

### **ESSENTIALS OF LIFE-SPAN DEVELOPMENT** JOHN W. SANTROCK

### PHYSICAL AND COGNITIVE DEVELOPMENT IN

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# CHAPTER OUTLINE

- Physical changes
- Cognitive changes
- Language development
- Early childhood education

### PHYSICAL CHANGES

- Body growth and change
- Motor development
- Nutrition and exercise
- Illness and death

# BODY GROWTH AND CHANGE

- Height and weight-Early Childhood
  - Average growth is 2.5 inches and 5 to 7 pounds per year during early childhood
  - Growth patterns vary individually
  - Important contributors to height differences
    - Ethnic origin
    - Nutrition
- Height and Weight-Middle-Late Childhood
  - Growth averages 2–3 inches per year
  - Weight gain averages 5–7 pounds a year
  - Muscle mass and strength increase as "baby fat" decreases

# BODY GROWTH AND CHANGE

- The brain
  - Does not grow as rapidly during early childhood as in infancy
    - Undergoes remarkable changes
  - From 3 to 6 years of age
    - Most rapid growth in the brain takes place in the part of the frontal lobes known as the prefrontal cortex
  - Rapid, distinct spurts of growth in the frontal lobes
  - **Myelination**: Process through which axons are covered with a layer of fat cells
    - Increases the speed and efficiency of information traveling through the nervous system
  - More stabilization but continued growth in prefrontal cortex through the remainder of childhood.

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### FIGURE 5.1 - THE PREFRONTAL CORTEX

# Prefrontal cortex

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# MOTOR DEVELOPMENT

- Gross motor skills
  - Simple movements at age 3
  - More adventurous at age 4
  - Hair-raising risks at age 5
- Fine motor skills
  - Still clumsy at 3 years
  - Improved fine motor coordination at 4 years
  - Body coordination by 5 years
- Boys outperform girls in gross motor skills involving large muscle activity
- Improvement of fine motor skills during middle and late childhood due to increased myelination of the central nervous system

# NUTRITION AND EXERCISE

- Overweight young children
  - Serious health problems in early childhood
  - Strongly influenced by caregivers' behavior
  - Determined by body mass index U.S. has second highest rate of childhood obesity
  - Consequences of being overweight
    - Diabetes, hypertension, and elevated blood cholesterol levels
- Exercise
  - Young children should engage in physical activity every day

### ILLNESS AND DEATH

### The United States

- Leading causes of death in U.S. children are:
  - Motor vehicle accidents
  - Cancer- Second leading cause of death in children 5–14 years old ,Most common child cancer is leukemia, Children with cancer are surviving longer because of advancements in cancer treatment
  - Cardiovascular disease
- Safety influenced by:
  - Children's own skills and safety-related behaviors
  - Characteristics of their family and home, school and peers, and the community
- Parental smoking a major danger

# FIGURE 7.1 - TYPES OF CANCER IN CHILDREN



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### FIGURE 5.2 - CHARACTERISTICS THAT ENHANCE YOUNG CHILDREN'S SAFETY

### Individual

Development of social skills and ability to regulate emotions

Impulse control (such as not darting out into a street to retrieve a ball)

Frequent use of personal protection (such as bike helmets and safety seats)

### Family/Home

High awareness and knowledge of child management and parenting skills

Frequent parent protective behaviors (such as use of child safety seats)

Presence of home safety equipment (such as smoke alarms and cabinet locks)

### School/Peers

Promotion of home/school partnerships

Absence of playground hazards

Injury prevention and safety promotion policies and programs

### Community

Availability of positive activities for children and their parents

Active surveillance of environmental hazards

Effective prevention policies in place (such as pool fencing)

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# Children with Disabilities: THE SCOPE OF DISABILITIES

- Learning disability: Difficulty in learning that involves understanding or using spoken or written language, and the difficulty can appear in listening, thinking, reading, writing, and spelling
  - Dyslexia Severe impairment in the ability to read and spell
  - Dysgraphia Difficulty in handwriting
  - Dyscalculia Developmental arithmetic disorder

### THE SCOPE OF DISABILITIES

- Attention deficit hyperactivity disorder (ADHD): Characterized by inattention, hyperactivity, and impulsivity
  - Number of children diagnosed has increased
  - Possible causes
    - Genetics
    - Brain damage during prenatal or postnatal development
    - Cigarette and alcohol exposure during prenatal development
    - Low birth weight

