CHAPTER 11

Middle Childhood—Physical, Cognitive, and Language Development

CHAPTER OUTLINE

I. Physical development in middle childhood
   A. Motor skills Differentiation and integration of motor and sensory skills continue to develop into the preschool and later-childhood years. Throughout childhood, children perform motor skills more quickly and efficiently, providing them with increasing competence in their interactions with the environment. Gender and individual differences emerge, especially as children approach the end of middle childhood.

   B. Body Growth Children also undergo dramatic changes in physical size, a highly visible indicator of development. The powerful influence of the environment on maturation is also evident when examining secular trends, consistent patterns of change that occur over generations when the environment changes. People’s perceptions of one another are often influenced by observable physical characteristics. Taller boys, for example, are seen as more competent than shorter boys. However, lowered self-esteem has not been consistently reported for shorter children. Society’s stereotypical attitudes about height have led some parents to seek human growth hormone treatment to increase their children’s height, a procedure that raises many ethical questions.

      1. Obesity Despite the negative attitudes toward people with excess weight, obesity has increased substantially in recent decades. An increase in the time spent in sedentary activity, limited physical activity, and shifts to higher-calorie diets all contribute to the increase in obesity in children. Genetic predispositions for obesity may interact with the environment so that obese children less effectively monitor their calorie intake. Controlling weight is also complicated by the tendency of heavy children to be more sensitive to external weight cues and less responsive to internal hunger cues.

II. Cognition in Middle Childhood: Piaget’s theory Piaget was a stage theorist, maintaining that cognition becomes qualitatively reorganized as the child progresses through four stages of cognitive development.

   A. Concrete operational stage (7 – 11 years) Conservation tasks require the child to make a judgment about the equivalence of two displays following the observation of a transformation of one of the displays (e.g., the conservation of liquid task). The child’s ability to solve conservation tasks signals the beginning of the third stage, the concrete operational stage (about seven to eleven years). The ability to solve conservation tasks results from the child’s ability to perform mental activities, or operations, such as reversibility.

   B. Concepts of causality Piaget believed that up until the early school years, children lack an awareness of physical causality. One type of error typically seen is animism, or attributing life-like properties to inanimate objects. Another error seen is artificialism, or the belief that people cause naturally occurring events. However, more recent research has found that Piaget underestimated the cognitive capabilities of young children, due to the type of tasks used to measure their abilities.
C. **Implications for education** Piaget’s theory of cognitive development has several implications for education. First, it suggests that the educator consider the child’s current stage of development and designs individual plans of instruction that match the child’s abilities. Second, it encourages the active engagement of the child with tasks that are one step beyond his or her current state of knowledge. Several educational programs based on Piagetian models have emerged, each emphasizing different aspects of Piaget’s theory.

III. **Cognition in middle childhood** Information-processing theorists view human cognition as an information management system with limited space and resources. Many traditional information-processing models are called **multistore models**. These models describe information as flowing through a sequence of mental structures, including a sensory store, memory stores, a central processor, and a response system. Control processes are mental activities that are assumed to move information from structure to structure. The beginning of information processing often takes place in the **sensory register**, where information is held for a fraction of a second. The information may move to **working memory**, which holds it for no more than a couple of minutes, or to **long-term memory**, the repository of more enduring information.

The **limited-resource model** emphasizes not mental structures but various cognitive activities or operations. The resources for operations are limited; thus, a considerable amount of mental activity performed on one operation (e.g., processing sensory information) will make less activity available for other operations (e.g., storage or retrieval of information).

Multistore models explain cognitive development as increases in the size of structures and in the proficiency of control processes. Limited-resource models describe cognitive growth as increases in the efficiency of operations (as the proficiency of sensory processes improves, more mental activity is available for remembering).

