Chapter 1: Introduction to Motor Development

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Outline
- Definitions of motor development and human development
- Elements of developmental change
- Concepts of development, maturation, and growth
- Common terms in motor development
- Age periods and stages of human development
- History of the field of motor development
- Research designs

Website
yorku.ca/bakerj/3340.html
What is Motor Development?

• A process through which we pass during the course of our life.
  – Change that occurs in our ability to move as we proceed through the lifespan.

• A field of study
  – The study of changes in human motor behavior over the lifespan, the processes that underlie these changes, and the factors that affect them.

Controversial Research Approaches

There are two diverse approaches to studying motor development

• Product (Task-Oriented) Approach
  – Emphasizes the outcome of a movement
    • How much control did the child have while catching the ball?

• Process Approach
  – Emphasizes the movement without consideration for the outcome
    • What technique did the child use to catch the ball?
Human behavior is not compartmentalized; there is a complex system of constant, reciprocal exchanges among an individual’s cognitive, affective, motor, and physical being.

Domains of Human Development

- Cognitive
  - Concerns human intellectual development
- Affective
  - Concerned with the social and emotional aspects of human development
- Motor
  - Development of human movement and factors that affect that development
- Physical
  - All types of physical/bodily change

• The four domains are useful for categorizing the study of human and motor development.
• Domains are not discrete.
Why is the study of motor development important?

- Helps us to fully understand human development.
- Enables us to diagnose problems in individuals who may not be following a normal course of development.
- Allows us to structure developmentally appropriate programs / curricula.

What is Human Development?

“...changes that all human beings face across their lifespan. Such changes result from increasing age as well as one’s experiences in life, one’s genetic potential, and the interactions of all three factors at any given time. Therefore, development is an interactional process that leads to changes in behavior over the lifespan.”

(Motor Development Task Force, 1995)
“Developmentally Appropriate”

- Increasingly popular term over the past few decades.
- Programs claim to be both appropriate for the child’s age group and appropriate to the child’s individual needs.
- Term is often misused and abused.

Elements of Developmental Change

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Not “just more of something”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequential</td>
<td>Certain motor patterns precede others</td>
</tr>
<tr>
<td>Cumulative</td>
<td>Behaviors are additive</td>
</tr>
<tr>
<td>Directional</td>
<td>Development has an ultimate goal</td>
</tr>
<tr>
<td>Multifactorial</td>
<td>No single factor directs change</td>
</tr>
<tr>
<td>Individual</td>
<td>Rate of change varies for all people</td>
</tr>
</tbody>
</table>

Motor Development Task Force, 1995
Development, Growth and Maturation

- **Development** refers to the progressions and regressions that occur throughout the lifespan.
- **Growth** refers to the structural aspects of development.
- **Maturation** refers to the functional changes of development.

Growth and Maturation

- **Growth** is quantitative  
  - E.g. increase in size
- **Maturation** is qualitative  
  - E.g. functions of organs and tissues
- **Growth and Maturation**  
  - Interrelated (e.g. as body grows, functions improve)  
  - Different (e.g. as we age, growth slows, but maturation can continue through lifespan)

General Motor Development Terms

- **Developmental Directions**  
  - **Cephalocaudal**  
    - From head to tail (i.e. head to feet)  
    - Growth – E.g. Head size of infant relative to body.  
    - Movement Ability – E.g. Toddler learning to walk.
General Motor Development Terms

- Developmental Directions
  - Proximodistal
    - From those points close to the body’s center to those points close to the periphery
  - Growth – E.g. Prenatal growth
  - Movement Ability – E.g. Infant acquiring motor skill

Fetal Growth From 8 to 40 Weeks

General Motor Development Terms

Movement Differentiation and Integration

- Differentiation
  - Progression from gross, immature movement to well-controlled, intentional, precise movement
  - E.g. Toddler learning to walk

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Movement Differentiation and Integration

- **Integration**
  - Motor systems are able to function together as ability progresses
  - E.g. See next slide

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**General Motor Development Terms**

- **Gross and Fine Movement**
  - **Gross movement**
    - Movement controlled by the large muscles or muscle groups (e.g. legs)
  - **Fine movement**
    - Movement controlled by the small muscles or muscle groups (e.g. hands)

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How does the child in this picture demonstrate the concept of integration?
**Age Periods**

- Do not suggest that everyone within an age range possesses the same movement characteristics.
- Helpful in discussions about development throughout the lifespan.
- Often substituted for the term “stages.”

### Details on Age Periods

<table>
<thead>
<tr>
<th>Period</th>
<th>Significant Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prenatal Period</strong></td>
<td>Conception to birth</td>
</tr>
<tr>
<td>- Embryonic Period</td>
<td>Conception to 8 weeks</td>
</tr>
<tr>
<td>- Fetal Period</td>
<td>Very important period</td>
</tr>
<tr>
<td></td>
<td>Fetus: 8 weeks to birth</td>
</tr>
<tr>
<td></td>
<td>Organogenesis</td>
</tr>
<tr>
<td><strong>Infancy</strong></td>
<td>Birth to year 1</td>
</tr>
<tr>
<td>- Neonatal Period</td>
<td>Neonatal: 0-22 days after birth</td>
</tr>
<tr>
<td><strong>Toddlerhood</strong></td>
<td>Walking alone (1 year) to 4 years</td>
</tr>
<tr>
<td><strong>Early Childhood (Cont.)</strong></td>
<td>Ages 4 to 7 years</td>
</tr>
<tr>
<td><strong>Middle Childhood</strong></td>
<td>Ages 7 to 9 years</td>
</tr>
<tr>
<td><strong>Late Childhood</strong></td>
<td>Last 3 years (ages 9 to 12)</td>
</tr>
</tbody>
</table>