### FIGURE 7.4 - REGIONS OF THE BRAIN IN WHICH CHILDREN WITH ADHD HAD A DELAYED PEAK IN THE THICKNESS OF THE CEREBRAL CORTEX



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### THE SCOPE OF DISABILITIES

- Autism spectrum disorders (ASD): Range from autistic disorder to Asperger syndrome
  - Autistic disorder Onset in the first three years of life
    - Deficiencies in social relationships, abnormalities in communication, restricted, repetitive, and stereotyped patterns of behavior
  - Asperger syndrome Good verbal language skills
    - Milder nonverbal language problems
    - Restricted range of interests and relationships

### EDUCATIONAL ISSUES

- Individualized Education Plan (IEP): Written statement that is specifically tailored for the disabled student
- Least Restrictive Environment (LRE): Setting that is as similar as possible to the one in which non-disabled children are educated
- Inclusion: Educating a child with special education needs full-time in the regular classroom

# COGNITIVE CHANGES

- Piaget's preoperational stage
- Vygotsky's theory
- Information processing

### PIAGET'S PREOPERATIONAL STAGE

- Preoperational stage: Piaget's second stage
  - Ages 2 to 7 years
  - Children represent the world with words, images, and drawings
    - Form stable concepts and begin to reason
    - Cognitions are dominated by egocentrism and magical beliefs
- **Operations**: Reversible mental actions
- Allow children to do mentally what they formerly did physically

### SUBSTAGES OF PREOPERATIONAL THOUGHT

- Symbolic function substage: Child gains the ability to mentally represent an object that is not present
  - Occurs roughly between the ages of 2 and 4
  - Limitations
    - **Egocentrism**: Inability to distinguish one's own perspective from someone else's
    - Animism: Belief that inanimate objects have lifelike qualities and are capable of action

### FIGURE 5.3 - THE THREE MOUNTAINS TASK



### SUBSTAGES OF PREOPERATIONAL THOUGHT

- Intuitive thought substage: Children use primitive reasoning and want to know the answers to questions
- Centration and the limits of preoperational thought
  - **Centration**: Centering attention on one characteristic to the exclusion of all others
  - **Conservation**: Altering a substance's appearance does not change its basic properties

### FIGURE 5.4 - PIAGET'S CONSERVATION TASK



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# FIGURE 5.5 - SOME DIMENSIONS OF CONSERVATION: NUMBER, MATTER, AND LENGTH

| Type of<br>Conservation | Initial Presentation  | Manipulation  | Preoperational<br>Child's Answer  |
|-------------------------|---|---|-----------------------------------|
| Number                  | Two identical rows of objects are shown to the child, who agrees they have the same number.   | One row is lengthened and the child is asked whether one row now has more objects.  | Yes, the longer row.              |
| Matter                  | Two identical balls of clay are shown to the child. The child agrees that they are equal.     | The experimenter changes the shape of one of the balls and asks the child whether they still contain equal amounts of clay. | No, the longer one has more.      |
| Length                  | Two sticks are aligned in front of the child. The child agrees that they are the same length. | The experimenter moves one stick to the right, then asks the child if they are equal in length.                             | No, the one on the top is longer. |

### PIAGET'S COGNITIVE DEVELOPMENTAL THEORY

- Concrete operational stage
  - Ages 7 to 11
  - Children can perform concrete operations and reason logically, and are able to classify things into different sets
  - **Seriation**: Ability to order stimuli along a quantitative dimension
  - **Transitivity**: Ability to logically combine relations to understand certain conclusions

### PIAGET'S COGNITIVE DEVELOPMENTAL THEORY

- Evaluating Piaget's concrete operational stage
  - Concrete operational abilities do not appear in synchrony
  - Education and culture exert strong influences on children's development

### PIAGET'S COGNITIVE DEVELOPMENTAL THEORY

- Neo-Piagetians: Argue that Piaget got some things right but that his theory needs considerable revision
  - Elaborated on Piaget's theory, giving more emphasis to:
    - How children use attention, memory, and strategies to process information

# VYGOTSKY'S THEORY

### • Social constructivist approach: Emphasizes

- Social contexts of learning
- Construction of knowledge through social interaction
- Zone of proximal development (ZPD): Range of tasks that are too difficult for the child alone but that can be learned with guidance
- Scaffolding Changing the level of support