A. **Attention** Before an individual can process information, he or she must attend to the relevant stimuli. Older children are better able to deploy their attention effectively and efficiently as is evident from changes in the way they systematically search visual arrays. As they grow older, children also show greater selective attention, more easily ignoring irrelevant information. Various factors, such as maturation of the prefrontal cortex and the child’s own understanding of attention, contribute to this development.

Atypical Development: **Attention Deficit Hyperactivity Disorder**

Approximately 3 to 5 percent of children in the United States have this disorder. ADHD is characterized by a pattern of impulsivity, high levels of motor activity, and attention problems. As a result, these children often have academic difficulties and problems in social relationships. The causes of this disorder are presumed to be neurological, but at this time ADHD is poorly understood. For example, an overstimulating, intrusive environment also seems to be related to ADHD. Being able to inhibit response in simple situations appears unrelated to ADHD. Treatment includes stimulant medications such as Ritalin, which has the paradoxical effect of slowing down behavior in children.

B. **Recall memory** Studies show that the **memory span**, which is believed to indicate an individual’s short-term (working) memory capacity, increases with age. This developmental change in recall appears to be related to the child’s improved ability to use memory strategies as she or he gains experience and as a result of increasing efficiency and **processing speed**. Children usually recall the words at the end and the beginning of a list better than the words in the middle. Better recall of the end of a list is called the **recency effect** and is believed to reflect what is available in short-term memory; better recall of beginning words is called the **primacy effect** and is believed to reflect the recall of information that was stored as a result of effective use of memory strategies. Developmental
research indicates that children three years of age and older show similar recency effects, but older children show a stronger primacy effect.

1. Many memory strategies can be used to improve recall—including rehearsal, organization, the reordering of items in terms of some higher-order relationship, and elaboration, linking items in the form of images or sentences—which strengthen memory by imposing meaningful relationships among things to be remembered. The tendency of children to spontaneously use memory strategies increases with age, particularly in children over seven. Children often use multiple strategies in remembering.

2. Controlling cognitive processing Children may acquire memory strategies from direct instruction by parents and teachers, as well as an emerging understanding of metamemory that leads to the child’s realization of a need for memory strategies, and the child’s expanding general knowledge base. Fuzzy trace theory suggests that memories are stored on a continuum from information faithful to the original event to information that only retains the core or gist. The importance of general knowledge in recall has been demonstrated by observation of the effect of domain-specific knowledge on the ability to remember. For example, children knowledgeable in chess display superior recall of briefly presented chess positions compared to college-educated adults unfamiliar with chess.

C. Problem solving One of the hallmarks of a mature problem solver is the ability to plan an approach to obtaining a goal. Khlar’s research on the Tower of Hanoi problem shows a clear developmental trend in the ability to plan. Older children are more likely to plan, as well as being more flexible in their planning. Planning is likely to occur as children gain experiences with everyday routines in which specific events occur in a certain order. With development, children also become more likely to choose from among several strategies for solving a problem rather than relying on one. Children not only resort to multiple strategies in their efforts to solve problems, but also blend strategies together. In doing so, they also become more proficient at using those strategies that are most appropriate for the problem at hand. It is also important to transfer or generalize successful problem-solving skills to new situations. In analogical transfer, elements of one problem are successfully applied to solve a problem in a different domain. Research indicates that toddlers, and possibly even infants, are capable of displaying analogical transfer.

Research Applied to Education: Facilitating Transfer in the Classroom

Procedures for facilitating transfer in the classroom include providing multiple contexts in which to encode information, organizing information in scripts or other frameworks, identifying commonalities in problems across content areas, and having students actively apply what they have learned. All of these pointers have a common aim: to make students aware of transfer as an explicit goal of learning.

1. Learning Mathematics When children enter school they are expected to master formal properties of mathematics. Before children learn formal rules, they develop intuitive concepts about how numbers can be manipulated. Children seem to have a good grasp of complex numerical concepts, such as fractions, by age 4. Cross-cultural findings in math learning are evident.

