7



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Figure 8.8



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Motor Behavior

- **Important in all aspects of life**
 - Babies
 - Athletes
 - Surgeons
- **Important to many professions**
 - Teaching
 - Coaching
 - Medicine
 - Therapy