# VYGOTSKY'S THEORY

- Language and thought
  - Children use speech to communicate socially and to help them solve tasks
  - Private speech Use of language for self-regulation
  - Inner speech becomes their thoughts
  - More private speech = more social competence

# VYGOTSKY'S THEORY

- Teaching strategies Vygotsky's theory can be applied to education
  - Assess child's ZPD
  - Use the child's ZPD in teaching
  - Use more-skilled peers as tutors
  - Monitor and encourage children's use of private speech
  - Place instruction in a meaningful context

### FIGURE 5.7 - COMPARISON OF VYGOTSKY'S AND PIAGET'S THEORIES

|  | Vygotsky  |   | Piaget  |                              |
|--|---|---|---|------------------------------|
| Sociocultural Context  | Strong emphasis   | C I   | Little emphasis   | SA                           |
| Constructivism   | Social constructivist   |   | Cognitive<br>constructivist   |                              |
| Stages   | No general stages of development proposed                                       |   | Strong emphasis on stages (sensorimotor, preoperational, concrete operational, and formal operational)                |                              |
| Key Processes Zone of proximal development, language, dialogue, tools of the culture |   | Schema, assimilation, accommodation, operations, conservation, classification     |   |                              |
| Role of Language   | A major role; language plays a powerful role in shaping thought                 |   | Language has a minimal role; cognition primarily directs language   |                              |
| View on Education  | Education plays a central role, helping children learn the tools of the culture |   | Education merely refines the child's cognitive skills that have already emerged                                       |                              |
| Teaching Implications  | Teacher is a facilitator a<br>establish many opport<br>the teacher and more-s   | and guide, not a director;<br>unities for children to learn with<br>skilled peers | Also views teacher as a facilitator and guide,<br>provide support for children to explore their<br>discover knowledge | not a director;<br>world and |

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- Attention Focusing of mental resources on select information
  - Executive attention
    - Action planning
    - Allocating attention to goals
    - Error detection and compensation
    - Monitoring progress on tasks
    - Dealing with difficult circumstances

- **Sustained attention**: Focused and extended engagement with:
  - Object, task, event, or other aspect of the environment
- Deficiencies in attention
  - Salient versus relevant dimensions
  - Planfulness
- Memory Retention of information over time
  - Short-term: Individuals can retain information up to 30 seconds with no rehearsal
  - Assessing short-term memory Memory-span task

### FIGURE 5.8 - DEVELOPMENTAL CHANGES IN MEMORY SPAN



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- How accurate are young children's long-term memories?
  - There are age differences in children's susceptibility to suggestion
  - There are individual differences in susceptibility
  - Interviewing techniques can produce substantial distortions in children's reports about highly salient events

- Executive functioning:
  - Umbrella-like concept that consists of:
    - Higher-level cognitive processes linked to the development of the brain's prefrontal cortex
  - Managing one's thoughts to engage in goal-directed behavior and self-control

- Theory of mind: Awareness of one's own mental process and the mental processes of others
  - Ages 2 to 3 Children begin to understand the following three mental states
    - Perceptions
    - Emotions
    - Desires

- Ages 4 to 5 Realization that people can have false beliefs develops in a majority of children
- Beyond age 5 Children have a deepening appreciation of the mind itself
  - Rather than just an understanding of mental states
- Individual differences
- Middle to Late childhood
  - Long-term memory: A relatively permanent and unlimited type of memory

- Experts have acquired extensive knowledge about a particular content area
  - **Strategies**: Deliberate mental activities that improve the processing of information
    - **Elaboration**: Extensive processing of the information
    - Engage in mental imagery
    - Understanding the material
    - Repeat with variation
    - Embed memory-relevant language

# LANGUAGE DEVELOPMENT

- Understanding phonology and morphology
- Changes in syntax and semantics
- Advances in pragmatics
- Young children's literacy

### UNDERSTANDING PHONOLOGY AND MORPHOLOGY

- **Phonology**: Sound system of a language, including the sounds used and how they may be combined
- During preschool years, children:
  - Become sensitive to the sounds of spoken words
  - Produce all the sounds of their language
  - Demonstrate a knowledge of morphology rules
    - Use plurals, possessives, prepositions, articles, and verb forms
- **Morphology**: Units of meaning involved in word formation

