We have seen that children make impressive gains in physical development, becoming bigger, stronger, and capable of a broader range of motor activities. Their leaps in cognitive development are even more impressive. Children's capacities to take in, process, and retain information all increase dramatically. In this chapter, we examine how cognitive development unfolds and its implications for how children understand and operate in their world.
Learning Objectives

11.1 Examine school-age children’s capacities for reasoning and processing information.

Video Activity 11.1: Piaget’s Conservation Tasks

11.2 Summarize views of intelligence, including the uses, correlates, and criticisms of intelligence tests.

11.3 Discuss patterns of moral development during middle childhood.

11.4 Explain processes of language development during middle childhood.

11.5 Discuss children’s learning at school.

Chapter Contents

Cognitive Development in Middle Childhood
  Piaget’s Cognitive-Developmental Theory:
    Concrete Operational Reasoning
    Classification
    Conservation
    Culture and Concrete Operational Reasoning
    Implications of Cognitive-Developmental Theory for Education

Information Processing Theory
  Working Memory and Executive Function
  Metacognition and Metamemory
  Memory Strategies
  Context and Cognition
  Implications for Education

Intelligence
  Intelligence Tests
    Individual and Group Differences in IQ
    Contextual Influences on IQ
  Alternative Views of Intelligence
    Multiple Intelligences
    Triarchic Theory of Intelligence

Moral Reasoning in Middle Childhood
  Moral Reasoning: Piaget’s Theory
  Children’s Conceptions of Justice: Kohlberg’s Cognitive-Developmental Theory
  Distributive Justice Reasoning
  Distinguishing Moral and Conventional Rules

Language Development in Middle Childhood
  Vocabulary
  Grammar
  Pragmatics
  Bilingual Language Learning

Learning and Schooling in Middle Childhood
  Approaches to Education
    Teacher-Centered Classroom
    Constructivist Classroom
  Reading and Mathematics Instruction
  Transition to First Grade
  Access to Digital Technology and Learning
  Giftedness
  Educating Children With Special Needs
COGNITIVE DEVELOPMENT IN MIDDLE CHILDHOOD

School-age children grasp the world around them in new, more adultlike ways and become capable of thinking logically, although their reasoning remains different from that of adults. Children become faster, more efficient thinkers, and they develop more sophisticated perspectives on the nature of knowledge and how the mind works.

Piaget's Cognitive-Developmental Theory: Concrete Operational Reasoning

When children enter Piaget's concrete operational stage of reasoning, at about age 6 or 7, they become able to use logic to solve problems but are still unable to apply logic to abstract and hypothetical situations. Older children's newly developed ability for logical thinking enables them to reason about physical quantities and is evident in their skills for conservation and classification.

Classification

What hobbies did you enjoy as a child? Did you collect and trade coins, stamps, rocks, or baseball cards? School-age children develop interests and hobbies that require advanced thinking skills, such as the ability to compare multiple items across several dimensions. Classification is the ability to understand hierarchies, to simultaneously consider relations between a general category and more specific subcategories. Several types of classification skills emerge during the concrete operational stage: transitive inference, seriation, and class inclusion.

The ability to infer the relationship between two objects by understanding each object's relationship to a third is called transitive inference. For example, present a child with three sticks: A, B, and C. She is shown that Stick A is longer than Stick B and Stick B is longer than Stick C. The concrete operational child does not need to physically compare Sticks A and C to know that Stick A is longer than Stick C. She uses the information given about the two sticks to infer their relative lengths (Wright & Smailes, 2015). Transitive inference emerges earlier than other concrete operational skills. By about 5 years of age, children are able to infer that A is longer than C (Goodwin & Johnson-Laird, 2008).

Seriation is the ability to order objects in a series according to a physical dimension such as height, weight, or color. For example, ask a child to arrange a handful of sticks in order by length, from shortest to longest. Four- to 5-year-old children can pick out the smallest and largest stick but will arrange the others haphazardly. Six- to 7-year-old children, on the other hand, arrange the sticks by picking out the smallest, and next smallest, and so on (Inhelder & Piaget, 1964).

Class inclusion involves understanding hierarchical relationships among items. For example, suppose that a child is shown a bunch of flowers, seven daisies and two roses. She is told that there are nine flowers; seven are called daisies and two are called roses. The child is then asked, “Are there more daisies or flowers?” Preoperational children will answer that there are more daisies, as they do not understand that daisies are a subclass of flowers. By age 5, children have some knowledge of classification hierarchies and may grasp that daisies are flowers but still not fully understand and apply classification hierarchies to correctly solve the problem (Deneault & Ricard, 2006). By about age 8, children not only can classify objects, in this case flowers, but they also can make quantitative judgments and respond that there are more flowers than daisies (Borst, Poirel, Pineau, Cassotti, & Houdé, 2013).

Children's ability and interest in hierarchical classification becomes apparent in middle childhood when they begin to collect items and spend hours sorting their collections along various dimensions. For example, one day Susan sorts her rock collection by geographic location (e.g., the part of the world in which it is most commonly found), with subcategories based on hardness and color. She might then reorganize her rocks based on other characteristics, such as age or composition.

Conservation

In a classic conservation problem, a child is shown two identical balls of clay and watches while the experimenter rolls one ball into a long hotdog shape. When asked which piece contains more clay, a child who reasons at the preoperational stage will say that the hotdog shape contains more clay because it is longer. Eight-year-old Julio, in contrast, notices that the ball shape is shorter than the hotdog shape, but it is also thicker. He knows that the two shapes contain the same amount of clay. At the concrete operational stage of reasoning, Julio understands that certain characteristics of an object do not change despite superficial changes to the object's appearance. An understanding of reversibility—that an object can be returned to its original state—means Julio realizes that the hotdog-shaped clay can be reformed into its original ball shape.

Most children solve this conservation problem of substance by age 7 or 8. At about age 9 or 10,
children also correctly solve conservation of weight tasks (after presenting two equal-sized balls of clay and rolling one into a hotdog shape, “Which is heavier, the hotdog or the ball?”). Conservation of volume tasks (after placing the hotdog- and ball-shaped clay in glasses of liquid: “Which displaces more liquid?”) are solved last, at about age 12. The ability to conserve develops slowly, and children show inconsistencies in their ability to solve different types of conservation problems.

Recent theorists link children’s success on conservation tasks with the development of information processing capacities, such as working memory and the ability to control impulses (Borst et al., 2013). In response to conservation of number tasks, for example, older children show more activity in parts of the temporal and prefrontal cortex as well as other parts of the brain associated with working memory, inhibitory control, and executive control (Houdé et al., 2011; Poirel et al., 2012). With practice, the cognitive abilities tested in Piagetian tasks become automatic and require less attention and fewer processing resources, enabling children to think in more complex ways (Case, 1999). For example, once a child solves a conservation task, the problem becomes routine and requires less attention and mental resources than before, enabling the child to tackle more complex problems.

Culture and Concrete Operational Reasoning

Piaget emphasized the universal nature of cognitive development, assuming that all children around the world progress through the same stages. Today’s researchers, however, find that the cultural context in which children are immersed plays a critical role in development (Goodnow, Lawrence, Goodnow, & Lawrence, 2015). Studies of children in non-Western cultures suggest that they achieve conservation and other concrete operational tasks later than children from Western cultures. However, cultural differences in children’s performance on tasks that measure concrete operational reasoning may be influenced by methodology (e.g., how questions are asked and the cultural identity of the experimenter) rather than children’s abilities (Gauvain & Perez, 2015). For instance, when 10- and 11-year-old Canadian Micmac Indian children were tested in English on conservation problems (substance, weight, and volume), they performed worse than 10- to 11-year-old White English-speaking children. But when tested in their native language, by researchers from their own culture, the children performed as well as the English-speaking children (Collette & Van der Linden, 2002).

Children around the world demonstrate concrete operational reasoning, but experience, specific cultural practices, and education play a role in how it is displayed (Manoach et al., 1997). Children are more likely to display logical reasoning when considering substances with which they are familiar. Mexican children who make pottery understand at an early age that clay remains the same when its shape is changed. They demonstrate conservation of substance earlier than other forms of conservation (Fry & Hale, 1996) and earlier than children who do not make pottery (Hitch, Tows, & Hutton, 2001; Leather & Henry, 1994).

Despite having never attended school and scoring low on measures of mathematics achievement, many 6- to 15-year-old children living in the streets of Brazil demonstrate sophisticated logical and computational reasoning. Why? These children sell items such as fruit and candy to earn their living. In addition to pricing their products, collecting money, making change, and giving discounts, the children must adjust prices daily to account for changes in demand, overhead, and the rate of inflation (Gathercole, Pickering, Ambridge, & Wearing, 2004). Researchers found that these children’s competence in mathematics was influenced by experience, situational demands, and learning from others. Nevertheless, schooling also matters; children with some schooling were more adept at these tasks than were unschooled children (Siegel, 1994).