### Details on Age Periods (Cont.)

<table>
<thead>
<tr>
<th>Period</th>
<th>Significant Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescence</td>
<td>Puberty to Maximum Height</td>
</tr>
<tr>
<td></td>
<td>- Girls: Ages 11-19</td>
</tr>
<tr>
<td></td>
<td>- Boys: Ages 13 - 21</td>
</tr>
<tr>
<td>Early Adulthood</td>
<td>Maximum height (age 20) to 40</td>
</tr>
<tr>
<td>Middle Adulthood</td>
<td>Ages 40-60 yrs</td>
</tr>
<tr>
<td>Late Adulthood</td>
<td>Age 60 until death</td>
</tr>
</tbody>
</table>
Stages of Development

- **Common word** in human development.
  - Interchangeable with period, phase, time, or levels
- **Controversy** over whether actually exist.
  - Does life proceed smoothly and continuously?
  - Is life discontinuous with abrupt behavior changes?
- Provide **manageable portions of information**.
  - But not times of unique, hierarchical, or universal behaviours.

History of Motor Development

- **Precursor Period** (1787-1928)
  - Descriptive observation of human movement
  - Tiedemann – Observations of son’s first 2.5 yrs
  - Darwin’s “Biological Sketch of an Infant”
  - Shinn’s “The Biography of a Baby”
  - Preyer’s “The Mind of a Child”

Biographical Sketch of an Infant (Darwin, 1877)

M. Taine’s very interesting account of the mental development of an infant, translated in the last number of MIND (p. 202), has led me to look over a diary which I kept thirty-seven years ago with respect to one of my own infants. I had excellent opportunities for close observation, and wrote down at once whatever was observed. My chief object was expression, and my notes were used in my book on this subject, but as I attended to some other points, my observations may possibly possess some little interest in comparison with those by M. Taine, and with others which hereafter no doubt will be made. I feel sure, from what I have seen with my own infants, that the period of development of the several faculties will be found to differ considerably in different infants.

During the first seven days various reflex actions, namely sneezing, hiccuping, yawning, stretching, and of course sucking and screaming, were well performed by my infant. On the seventh day, I touched the naked sole of his foot with a bit of paper, and he jerked it away, curling at the same time his toes, like a much older child when tickled. The perfection of these reflex movements shows that the extreme imperfection of the voluntary ones is not due to the state of the muscles or of the coordinating centres, but to that of the seat of the will….

With respect to vision, his eyes were fixed on a candle as early as the 9th day, and up to the 45th day nothing else seemed thus to fix them; but on the 49th day his attention was attracted by a bright-coloured tassel, as was shown by his eyes becoming fixed and the movements of his arms ceasing. It was surprising how slowly he acquired the power of following with his eyes an object if swinging at all rapidly; for he could not do this well when seven and a half months old. At the age of 32 days he perceived his mother’s bosom when three or four inches from it, as was shown by the protrusion of his lips and his eyes becoming fixed; but I much doubt whether this had any connection with vision, he certainly had not touched the bosom. Whether he was guided through smell or the sensation of warmth or through association with the position in which he was held, I do not at all know.

Charles Darwin.
History of Motor Development

**Maturational Period** (1928-1946)
- Biological processes shape human development
- Interest in motor development as primary area
- Gesell’s “Infancy and Human Growth”
- McGraw’s work with twins Jimmy and Johnny
- Bayley’s scale of motor development

**Normative/Descriptive Period** (1946-1970)
- Dormant period (1946-1960)
- PE researchers: Espenschade, Glassow, Rarick
- Developed norm referenced standards and tests for motor performance in children.
- Kephart’s “Slow Learner in the Classroom”
  - Kephart maintained that certain movement activities enhanced academic performance.
  - Never well supported by research, theory still influences professional practice today.
- Biomechanical analysis of movement.

**Process-Oriented Period** (1970-present)
- Return to describing the process of movement, not just the product.
- First Part: Information-Processing Theory
  - Human mind functions like a computer
  - Connolly’s “Mechanisms of Motor Skill Development”
  - Summation of a meeting by a small group of psychologists
- Second Part: Dynamical Systems Theory
  - Kugler, Kelso & Turvey
  - Change arises from complex, coordinated, and self-organizing systems.
Interdisciplinary Approach in the Study of Motor Development

- Three subareas of motor behavior
  - motor learning
  - motor control
  - motor development

- Working together, experts are able to discern more accurately subtle movement changes and differences.

Research Designs

<table>
<thead>
<tr>
<th>Research Design</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Cross-Sectional</td>
<td>Comparison of two or more persons or groups at one point in time</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>A study of the same persons or groups over a long period of time</td>
</tr>
<tr>
<td>Time-Lag</td>
<td>Different cohorts are compared at different times</td>
</tr>
<tr>
<td>Sequential-Cohort</td>
<td>Integrates the cross-sectional, longitudinal, and time-lag designs within one study</td>
</tr>
</tbody>
</table>
## Research Designs ~ Pros

<table>
<thead>
<tr>
<th>Design</th>
<th>Pros</th>
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<tbody>
<tr>
<td>Cross-sectional</td>
<td>Administratively efficient  \n</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>Change can be observed across ages</td>
</tr>
<tr>
<td>Sequential-Cohort</td>
<td>Accounts for generational (cohort) effect</td>
</tr>
</tbody>
</table>

## Research Designs - Cons

<table>
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<tr>
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<th>Cons</th>
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<tbody>
<tr>
<td>Cross-sectional</td>
<td>Age and cohort are confounded  \n</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>Age and time are confounded  \n</td>
</tr>
<tr>
<td>Sequential-Cohort</td>
<td>Administratively inefficient  \n</td>
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