IV. Vygotsky’s sociocultural theory of cognitive development Vygotsky, in contrast to Piaget, emphasized that development must be understood within the context of the culture in which a child is reared. The social activity surrounding formal and informal exchanges with others plays a significant role in development.

A. Scaffolding Others provide a scaffolding for cognitive development—that is, temporary support by demonstrating cognitive skills and techniques in which the child is deficient and that the child eventually incorporates as part of her or his own thinking. The zone of
proximal development stresses that the most effective help the child can receive from an expert is assistance just slightly beyond his or her capacities, thereby building on the child’s current level of competence.

B. The role of skilled collaborators  
Research indicates that in general, when children work with a skilled collaborator (whether an adult or a peer), performance on cognitive tasks improves. Cross-cultural research reveals that cultures differ in how parents guide the child in becoming a responsible participant in society. In some cultures, children acquire skills primarily through caregiver support and assistance; in other cultures, a focus on play and conversation between child and caregiver is supplemented with more formal lessons and educational opportunities.

V. Language in middle childhood  
By about five, the speech of most children sounds like that of adults. By age 10, they understand almost 40,000 words. Middle childhood language development is characterized by a more mature use of language. Metalinguistic awareness, children’s ability to understand and be aware of their own competency with grammatical rules, does not occur until the early school years. Children’s appreciation of humor based on semantic ambiguities and their understanding of metaphors further demonstrate their metalinguistic awareness.

Atypical Development: Language-Impaired Children  
Many children display speech and language problems, including dyslexia, or difficulty in reading. One reason for dyslexia may be difficulty in discriminating phonemes. When a child is given training to help identify auditory sounds, language development has been found to improve substantially. Why language-impaired children lag behind in phonological processing skills is not completely understood.

A. Biology and language acquisition  
The biological approach emphasizes the maturation of brain structures and the role of lateralization in language development. Neuropsychological studies reveal that several portions of the temporal, prefrontal and visual areas of the brain are involved in language processing. Expressive aphasia, the inability to speak fluently, occurs when Broca’s area is damaged; receptive aphasia, the inability to understand spoken speech, results from damage to Wernicke’s area. Similar impairments are seen in children, but children are more likely to recover language. Brain-wave activity becomes more focused in the left hemisphere once children start speaking. The predictable emergence of language milestones seen in all children (even deaf children not exposed to a formal language) and the common features all languages share (such as phonology, semantics, and syntax) suggest that language may result from an innate biological mechanism. There has been considerable debate concerning whether humans display a critical period for the acquisition of language.

B. The functions of language  
1. Language and cognition  
Language has a powerful influence on cognitive accomplishments. Children who use verbal rehearsal strategies are more likely to recall information following a time delay than children who do not. Children are more successful in categorizing groups of objects if they are provided with the name of one category member from each group.

2. Bilingualism and cognition  
The influence of language on thought is also illustrated by the better performances of bilingual children on problem-solving tasks compared to monolingual children. Bilingual children have been characterized as more analytic and flexible in their approach to different types of thought problems.
Controversy: How Should Bilingual Education Programs Be Structured?

More than 10 percent of school-age children in the United States are estimated to have limited English proficiency. Controversy exists on whether such children should be initially educated in their primary language or immersed in English much the way a child learns a first language. Many programs offer some compromise to these two approaches, such as providing some courses in English and others in the child’s first language. Evaluations of bilingual programs have yielded mixed success, often because of methodological difficulties. For instance, many language minority children come from backgrounds of poverty, which may contribute to difficulties with school. Questions are raised about how our knowledge of language learning bears on bilingual education.

3. **Language and self-regulation**  Lev Vygotsky saw a child’s *private speech* as guiding the child’s observable behavior and her or his *inner speech* as directing the nature of the child’s thoughts.

4. **Language and cultural socialization**  Language also plays an important role in the socialization of children by helping them learn their culture’s values and beliefs. For instance, in many languages the words used to speak to individuals with greater authority differ from those used to speak to individuals of equal status.