Schooling influences the rate at which principles are understood. For example, children who have been in school longer tend to do better on transitive inference tasks than same-age children with less schooling (Artman & Cahan, 1993). Likewise, Zimbabwean children’s understanding of conservation is influenced by academic experience, age, and family socioeconomic status (Mpouf & Vijver, 2000). Japanese children’s understanding of mathematical concepts tends to follow a path consistent with Piaget’s maturational view, but other mathematical concepts are understood because of formal instruction, supportive of Vygotsky’s principle of scaffolding (see Chapter 8).
Implications of Cognitive-Developmental Theory for Education

The constructive nature of thinking, that children actively engage with their surroundings to make sense of the world, is highly relevant to education. The simplest implication for parents and teachers is to encourage curiosity (McDevitt & Ormrod, 2016). School-age children often believe that they should be mastering facts. Parents and teachers should encourage and validate children’s questions, even if ill-timed. “What a great question, Narvesha! I’ll write it on the board so that we can discuss it after this activity,” Mr. Lopes said. Older children benefit from opportunities to learn from each other, such as through group work and in free-play recess.

Like infants and young children, older children learn by exploring the physical world. Provide children with opportunities to explore and experiment with physical objects. Hands-on activities might include grouping objects with similar characteristics, working with clay, and building structures with sticks. Unlike their younger peers, school-age children engage in intellectual exploration and generate simple logical explanations for phenomena. Pose problems and probe children’s reasoning and conclusions. Sometimes children misinterpret their observations, confirming misconceptions or drawing the wrong conclusions (Fitzsimmons, Leddy, Johnson, Biggam, & Locke, 2013). By creating lessons that combine exploration and guided instruction, teachers can help children interpret their observations and draw accurate conclusions.

School-age children’s emerging capacities for reasoning influence their understanding of a variety of phenomena, including their conceptions of illness (Brodie, 1974). We explore this concept more in the accompanying Lives in Context feature.

Information Processing Theory

“If you’re finished, put your head down on your desk and rest for a moment,” Mrs. McCalvert advised. She was surprised to see that three-quarters of her students immediately put their heads down. “They are getting quicker and quicker,” she thought to herself. Information processing theorists would agree with Mrs. McCalvert’s observation, because the information processing perspective describes development as entailing changes in the efficiency of cognition rather than qualitative changes in reasoning. School-age children can take in more information, process it more accurately and quickly, and retain it more effectively than younger children. They are better able to determine what information is important, attend to it, and use their understanding of how memory works to choose among strategies to retain information more effectively.

Working Memory and Executive Function

Children’s working memory expands rapidly but is more limited than that of adults. By 8 years of age, children on average recall about half as many items as adults (Kharitonova, Winter, & Sheridan, 2015). Steady increases in working memory and executive function continue throughout childhood and are responsible for the cognitive changes seen during childhood. Advanced executive function capacities enable older children to control their attention and deploy it selectively, focusing on the relevant information and ignoring other information, compared with younger children, who are easily distracted and fidget (Ristic & Enns, 2015a). Children not only get better at attending to and manipulating information, but they get better at storing it in long-term memory, organizing it in more sophisticated ways, and encoding and retrieving it more efficiently and with less effort.

Improvements in memory, attention, and processing speed are possible because of brain development, particularly myelination and pruning in the prefrontal cortex and corpus callosum (Crone & Steinbeis, 2017; Perone, Almy, & Zelazo, 2016). Between ages 3 and 7, children show increasing prefrontal cortex engagement while completing tasks that measure working memory (Perlman, Huppert, & Luna, 2016). Neural systems for visuospatial working memory, auditory working memory, and response inhibition differentiate into separate parts to enable faster and more efficient processing of these critical cognitive functions (Crone & Steinbeis, 2017; Tsujimoto, Kuwajima, & Sawaguchi, 2007). Older children are quicker at matching pictures and recalling spatial information than younger children, and they show more activity in the frontal regions of the brain compared with younger children (Farber & Betelova, 2011). Development of the prefrontal cortex leads to advances in response inhibition, the ability to withhold a behavioral response inappropriate in the current context. These advances improve children’s capacity for self-regulation, controlling their thoughts and behavior. Advances in working memory and executive function are associated with language, reading, writing, and mathematics skills (Berninger, Abbott, Cook, & Nagy, 2017; Peng et al., 2018).

Age changes in performance on working memory tasks are also influenced by context. For example, the amount of schooling is a better predictor of working memory in Australian schoolchildren than chronological age (Roberts et al., 2015). High-quality relations with teachers are associated...
Children’s Understanding of Illness

Cognitive development influences how children understand biology, their bodies, and the causes of illness. For example, young children tend to attribute contagious illnesses such as colds, coughs, and stomachaches to immanent justice—the belief that illness is caused by misdeeds and naughtiness (Myant & Williams, 2005). Other nonbiological explanations (e.g., magic or fate) are also common. As children advance in cognitive maturity, they develop more mature conceptions of illness, distinguish specific symptoms and diseases, and appreciate the biological causes of illness and contagiousness (Mouratidi, Bonoti, & Leondari, 2016).

Beliefs about biology and the causes of illness may vary by cultural setting. Research has suggested that nonbiological explanations of illness are common in adults from non-Western societies. For example, Murdock (1980) examined evidence from 139 nonindustrial societies around the world and found that most emphasized nonbiological causes of illness. Among the Zande of southern Sudan, for example, illness is thought to be caused by jealous or angry neighbors practicing witchcraft (Allen, 2007).

Cultural differences in beliefs about the causes of illness may arise from exposure to different explanations for illness. For example, most children in the United States are exposed to a germ and infection model of illness. Young children show a simple understanding of germs, and older children develop a more elaborate understanding. Children growing up in China have traditionally been exposed to Chinese medicine, which concerns the balance of yin and yang; breaking the balance is thought to lead to illness. In recent decades, however, Chinese children have been increasingly exposed to Western medicine. With age and the cognitive development that accompanies it, Chinese children tend to integrate these two perspectives, emphasizing biological causes but also referring to concepts from traditional Chinese medicine (Zhu, Liu, & Tardif, 2009).

When exposed to biological concepts of illness, children of all cultures tend to incorporate them into their understanding. For example, one study of 5- to 15-year-old children and adults from Sesotho-speaking South African communities showed that the participants, who were exposed to Western medicine, most commonly endorsed biological explanations for illness but also often endorsed witchcraft (Legare & Gelman, 2008). Both natural and supernatural explanations were viewed as complementary. Likewise, comparisons of older children, adolescents, and adults from Tanna and Vanuatu, remote islands off the coast of Malaysia, find that as individuals are confronted with scientific understandings of the world, they integrate scientific explanations with preexisting supernatural and other kinds of natural (e.g., folk-biological) explanations (Watson-Jones, Busch, & Legare, 2015). Tanna and Vanuatu children endorsed biological just as frequently as supernatural explanations, but adolescents and adults most commonly endorsed biological explanations.

With age and across cultural groups, when individuals are exposed to biological explanations of illness, such explanations tend to be most frequently endorsed (Legare, Evans, Rosengren, & Harris, 2012). Moreover, the coexistence of biological and nonbiological reasoning about causes of illness is not confined to specific cultures. For example, in the United States and other industrialized societies, many alternative medicine practitioners attribute illness to negative thinking and other psychological problems. U.S. children and adults tend to retain some supernatural explanations alongside biological explanations (Legare et al., 2012). Among people in all cultures, diverse, culturally constructed belief systems about illness coexist with factual understanding, and explanations of illness change with development.

What Do You Think?

1. How does our knowledge of individuals’ understanding of illness compare with Piaget’s cognitive-developmental theory?

2. Consider your own views and experience. Do you remember “catching a cold” when you were a child? What did that mean to you?
with higher scores on working memory tasks during elementary school (de Wilde, Koot, & van Lier, 2016).

Metacognition and Metamemory

Whereas young children tend to see the mind as a static container for information, older children view the mind in more sophisticated terms, as an active manipulator of information. Development of the prefrontal cortex influences children’s growing capacities for metacognition. Children become mindful of their thinking and better able to consider the requirements of a task, determine how to tackle it, and monitor, evaluate, and adjust their activity to complete the task (Ardila, 2013).