### CHANGES IN SYNTAX AND SEMANTICS

- Learn and apply rules of syntax
  - Syntax: Involves the way words are combined to form acceptable phrases and sentences
- Show a growing mastery of complex rules for how words should be ordered
  - Semantics: Meaning of words and sentences
    - Characterize early childhood

### ADVANCES IN PRAGMATICS

- **Pragmatics**: Appropriate use of language in different contexts
  - Characterize young children's language development

### ADVANCES IN PRAGMATICS

- Young children's literacy
  - Positive orientation toward reading and writing must be developed
  - Strategies for using books effectively with preschool children
    - Use books to initiate conversation with young children
    - Use what and why questions
    - Encourage children to ask questions about stories
    - Choose some books that play with language

- Ability to solve problems and to adapt and learn from experiences
  - Individual differences Stable, consistent ways in which people differ from each other
  - Binet tests
    - Mental age (MA): Individual's level of mental development relative to others

- Intelligence quotient (IQ): Person's mental age divided by chronological age, multiplied by 100
- Normal distribution: Symmetrical distribution
  - Most scores falling in the middle of the possible range of scores
  - Few scores appearing toward the extremes of the range
- Wechsler Scales

### FIGURE 7.6 - THE NORMAL CURVE AND STANFORD-BINET IQ SCORES



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### FIGURE 7.7 - SAMPLE SUBSCALES OF THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN-FOURTH EDITION (WISC-IV)

### Verbal Subscales

### Similarities

A child must think logically and abstractly to answer a number of questions about how things might be similar.

Example: "In what way are a lion and a tiger alike?"

### Comprehension

This subscale is designed to measure an individual's judgment and common sense.

Example: "What is the advantage of keeping money in a bank?"

### **Nonverbal Subscales**

### **Block Design**

A child must assemble a set of multicolored blocks to match designs that the examiner shows.

Visual-motor coordination, perceptual organization, and the ability to visualize spatially are assessed.

Example: "Use the four blocks on the left to make the pattern on the right."



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- Types of intelligence
  - Sternberg's triarchic theory of intelligence
    - Analytical intelligence
    - Creative intelligence
    - Practical intelligence

- Gardner's eight frames of mind:
  - Verbal
  - Mathematical
  - Spatial
  - Bodily-kinesthetic
  - Musical
  - Interpersonal
  - Intrapersonal
  - Naturalist
- Evaluating multiple-intelligence approaches

- Culture and intelligence
- Interpreting differences in IQ scores
  - Influences of genetics
  - Environmental influences
  - Group differences
  - Culture-fair tests: Designed to be free of cultural bias

### FIGURE 7.8 - CORRELATION BETWEEN INTELLIGENCE TEST SCORES AND TWIN STATUS



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### EXTREMES OF INTELLIGENCE

- Mental retardation: Limited mental ability in which an individual has a low IQ and has difficulty adapting to everyday life
  - Organic retardation: Caused by a genetic disorder or brain damage
  - Cultural-familial retardation: No evidence of organic brain damage
    - IQ is generally between 50 and 70

### EXTREMES OF INTELLIGENCE

- **Gifted**: Above-average intelligence and/or superior talent for something
  - Three criteria
    - Precocity
    - Marching to their own drummer
    - A passion to master
  - Nature-nurture
  - Domain-specific giftedness and development
  - Education of children who are gifted

# EARLY CHILDHOOD EDUCATION

- Variations in early childhood education
- Education for young children who are disadvantaged
- Controversies in early childhood education

### VARIATIONS IN EARLY CHILDHOOD EDUCATION

- Child-centered kindergarten: Education of the whole child and concern for his or her physical, cognitive, and socioemotional development
- Montessori approach: Child is given freedom and spontaneity in choosing activities
- Developmentally appropriate education
  - Developmentally appropriate practice (DAP): Typical developmental patterns of children and the uniqueness of each child

# EARLY CHILDHOOD EDUCATION

- Education for young children who are disadvantaged
  - Project head start: Compensatory program designed to provide children from low-income families:
    - Opportunity to acquire the skills and experiences important for success in school
  - Controversies in early childhood education
    - Controversy over curriculum
    - Universal preschool education