Metamemory, an aspect of metacognition, includes the understanding of one’s memory and the ability to use strategies to enhance it. Metamemory improves steadily throughout the elementary school years and contributes to advances in memory (Cottini, Basso, & Palladino, 2018; Schneider & Ornstein, 2015). Kindergarten and first-grade children understand that forgetting occurs with time and studying improves memory, but not until they are age 8 or 9 can children accurately evaluate their knowledge and apply it to learn more effectively. Older children perform better on cognitive tasks because they can evaluate the task; determine how to approach it given their cognitive resources, attention span, motivation, and knowledge; and choose and monitor the use of memory strategies that will permit them to successfully store and retrieve needed information (Schneider & Pressley, 2013). These abilities improve with neural maturation and experience.

Memory Strategies

Advances in executive function, working memory, and attention enable children to use memory strategies—cognitive activities (“tricks”) that make them more likely to remember (Coughlin, Leckey, & Ghatti, 2018). Common memory strategies include rehearsal, organization, and elaboration. Rehearsal refers to systematically repeating information in order to retain it in working memory. A child may say a phone number over and over so that he does not forget it before writing it down. Children do not spontaneously and reliably apply rehearsal until after the first grade (Miller, McCulloch, & Jarrold, 2015; Morey, Mareva, Lelonkiewicz, & Chevalier, 2018). Shortly after rehearsal appears, children start to use organization, categorizing or chunking items to remember by grouping them by theme or type, such as animals, flowers, and furniture. When memorizing a list of words, a child might organize them into meaningful groups, or chunks—foods, animals, objects, and so forth. Growth in working memory is partially attributed to an increase in the number of chunks children can retain with age (Cowan et al., 2010). A third strategy, elaboration, entails creating an imagined scene or story to link the material to be remembered. To remember to buy bread, milk, and butter, for example, a child might imagine a slice of buttered bread balancing on a glass of milk. It is not until the later school years that children use elaboration without prompting and apply it to a variety of tasks (Schneider & Ornstein, 2015). As metacognition and metamemory skills, and the executive function that underlies these abilities, improve, children get better at choosing, using, and combining memory strategies, and their recall improves dramatically (Stone et al., 2016). For example, fifth-grade students who use more complex memory strategies are more successful in delayed recall tasks in which they are asked to read a passage and then recall it after a delay (Jönsson, Wiklund-Hörnqvist, Nyroos, & Börjesson, 2014).

Context and Cognition

As children go about their daily lives, they acquire increasing amounts of information, which they naturally organize in meaningful ways. As children learn more about a topic, their knowledge structures become more elaborate and organized, while the information becomes more familiar and meaningful. It is easier to recall new information about topics with which we are already familiar, and existing knowledge about a topic makes it easier to learn more about that topic (Ericsson & Moxley, 2013). During middle childhood, children develop vast knowledge bases and organize information into elaborate hierarchical networks that enable them to apply strategies in more complex ways and remember more material than ever before—and more easily than ever before. For example, fourth-grade students who are experts at soccer show better recall of a list of soccer-related items than do students who are soccer novices, although the groups of children do not differ on the non-soccer-related items (Schneider & Bjorklund, 1992). The soccer experts tend to organize the lists of soccer items into categories; their knowledge helps them to organize the soccer-related information with little effort, using fewer resources on organization and permitting the use of more working memory for problem solving and reasoning. Novices, in contrast, lack a knowledge base to aid their attempts at organization. Children’s experiences, then, influence their memory, thinking, and reasoning.

The strategies that children use to tackle cognitive tasks vary with culture. In fact, daily tasks themselves vary with our cultural context. Children in Western cultures receive lots of experience with tasks that require them to recall bits of information, leading them to develop considerable expertise
in the use of memory strategies such as rehearsal, organization, and elaboration. In contrast, research shows that people in non-Western cultures with no formal schooling do not use or benefit from instruction in memory strategies such as rehearsal (Rogoff & Chavajay, 1995). Instead, they refine memory skills that are adaptive to their way of life. For example, they may rely on spatial cues for memory, such as when recalling items within a three-dimensional miniature scene. Australian aboriginal and Guatemalan Mayan children perform better at these tasks than do children from Western cultures (Rogoff & Waddell, 1982). Culture and contextual demands influence the cognitive strategies that we learn and prefer, as well as how we use our information processing system to gather, manipulate, and store knowledge. Children of all cultures amass a great deal of information, and as they get older, they organize it in more sophisticated ways and encode and retrieve it more efficiently and with less effort.

Implications for Education

Children's capacities for executive function hold important implications for education. Parents and teachers can help children learn about the mind and how memory works. They can teach memory strategies, and especially the role of elaboration in learning. We learn more efficiently when we relate new material to what we already know. Parents and teachers can help children relate what they are learning to existing knowledge. They can point out connections, such as that subtraction is the reverse of addition.

Although school-age children's attention and working memory improve, their thinking remains limited as compared with adults. Children can only process a small amount of information at once, so parents and teachers should pace their presentation of new information. Give children time to process information and reduce the working memory demands of tasks by using scaffolds such as presenting complex instructions on the board or asking children to write them down (McDevitt & Ormrod, 2016). Practice in basic skills, such as multiplication table drills, can help children memorize them and free cognitive resources so that they can solve more complex problems.

THINKING IN CONTEXT 11.1

1. In what ways might children's increasing ability to apply logic influence their social relationships and their interactions with others?

2. How do children's surroundings influence their thinking? How might your surroundings—culture, neighborhood, media, home, school, and peers—have influenced specific aspects of your thinking, such as what strategies you use and your capacities for metacognition? Provide examples of how your context has influenced your cognitive development.

3. Imagine that you are an elementary school teacher. How would cognitive-developmental and information processing theories influence your teaching? What parts of each theory do you think are most useful for helping children learn in a classroom setting?

INTELLIGENCE

At its simplest, intelligence refers to an individual's ability to adapt to the world in which he or she lives (Sternberg, 2014a). Individuals differ in intelligence, an example of the lifespan concept of individual differences. There are many ways of defining and measuring intelligence. Intelligence is most commonly assessed through the use of intelligence tests (IQ tests), which measure intellectual aptitude, an individual's capacity to learn.

Intelligence Tests

Individually administered intelligence tests are conducted in a one-on-one setting by professionally trained examiners. The most widely used, individually administered measures of intelligence today are a set of tests constructed by David Wechsler, who viewed intelligence as "the global capacity of a person to act purposefully, to think rationally, and to deal effectively with his environment" (Wechsler, 1944, p. 3). The Wechsler Intelligence Scale for Children (WISC-V), appropriate for children aged 6 through 16, is the most widely used individually administered intelligence test for children. In addition to the WISC, there are Wechsler tests for preschoolers.
IQ scores are a strong predictor of academic achievement. Children with high IQs tend to earn higher-than-average grades at school and are more likely to stay in school (Mackintosh, 2011). School, in turn, provides children with exposure to information and ways of thinking that are valued by the majority culture and reflected in IQ tests. Same-age children with more years of schooling tend to have higher IQs than their less educated peers (Cliffordson & Gustafsson, 2008), and correlations between IQ and school achievement tests tend to increase with age (Sternberg, Grigorenko, & Bundy, 2001), suggesting that schooling is also an influence on IQ.

Individual and Group Differences in IQ

A consistent and controversial finding in the intelligence literature is that African American children as a group tend to score 10 to 15 points below non-Hispanic White Americans on standardized IQ tests (Rindermann & Thompson, 2013). The IQ scores of Hispanic children as a group tend to fall between those of children of African American and non-Hispanic White descent, and the scores of Asian American children tend to fall at the same level or slightly higher than those of non-Hispanic White children (Neisser et al., 1996; Nisbett et al., 2013). It is important to remember, however, that emphasizing differences between groups overlooks important facts. For one thing, individuals of all races and ethnicities show a wide range of functioning, from severely disabled to exceptionally gifted. In addition, the IQ scores of children of all races and ethnicities overlap. For example, at least 20% of African American children score higher on IQ than all other children, whether African American or non-Hispanic White (Rindermann & Thompson, 2013). Because there are more differences among African American
children and among non-Hispanic White children than between the two groups, many researchers conclude that group comparisons are meaningless (Daley & Onwuegbuzie, 2011).

**Contextual Influences on IQ**

Like all facets of development, intelligence is influenced by dynamic interactions among genetic or biological factors and context. Heredity is thought to play a role in intelligence, but to date, researchers have not identified any specific genes that are responsible for IQ (Franić et al., 2015). Genes likely do not act independently but instead in conjunction with the environment (Dubois et al., 2012; Plomin et al., 2016). Perhaps most telling is that the heritability of IQ tends to vary with context. Genes appear to play a large role in determining IQ scores of children from high SES homes but play less of a role in determining IQ scores for children in low SES homes (Nisbett et al., 2013). Because high SES homes tend to provide consistent support, such as cognitive stimulation, to help children achieve their genetic potential, differences in IQ among children reared in high SES homes are more likely due to genetics. Children from impoverished homes, however, often lack consistent access to the basic support needed for intellectual development, such as nutrition, health care, and stimulating environments and activities. In these cases, IQ scores are often heavily influenced by the context and opportunities that children have experienced (Nisbett et al., 2013). African American children are disproportionately likely to live in poverty, and impoverished children’s IQ scores tend to be more influenced by the disadvantaged contexts in which they are immersed than by the genes with which they are born. Likewise, children who are adopted from low SES homes into higher SES homes typically score 12 points higher on IQ tests than siblings who are raised by birth parents or adopted into lower SES homes (Duyme, Dumaret, & Tomkiewicz, 1999).

Socioeconomic status contributes to IQ through differences in culture, nutrition, living conditions, school resources, intellectual stimulation, and life circumstances such as the experience of discrimination. Any or all of these factors can influence cognitive and psychosocial factors related to IQ, such as motivation, self-concept, and academic achievement (Plomin & Deary, 2015). Education plays a particularly important role in IQ. As noted earlier, school provides children with exposure to information and ways of thinking that are valued by the majority culture and reflected in IQ tests. IQ rises with each year spent in school, improves during the school year—which generally runs from September to May in the United States—and drops over the summer vacation (Huttenlocher, Levine, & Vevea, 1998). The seasonal drop in IQ scores each summer is larger for children from low SES homes (Nisbett et al., 2013).

Some experts argue that IQ tests tap the thinking style and language of the majority culture (Heath, 1989; Helms, 1992). Language difficulties also may explain some group differences. For example, Latino and Native American children tend to do better on nonverbal tasks than ones that require the use of language (Neisser et al., 1996). However, even nonverbal sorting tasks can be influenced by culture. When presented with a series of cards depicting objects and activities and told to sort the cards into meaningful categories, children from Western cultures tend to sort the cards by category, putting bird and dog in the same category of animal. Children of the Kpelle tribe in Nigeria instead sort the cards by function, placing bird with fly, for example, because birds fly (Sternberg, 1985). Learning experiences and opportunities influence children’s scores on nonverbal tasks. For example, performance on spatial reasoning tasks is associated with experience with spatially oriented video games (Subrahmanyan & Greenfield, 1996).

Finally, sociohistorical context influences intelligence. Since the 1930s, some researchers have noted that intelligence scores increase with each generation (Lynn, 2013). Over the past 60 years, intelligence scores have increased by about 9 points for measures of general knowledge and 15 points for nonverbal measures of fluid reasoning with each generation (Flynn, 1987, 1998). Referred to as the Flynn effect, this generational increase in IQ is thought to be a function of contextual factors—specifically, changes in education and environmental stimulation that improve children’s reasoning and problem-solving skills (Flynn & Weiss, 2007). Each generation of children is exposed to more information and ideas than the generation before, and this exposure likely influences thinking itself (te Nijenhuis, 2013).

**Alternative Views of Intelligence**

Arguments about the cultural bias of IQ tests have led some researchers to reconsider what it means to be intelligent. Howard Gardner and Robert Sternberg propose that intelligence entails more than academics. Their theories link intelligence to everyday problems and situations.

**Multiple Intelligences**

A skilled dancer, a champion athlete, an award-winning musician, and an excellent communicator all have talents that are not measured by traditional IQ tests. According to Howard Gardner (2017), intelligence is the ability to solve problems or create
culturally valued products. Specifically, Gardner’s multiple intelligence theory proposes at least eight independent kinds of intelligence, shown in Table 11.2. Multiple intelligence theory expands the use of the term intelligence to refer to skills not usually considered intelligence by experts and has led to a great deal of debate among intelligence theorists and researchers (Kaufman, Kaufman, & Plucker, 2013).

According to multiple intelligence theory, each person has a unique pattern of intellectual strengths and weaknesses. A person may be gifted in dance (bodily-kinesthetic intelligence), communication (verbal-linguistic intelligence), or music (musical intelligence), yet score low on traditional measures of IQ. Each form of intelligence is thought to be biologically based, and each develops on a different timetable (Gardner, 2017). Assessing multiple intelligences requires observing the products of each form of intelligence (e.g., how well a child can learn a tune, navigate an unfamiliar area, or learn dance steps), which at best is a lengthy proposition and at worst is nearly impossible (Barnett, Ceci, & Williams, 2006). However, through extended observations, an examiner can identify patterns of strengths and weaknesses in individuals and help them understand and achieve their potential (Gardner, 2016).

The theory of multiple intelligences is an optimistic perspective that allows everyone to be intelligent in his or her own way, viewing intelligence as broader than book-learning and academic skills. If intelligence is multidimensional, as Gardner suggests, perhaps school curricula should target the many forms that intelligence may take and help students to develop a range of talents (Gardner, 2013). Although the theory of multiple intelligences has been criticized as not being grounded in research (Waterhouse, 2006), neuroscientists have noted that each type of intelligence corresponds to specific neurological processes (Shearer & Karanian, 2017). The theory of multiple intelligences draws attention to the fact that IQ tests measure a specific set of mental abilities and ignore others.

**Triarchic Theory of Intelligence**

Jason Bourne, hero of the popular spy-action novel and movie series *The Bourne Trilogy*, is highly adaptive. He can quickly gather information, such as a villain’s plot, process it, and devise a plan. He adapts his plan on the fly as the situation changes and thinks creatively in order to escape seemingly impossible situations—traps, car chases, and other dangerous scenarios. Certainly Jason Bourne is a fictional character, but he illustrates another view of intelligence, articulated by Robert Sternberg. According to Sternberg (1985), intelligence is a set of mental abilities that permit individuals to adapt to any context and to select and modify the sociocultural contexts in which they live and behave. Sternberg’s triarchic theory of intelligence poses three interacting forms of intelligence.

---

**TABLE 11.2**

**Multiple Intelligences**

<table>
<thead>
<tr>
<th>INTELLIGENCE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal-linguistic intelligence</td>
<td>Ability to understand and use the meanings and subtleties of words (“word smarts”).</td>
</tr>
<tr>
<td>Logical-mathematical intelligence</td>
<td>Ability to manipulate logic and numbers to solve problems (“number smarts”).</td>
</tr>
<tr>
<td>Spatial intelligence</td>
<td>Ability to perceive the visual-spatial world accurately, navigate an environment, and judge spatial relationships (“spatial smarts”).</td>
</tr>
<tr>
<td>Bodily-kinesthetic intelligence</td>
<td>Ability to move the body skillfully (“body smarts”).</td>
</tr>
<tr>
<td>Musical intelligence</td>
<td>Ability to perceive and create patterns of pitch and melody (“music smarts”).</td>
</tr>
<tr>
<td>Interpersonal intelligence</td>
<td>Ability to understand and communicate with others (“people smarts”).</td>
</tr>
<tr>
<td>Intrapersonal intelligence</td>
<td>Ability to understand the self and regulate emotions (“self-smarts”).</td>
</tr>
<tr>
<td>Naturalist intelligence</td>
<td>Ability to distinguish and classify elements of nature: animals, minerals, and plants (“nature smarts”).</td>
</tr>
</tbody>
</table>

**Source:** Gardner (2017).
triarchic theory of intelligence—analytic, creative, and applied (Sternberg, 2011) (see Figure 11.1). Individuals may have strengths in any or all of them.

Analytical intelligence refers to information processing capacities, such as how efficiently people acquire knowledge, process information, engage in metacognition, and generate and apply strategies to solve problems—much like Bourne’s ability to process information quickly and consider different solutions. Creative intelligence taps insight and the ability to deal with novelty. People who are high in creative intelligence, like Bourne, respond to new tasks quickly and efficiently. They learn easily, compare information with what is already known, come up with new ways of organizing information, and display original thinking. Applied intelligence influences how people deal with their surroundings: how well they evaluate their environment, select and modifying it, and adapting it to fit their own needs and external demands—similar to Bourne’s ability to modify his plans on the fly, using whatever resources are available. Intelligent people apply their analytical, creative, and applied abilities to suit the setting and problems at hand (Sternberg, 2011). Some situations require careful analysis, others the ability to think creatively, and yet others the ability to solve problems quickly in everyday settings. Many situations tap more than one form of intelligence.

Traditional IQ tests measure analytical ability, which is thought to be associated with school success. However, IQ tests do not measure creative and practical intelligence, which predict success outside of school. Some people are successful in everyday settings but less so in school settings and therefore may obtain low scores on traditional IQ tests despite being successful in their careers and personal lives. In this way, traditional IQ tests can underestimate the intellectual strengths of some children.

Cultures vary in the specific skills thought to constitute intelligence, but the three mental abilities that underlie intelligent behavior—analytic, creative, and applied intelligence—are recognized across cultures. Still, the relative importance ascribed to each may differ (Sternberg & Grigorenko, 2008). In Western cultures, the intelligent person is one who invests a great deal of effort into learning, enjoys it, and enthusiastically seeks opportunities for lifelong learning. In contrast, other cultures emphasize applied intelligence. For example, the Chinese Taoist tradition emphasizes the importance of humility, freedom from conventional standards of judgment, and awareness of the self and the outside world (Yang & Sternberg, 1997). In many African cultures, conceptions of intelligence revolve around the skills that maintain harmonious interpersonal relations (Ruzgis & Grigorenko, 1994). Chewa adults in Zambia emphasize social responsibilities, cooperativeness, obedience, and respectfulness as being important to intelligence. Likewise, Kenyan parents emphasize responsible participation in family and social life (Serpell, 1974; Serpell & Jere-Folotiya, 2008; Super & Harkness, 1982).

Views of intelligence even vary within a given context (Sternberg, 2014b). For example, when parents were asked of the characteristics of an intelligent child in the first grade of elementary school, White American parents emphasized cognitive capacities. Parents who were immigrants from Cambodia, the Philippines, Vietnam, and Mexico, on the other hand, pointed to motivation, self-management, and social skills (Okagaki & Sternberg, 1993), suggesting that characteristics valued as intelligent vary across cultures and that children within the same context may be immersed in different cultures (Sternberg, 2014). Once again, we see the complexity of context and culture as influences on development.

THINKING IN CONTEXT 11.2

1. To what extent do you think the WISC-V subscales match the content taught in elementary school classes? What kinds of experiences might help children improve their verbal comprehension skills? How about spatial reasoning, fluid reasoning, working memory, and processing speed? Are some abilities more easily modified than others? In your view, do schools offer opportunities for children to modify the abilities assessed by the WISC-V?

2. Compare and contrast the multiple intelligence and triarchic perspectives on intelligence. What is the role of context in each theory? In your view, which theory most effectively integrates biological and contextual influences on intelligence?
MORAL REASONING IN MIDDLE CHILDHOOD

The development of moral reasoning is influenced by childhood advances in cognitive development, social experience, and opportunities to consider issues of fairness. Specifically, children's reasoning about justice changes in middle childhood.

Moral Reasoning: Piaget's Theory

As elementary school children spend more time with peers and become better at taking their friends' perspectives, their understanding of rules becomes more flexible. Recall from Chapter 8 that according to Piaget (1932), young children view rules rigidly. Piaget referred to this stage as heteronomous morality. In middle childhood, at about age 7, children enter the second stage of Piaget's scheme, autonomous morality (also known as the morality of cooperation). Now children begin to see rules as products of group agreement and tools to improve cooperation. For example, older children are likely to recognize that the teacher's rule that the youngest children must be the first to bat at the piñata at a children's party is a way to help the youngest children, who are less likely to be successful. Some children might agree that the rule promotes fairness, while others might argue to abandon the rule as it gives younger children an unfair advantage. At this stage, children view a need for agreement on rules and consequences for violations. Piaget's theory of moral reasoning inspired Lawrence Kohlberg, who created perhaps the most well-known theory of moral reasoning.

Children's Conceptions of Justice: Kohlberg's Cognitive-Developmental Theory

Kohlberg (1976) proposed that moral reasoning reflects cognitive development and is organized into stages and levels. Each level of moral reasoning is composed of two stages. Beginning in early childhood and persisting until about age 9, children demonstrate what Kohlberg called preconventional reasoning. Similar to Piaget, Kohlberg argued that young children's behavior is governed by self-interest, the desire to gain rewards and avoid punishments (“Don't steal because you don't want to go to jail!”). Moral behavior is a response to external pressure, and children's reasoning illustrates their difficulty in taking another person's perspective. Instead, young children's moral reasoning is motivated by their desires. The preconventional level comprises two stages, in which children move from avoiding punishment as a motivator of moral judgments (Stage 1) to self-interest, rewards, and concern about what others can do for them (Stage 2).

At about age 9 or 10, children transition to the second level of Kohlberg's scheme, conventional moral reasoning. Children are now able to take others' perspectives and are motivated by reciprocity, seeking to be accepted and avoid disapproval. Rules maintain relationships. At Stage 3, children uphold rules in order to please others, gain affection, and be a good person—honest, caring, and nice. The Golden Rule motivates their behavior: “Do unto others as you would have them do unto you.” At Stage 4, which emerges in adolescence, perspective taking expands beyond individuals to include society's rules. Adolescents accept rules as a tool to maintain social order and believe that everyone has a duty to uphold the rules. Reasoning is no longer influenced by relationships and a desire to be a good person. Instead, rules are universal and must be enforced for everyone. Many people demonstrate conventional reasoning throughout their lives. Not everyone develops the third and final level of reasoning, postconventional reasoning, discussed in Chapter 14. Preconventional and conventional moral reasoning are compared in Table 11.3.

Moral development is influenced by how parents and caregivers discuss moral issues, such as those involving telling the truth, harming others, and respecting property rights (Malti & Latzko, 2010). Reasoning advances when children have opportunities to engage in discussions that are characterized by mutual perspective taking and opportunities to discuss different points of view. When children encounter reasoning that is slightly more advanced than their own, they may be prompted to reconsider their own thinking and advance their reasoning. Parents who are warm and engage their children in discussion, listen with sensitivity, and use humor promote the development of moral reasoning (Carlo, Mestre, Samper, Tur, & Armenta, 2011; Killen & Smetana, 2015).

Distributive Justice Reasoning

Every day, children are confronted with moral issues of distributive justice—how to divide goods fairly (Damon, 1977, 1988). For example, how should a candy bar be divided among three siblings? Does age matter? Height? Hunger? How much the child likes chocolate?

As with moral reasoning, children progress from self-serving reasons for sharing, expressed
TABLE 11.3

Moral Development in Middle Childhood: Comparison of Piaget’s and Kohlberg’s Theories

<table>
<thead>
<tr>
<th>PIAGET’S STAGES</th>
<th>KOHLBERG’S LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1: MORALITY OF CONSTRAINT</td>
<td>LEVEL 1: PRECONVENTIONAL MORAL REASONING</td>
</tr>
<tr>
<td>Preoperational</td>
<td>Individualistic. Children cannot take</td>
</tr>
<tr>
<td></td>
<td>the perspective of others; they assume</td>
</tr>
<tr>
<td></td>
<td>that everyone sees the world as they do.</td>
</tr>
<tr>
<td>STAGE 2: MORALITY OF COOPERATION</td>
<td>Multiple. Children can take the</td>
</tr>
<tr>
<td></td>
<td>perspective of others; they see that</td>
</tr>
<tr>
<td></td>
<td>more than one point of view is possible</td>
</tr>
<tr>
<td></td>
<td>and that others do not necessarily view</td>
</tr>
<tr>
<td></td>
<td>issues as they do.</td>
</tr>
<tr>
<td>LEVEL 2: CONVENTIONAL MORAL REASONING</td>
<td>Individualistic. Children cannot take</td>
</tr>
<tr>
<td></td>
<td>the perspective of others; they focus on</td>
</tr>
<tr>
<td></td>
<td>their own needs.</td>
</tr>
<tr>
<td></td>
<td>Community. Children take the perspective</td>
</tr>
<tr>
<td></td>
<td>of the community at large; there is</td>
</tr>
<tr>
<td></td>
<td>an emphasis on societal rules and</td>
</tr>
<tr>
<td></td>
<td>welfare.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive-developmental stage</th>
<th>Preoperational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete operational</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Preoperational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete operational</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>View of justice</th>
<th>Preoperational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete operational</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Understanding of rules</th>
<th>Preoperational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete operational</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason for compliance with rules</th>
<th>Preoperational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete operational</td>
</tr>
</tbody>
</table>

| Source: Adapted from Hoffman (1970), Kohlberg (1981), and Piaget (1932). |

In early childhood (e.g., “I get more candy because I want it” or “I share candy so that Mikey will play with me”), to more sophisticated and mature conceptions of distributive justice in middle childhood (Damon, 1977). At about 7 years of age, children take merit into account and believe that extra candy should go to the child who has excelled or worked especially hard. At around 8 years of age, children can act on the basis of benevolence, believing that others at a disadvantage should get special consideration. For example, extra candy should go to the child who does not get picked to play on a sports team or a child who is excluded from an activity. Between ages 8 and 10, children come to understand that people can have different yet equally valid reasons for claiming a reward. They begin to reflect on the need to balance competing claims, such as those of merit and need (Smith & Warneken, 2016). Older children also tend to differentiate among their relationships, which may influence their judgments. For example, older children often see relationships with acquaintances as relationships of mutual exchange (e.g., you scratch my back and I’ll scratch yours), whereas relationships with their best friends might be seen as communal and reciprocal; decisions may be guided by concern for the other and a desire to maintain the relationship (Frederickson & Simmonds, 2008). Preadolescents and young adolescents try to coordinate claims of merit, need,
and equality and provide increasingly sophisticated answers that often cannot be expressed in a single sentence (Damon, 1980).

Culture subtly influences children’s ideas about distributive justice. Research with young children from rural and urban areas of China, Peru, Fiji, the United States, Brazil, and Tibet showed a similar pattern of development from self-interest to increasing fairness (Robbins, Starr, & Rochat, 2016; Rochat et al., 2009). Cultures varied in the magnitude of young children’s self-interest. Children reared in small-scale urban and traditional societies thought to promote more collective values showed less self-interest and more fairness. When Filipino and American fifth graders were presented with hypothetical scenarios that required that they distribute resources, both the Filipino and American children preferred equal division of the resources regardless of merit or need, but the children offered different explanations of their choices that are based in differences in Filipino and U.S. culture (Carson & Banuazizi, 2008). U.S. children emphasized that the characters in the scenario performed equally and therefore deserved equal amounts of the resources, reflecting U.S. culture’s emphasis on individuality and merit. Filipino children, on the other hand, tended to be more concerned with the interpersonal and emotional consequences of an unequal distribution, in line with their culture’s emphasis on the collective and the importance of interpersonal relationships (Carson & Banuazizi, 2008).

**Distinguishing Moral and Conventional Rules**

Like younger children, school-age children distinguish between moral and conventional rules, judging moral imperatives as more absolute than conventional rules (see Chapter 8) (Turiel & Nucci, 2017). Moral rules are seen as less violable, less contingent on authority, and less alterable than social conventions (Smetana, Jambon, & Ball, 2013). Children anticipate feeling positive emotions after following moral imperatives and are likely to label violations of moral imperatives as disgusting (Danovitch & Bloom, 2009). With advances in cognitive development, children can consider multiple perspectives and become better able to consider the situation and weigh a variety of variables in making decisions. They discriminate social conventions that have a purpose from those with no obvious purpose. Social conventions that serve a purpose, such as preventing injuries (e.g., not running indoors), are evaluated as more important and more similar to moral issues than social conventions with no obvious purpose (e.g., avoiding a section of the school yard despite no apparent danger) (Smetana et al., 2015). School-age children also consider intent and context. For example, Canadian 8- to 10-year-old children understood that a flag serves as a powerful symbol of a country and its values—and that burning it purposefully is worse than accidentally burning it. The 10-year-old children also understood that flag burning is an example of freedom of expression and can be used to express disapproval of a country or its activities. They agreed that if a person were in a country that is unjust, burning its flag would be acceptable (Helwig & Prencipe, 1999).

School-age children also distinguish among moral issues. For example, elementary school children judged bullying as wrong independent of rules and more wrong than other moral issues, such as lapses in truth-telling—and both were judged more wrong than etiquette transgressions (Thornberg, Thornberg, Alamaa, & Daud, 2016). School-age children become increasingly able to demonstrate nuanced judgments in response to complex moral dilemmas. For example, 5- to 11-year-old children become increasingly tolerant of necessary harm—that is, violating moral rules in order to prevent injury to others (Jambon & Smetana, 2014).

Children develop and hone their understanding of morality through social interaction, at home, at school, and with peers. Children regularly encounter moral and conventional issues, such as lying to a friend, not completing homework, or violating a household rule. Everyday social interactions can advance moral reasoning. When children engage in issue-focused discussions involving reasoning that is slightly more advanced than their own, it may prompt them to reconsider their own thinking. As a result, they often internalize the new reasoning, advancing their moral thinking to a new level.

As children grow older, they are more likely to view relational aggression as morally wrong and comparable to physical aggression. ©iStockphoto.com/LSOphoto
School-age children expand their vocabulary and develop a more complex understanding of grammar, rules that permit combining words to express ideas and feelings. Children’s understanding of pragmatics, how language is used in everyday contexts, grows and becomes more sophisticated during middle childhood.

**Vocabulary**

School-age children’s increases in vocabulary are not as noticeable to parents as the changes that occurred in infancy and early childhood. Nevertheless, 6-year-old children’s vocabularies expand by four times by the end of the elementary school years and six times by the end of formal schooling (Clark, 2017).

Children learn that many words can describe a given action, but the words often differ slightly in meaning (e.g., walk, stride, hike, march, tread, strut, and meander) (Hoff, 2014). They become more selective in their use of words, choosing the right word to meet their needs. As their vocabularies grow, children learn that some words can have more than one meaning, such as run (“The jogger runs down the street,” “The clock runs fast,” etc.). They begin to appreciate that some words have psychological meanings as well as physical ones (e.g., a person can be smooth and a surface can be smooth). This understanding that words can be used in more than one way leads 8- to 10-year-old children to understand similes and metaphors (e.g., a person can be described as “cold as ice” or “sharp as a tack”) (Katz, 2017).

**Grammar**

Older children become increasingly aware of and knowledgeable about the nature and qualities of language, known as metalinguistic awareness (Simard & Gutiérrez, 2018). Language arts classes in elementary school teach children about the parts of language and the syntax of sentences, aiding children as they further develop their ability to think about their use of language. By 8 years of age, children can analyze the grammatical acceptability of their utterances and spontaneously self-correct many of their errors (Hanley, Cortis, Budd, & Nozari, 2016).

In middle childhood, schoolchildren become better able to understand complex grammatical structures. They begin to use the passive voice (“The dog is being fed”), complex constructions such as the use of the auxiliary “have” (“I have already fed the dog”), and conditional sentences (“If I had been home earlier, I would have fed the dog”) (Clark, 2017). Despite these advances, school-age children often have difficulty understanding spoken sentences when the meaning depends on subtle shifts in intonation (Turnbull & Justice, 2016). An example
can be found in the sentence, “John gave a lollipop to David, and he gave one to Bob.” With the emphasis placed on “and,” the sentence can be taken to mean that John gave a lollipop to both David and Bob, whereas if the emphasis is on “he,” the sentence can be assumed to mean that John gave a lollipop to David, and David gave a lollipop to Bob.

Experience with language and exposure to complex constructions influence grammatical development. For example, most English-speaking children find passive-voice sentences (such as “The boy was struck by the car”) difficult to understand and therefore master passive-voice sentences later than other structures (Armon-Lotem et al., 2016). In contrast, the Inuit children of Arctic Canada hear and speak the Inuktitut language, which emphasizes full passives; they produce passive-voice sentences in their language sooner than do children from other cultures (Allen & Crago, 1996). The culture and language systems in which children are immersed influence their use of language and, ultimately, the ways in which they communicate. Throughout middle childhood, sentence structure and use of grammar become more sophisticated, children become better at communicating their ideas, and their understanding of pragmatics improves.

Pragmatics

Pragmatics refers to the practical application of language to communicate (Owens, 2016). With age and advances in perspective-taking skills that come with cognitive development, children are more likely to change their speech in response to the needs of listeners. For example, when faced with an adult who will not give them a desired object, 5-year-old children are more polite in restating their request than are 5-year-old children (Ninio, 2014). Similarly, 10-year-old Marques asks to share a cookie with his friend (“Yo! Gimme a cookie!”) using very different language and intonation than he does when asking his grandmother for a cookie (“May I please have a cookie?”). Children speak to adults differently than to other children, and they speak differently on the playground than in class or at home. In addition, older children begin to understand that there is often a distinction between what people say and what they mean.

One example of pragmatics that develops in middle childhood is the use of irony, choosing a word or expression that conveys the opposite of its literal meaning. Many contextual, linguistic, and developmental factors influence the processing and comprehension of irony, such as the ability to interpret intonation and facial expressions as well as the capacity to evaluate how well a statement matches the situation (Pexman, 2014). Children at the ages of 5 to 6 become capable of recognizing irony when they are able to understand that a speaker might believe something different from what has been said. Yet most children at this age tend to interpret irony as sincere, relying on the person’s statement and disregarding other cues in the story, such as intonation and gestures. Cognitive development permits children to detect the discrepancy between what the speaker says and what he or she believes. Children’s ability to understand ironic remarks continues to develop through middle childhood, and by age 8, children can recognize and use irony (Glenwright & Pexman, 2010). However, even in adolescence, the understanding of irony is still developing; children as old as 13 do not reliably distinguish irony, intended to joke or mock, from deception, intended to conceal information (Filippova & Astington, 2008).

Bilingual Language Learning

About 22% of school-age children in the United States speak a language other than English at home (Annie E. Casey Foundation, 2017). Of these, about one in five struggle with speaking English at school (Federal Interagency Forum on Child and Family Statistics, 2017). How should children be taught a new language? In the United States, English as a Second Language (ESL) is most often taught to children by English immersion, which places foreign-language-speaking children in English-speaking classes, requiring them to learn English and course content at the same time. Some studies suggest that immersion is associated with a loss in children’s native language use (Baus, Costa, & Carreiras, 2013).

Another approach is dual-language learning (also called two-way immersion), in which English-speaking and non-English-speaking students learn together in both languages and both languages are valued equally. Advocates of dual-language learning argue that bringing a child’s native language into the classroom sends children the message that their cultural heritage is respected and strengthens their cultural identity and self-esteem. Children exposed to dual-language immersion tend to retain their native language while learning the new language (Castro, Páez, Dickinson, & Frede, 2011). Longitudinal research with U.S. samples suggests that dual-language immersion approaches, which encourage students to retain their native language while learning English, are more effective than immersion approaches at promoting successful learning of English as well as overall academic achievement (Relji, Ferring, & Martin, 2015). Approaches to second language learning remain hotly debated, however.

Learning a second language during childhood may affect proficiency in the first or native language. The first language may be lost or the second language may become dominant, used more often
In one study of Chinese immigrant children in New York City, children who were under the age of 9 when they immigrated reported preferring English to Mandarin 1 year later and were more proficient in English 3 years later than children who were older than 9 at the time of immigration (Jia & Aaronson, 2003). Why the difference? The younger children became friends with children who spoke English and spent more time interacting with peers who spoke English than the older children. Peers and the surrounding community influence bilingual children’s language acquisition and use, and the language that is used most becomes dominant.

A similar switch in language preference and dominance has been shown in a study of children in Southern California who first learned Spanish at home and then began to learn English at school at 5 years of age (Kohnert & Bates, 2002). The children improved their proficiency in both Spanish and English but made faster progress in English, so that by middle childhood, they were more proficient in English. Children who are living in the United States or another English-speaking country and are Spanish-English bilingual at 2 years of age often become English dominant by age 4. As a result, many adults who grew up in Spanish-speaking homes retain little ability to speak Spanish (Hoff et al., 2014).

The ability to speak more than one language is associated with many cognitive skills. Individuals who have mastered two or more languages have higher scores on measures of memory, selective attention, analytical reasoning, concept formation, and cognitive flexibility (Bialystok, 2015). Bilingual children tend to score higher on measures of executive function, particularly the ability to control attention and ignore misleading information (Barac & Bialystok, 2012; Barac, Bialystok, Castro, & Sanchez, 2014). These effects emerge slowly over the course of several years. For example, one study of second- and fifth-grade students showed improvements over a 5-year span in tasks such as verbal fluency and executive control (Bialystok, Peets, & Moreno, 2014). Moreover, when children are able to speak, read, and write in two languages, they are more cognitively and socially flexible and can participate in both cultures.

1. Children’s advances in language enable them to have more complicated relationships with parents and peers. Discuss the social implications of gains in vocabulary, grammar, and pragmatics.

2. Recall from Chapter 1 that development is characterized by continuities and discontinuities. How might you characterize language development in middle childhood? Is it continuous or discontinuous? Why?

3. In your view, why is learning a second language beneficial for children’s development? Why is it associated with cognitive gains?

LEARNING AND SCHOOLING IN MIDDLE CHILDHOOD

Schoolchildren’s advancing cognitive abilities enable them to learn in more sophisticated ways. As we have discussed, however, their ability to grasp logic is still developing. Effective instruction helps older children grasp complex ideas by identifying connections between new material and prior knowledge, building on what they already know, and keeping pace with their growing abilities. During the school years, older children become proficient at reading, writing, and mathematics.

Approaches to Education

Recall from our discussion of early childhood education (see Chapter 8), that preschool programs vary in orientation from academically centered, emphasizing structured learning, to child centered, an approach that places the child at the center of his or her own learning. A similar distinction characterizes classrooms in elementary school.

Teacher-Centered Classroom

Classrooms that are teacher centered emphasize direct instruction from a teacher who selects the instructional strategies and conveys information to students through direct instruction (Powell, 2019). Learning activities typically include drills, quizzes,
presentations, and recitations of definitions, facts, and lists. Children's learning is assessed through quizzes and exams that often involve selecting responses, such as multiple choice or fill-in-the-blank items.

A criticism of teacher-centered instruction is that students tend to have a passive role in instruction because it is often limited to responding to teacher-specified directions (Burden & Byrd, 2019). Critics argue that teacher-centered instruction overemphasizes teacher talk and centers on learning and comprehending facts rather than higher-level thinking. Today facts are easily available via the Internet. Children need to develop skills in evaluating and applying information (Borich, 2017).

Constructivist Classroom

Often referred to as a student-centered approach, constructivist classrooms involve students in their own learning (Powell, 2019). Influenced by Piaget and Vygotsky's perspectives on cognitive development, children are viewed as active constructors of their own understanding through interactions with their worlds.

Constructivist student-centered instruction emphasizes engaging children in problem-solving activities in which students investigate a problem, examine data or information relevant to the problem, and devise conclusions. Teachers ask questions to encourage student exploration and nurture reflection and thought about the process rather than emphasizing a single correct answer. Constructivist approaches also encourage peer interaction. Cooperative learning, role playing, simulations, and debates permit students to interact, share their ideas, and learn from one another (Burden & Byrd, 2019).

Reading and Mathematics Instruction

Cognitive development, especially in executive functioning and working memory, contributes to advances in math achievement and reading comprehension in elementary school (Cormier, McGrew, Bulut, & Funamoto, 2017). Schooling plays a key role in aiding children in mastering reading and math.

In past generations, most children were taught to read via phonics instruction, lessons and drills that emphasized learning the patterns of sound combinations in words. Children learned the sounds of each letter, memorized language rules, and sounded out words (Brady, 2011). In the late 1980s, the whole-language approach to reading instruction was introduced. In this approach, literacy is viewed as an extension of language, and children learn to read and write through trial-and-error discovery that is similar to how they learn to speak—without drills or learning phonics. The emphasis on children as active constructors of knowledge is appealing and in line with cognitive-developmental theory. Today, the whole-language approach is still in widespread use, and many teachers are not trained in phonics instruction. However, the research comparing the two approaches has offered little support for whole-language claims and overwhelming support for the efficacy of phonics training in improving children's reading skills (Cunningham, 2013).

A substantial number of U.S. children are poor readers and thereby at risk for poor academic achievement. In 2017, over one-third of fourth-grade students were unable to meet basic standards for reading at their grade level (National Center for Education Statistics, 2019). Early reading deficits influence all areas of academic competence (math, writing, science, etc.), and children who experience early difficulties in reading often remain behind (Hong & Yu, 2007). Children's attitudes, interests, and motivation in reading and writing tend to decline over the school years, and the drop occurs more rapidly in worse readers (Wigfield, Gladstone, & Turzi, 2016). Deficits in reading skill are associated with social adjustment problems, and this association increases over time. For example, poor reading achievement in preschool and third grade predicts behavioral problems in first grade and fifth grade (Guo, Sun, Breit-Smith, Morrison, & Connor, 2015). Children with poor reading skills tend to have poor vocabularies, which may make it more difficult for them to successfully interact with peers (Benner, Nelson, & Epstein, 2002).

Similar to reading, in past generations, math was taught through rote learning activities such as drills, memorization of number facts (e.g., multiplication tables), and completion of workbooks. Many children found these methods boring or restrictive; they learned to dislike math and did not perform well. In 1989, the National Council of Teachers of Mathematics modified the national mathematics curriculum to emphasize mathematical concepts and problem solving, estimating, and probability; teachers were to encourage student interaction and social involvement in solving math problems. The emphasis changed from product—getting correct answers quickly—to process—learning how to understand and execute the steps in getting an answer. Teachers often use strategies that involve manipulatives, opportunities for students to interact physically with objects to learn target information, rather than relying solely on abstraction. Such strategies have been shown to be effective in enhancing problem solving and retention (Carbonneau, Marley, & Selig, 2013).
In contrast with research findings about the whole-language approach to reading, changes in the mathematics curriculum are supported by student achievement, as fourth-grade students’ mathematical skills have improved over the past 2 decades. Between 1990 and 2017, the proportion of fourth-grade students performing at or above the proficient level increased from 13% to 40%, and the proportion who could not do math at their grade level fell from 50% in 1990 to 20% in 2017 (National Center for Education Statistics, 2019). Although these represent important gains, the 20% statistic means that one in five U.S. schoolchildren is still deficient in math skills, suggesting that there is more work to be done. The past decades have seen new educational initiatives that emphasize math and reading instruction coupled with frequent assessments of student achievement to ensure that progress is made and children do not fall through the cracks. What should educators do when children fail to meet academic standards for promotion to the next grade level? See the accompanying Applying Developmental Science feature for more discussion on this topic.

Transition to First Grade

Most children go to kindergarten before entering first grade, and many go to preschool before kindergarten. Despite some experience with the educational system, children usually feel a mixture of excitement and anxiety upon entering first grade. For most children and parents, first grade holds symbolic value as the threshold to elementary school and older childhood.

Easing children’s transition to first grade is important because adjustment and behavior during the first year of elementary school influence teachers’ perceptions as well as children’s views of themselves, their academic performance, and class

**Should Children Get “Left Back”?
**

What should educators do when children fail to meet academic standards for promotion to the next grade level? In the 1970s, social promotion, the practice of promoting children to the next grade even when they have not met the academic standards, became a common educational practice because grade retention, or “getting left back,” became viewed as damaging to children’s self-esteem (Bowman, 2005; Kelly, 1999). As social promotion rose in popularity during the 1980s, schoolchildren’s standardized test scores declined and school officials were criticized for promoting failing students to the next grade level (Shepard & Smith, 1990). By the 1990s, legislators and the general public called for an end to social promotion and many states banned it in favor of grade retention as a way to remediate poor academic performance (Frey, 2005).

About 10% of U.S. children are retained in a grade at least once between kindergarten and eighth grade (National Center for Education Statistics, 2017a). In addition to state-mandated retention due to low achievement scores, students are retained for other reasons, such as frequent unexcused absences, social and cognitive immaturity, and the belief that an extra year of schooling will produce successful academic and socioemotional outcomes. Black students are more likely to be retained than White and Hispanic students (2.6% of Black students in kindergarten through eighth grade were retained in 2016, compared with 1.5% of White and Hispanic students) (National Center for Education Statistics, 2019). Children of color often face obstacles to education though challenging neighborhood and home environments, lack of access to resources, and discrimination (Warren & Saliba, 2012).

Does grade retention work? In some cases, retention can be a wake-up call to children and parents. Some students show an improvement in grades and are less likely to take remedial courses (Schwerdt, West, & Winters, 2017). However, the cumulative evidence published to date shows that students who are retained in school, even in the first 2 years of elementary school, do not fare as well as promoted students. They later show poor performance in reading, mathematics, and language as well as poor school attendance and more emotional and social difficulties. They also report a dislike for school more than do their peers who were promoted and are more likely to drop out of high school by age 16 (Ehmke, Drechsel, & Carstensen, 2010; Hughes, Cao, West, Allee Smith, & Cerda, 2017; Hughes, Chen, Thoemmes, & Kwok, 2010; Wu, West, & Hughes, 2010). Dropping out of high school has long-term negative effects on postsecondary education, career, and income. As shown in Table 11.4, the National Association of School Psychologists

(Continued)
TABLE 11.4  
National Association of School Psychologists’ Recommendations to Enhance Academic Achievement and Reduce Retention and Social Promotion

<table>
<thead>
<tr>
<th>TARGET</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental involvement</td>
<td>Have frequent contact with teachers.</td>
</tr>
<tr>
<td></td>
<td>Supervise children’s homework.</td>
</tr>
<tr>
<td>Instruction</td>
<td>Adopt age-appropriate and culturally sensitive instructional strategies.</td>
</tr>
<tr>
<td></td>
<td>Continuously monitor instructional strategies and effectiveness and</td>
</tr>
<tr>
<td></td>
<td>modify instructional efforts in response.</td>
</tr>
<tr>
<td></td>
<td>Implement effective early reading programs.</td>
</tr>
<tr>
<td></td>
<td>Offer extended year, extended day, and summer school programs to</td>
</tr>
<tr>
<td></td>
<td>develop and promote academic skills.</td>
</tr>
<tr>
<td>Student academic support</td>
<td>Identify students with learning difficulties, design interventions to</td>
</tr>
<tr>
<td></td>
<td>address academic problems, and evaluate the effectiveness of those</td>
</tr>
<tr>
<td></td>
<td>interventions.</td>
</tr>
<tr>
<td></td>
<td>Provide comprehensive education services for children with educational</td>
</tr>
<tr>
<td></td>
<td>disabilities, including collaboration between regular, remedial, and</td>
</tr>
<tr>
<td></td>
<td>special education professionals.</td>
</tr>
<tr>
<td>Student psychosocial support</td>
<td>Create and implement school-based mental health programs that</td>
</tr>
<tr>
<td></td>
<td>identify students in need of assistance and devise ways of aiding</td>
</tr>
<tr>
<td></td>
<td>students.</td>
</tr>
<tr>
<td></td>
<td>Address student behavior problems with the use of behavior</td>
</tr>
<tr>
<td></td>
<td>management and cognitive strategies to reduce classroom behavior</td>
</tr>
<tr>
<td></td>
<td>problems.</td>
</tr>
<tr>
<td></td>
<td>Establish full-service schools to organize educational, social, and</td>
</tr>
<tr>
<td></td>
<td>health services to meet the diverse needs of at-risk students.</td>
</tr>
</tbody>
</table>

What Do You Think?

How can parents and teachers help children avoid getting left back? Should a child ever repeat a grade? Why or why not?

(Continued)

involvement (Zafiropoulou, Sotiriou, & Mitsioli, 2007). Teachers play an important role in aiding children’s adjustment to first grade. They provide both instructional and emotional support: For example, they attend to students’ interests, promote initiative, provide appropriately challenging learning opportunities, and encourage positive social relationships (Cadima, Doumen, Verschueren, & Buyse, 2015). These forms of support help children develop not only academic skills but also social skills, such as self-control and the ability to follow directions (Lerkkanen et al., 2016).

High-quality, sensitive, responsive, and positive interactions with teachers are associated with greater student motivation and academic achievement and fewer problems with anxiety and poor behavior throughout elementary school (Maldonado-Carreño & Votruba-Drzal, 2011; Van Craeyveldt, Verschueren, Vancraeyveldt, Wouters, & Colpin, 2017). Conversely, teacher–child conflict is associated with aggression, poor social competence, and underachievement throughout elementary school (Runions et al., 2014; Spilt, Hughes, Wu, & Kwok, 2012; White, 2013).

First grade serves as a foundation for a child’s educational career because the school curriculum of each grade builds on prior grades. Starting in first grade, reading and math skills build step by step each year, so that doing well in one year helps children perform well the next year (Entwisle, Alexander, & Steffel Olson, 2005). Early academic deficiencies often persist through the school years, and children
may fall further behind with each successive year in school. In addition, children’s performance in each grade is documented into a cumulative file that follows them from year to year, influencing teachers’ perceptions and expectations of them, which, in turn, influences their educational success.

### Access to Digital Technology and Learning

All school-age children in the United States have access to computers or tablets at school, and broadband Internet is available to all schools (National Science Foundation, 2018). However, not all schools provide access to current technology, and the quality of Internet access varies across school systems. Schools in rural areas and low SES communities are less likely to have access to current technology or may have fewer opportunities to access computers and tablets, given fewer resources.


Unfortunately, children’s home access to technology varies with geography and socioeconomic status (Katz, Moran, & Gonzalez, 2018). About one-quarter of rural families report access to high-speed Internet as a major problem and an additional third report it as a minor problem (Anderson, 2018). While more than 90% of families with school-age children living in low SES homes report having Internet access, more than half of these families report that their connectivity is constrained by interrupted or slow service, outdated devices, or having to share devices (Rideout, 2016). Inequity in home access to technology, often referred to as the homework gap because of the challenges that students face when trying to do their homework, increases as teachers incorporate more technology-based learning into assignments and the effects magnify with each grade (Moore, Vitale, & Stawinoga, 2018). Children with poor access to technology at home typically report using their smartphone and cellular data plan. School and community initiatives that provide children with tablet computers for home use hold promise for improving children’s access to technology and closing the homework gap (Wenger, 2018).

### Giftedness

Traditionally, giftedness has been defined by IQ scores, specifically scores of 130 or greater (Horowitz & O’Brien, 1986), and thereby associated primarily with academic skill. Recent definitions of giftedness are broader, including a wide range of human abilities, talents, and accomplishments in areas such as art, music, creative writing, dance, and sports (Mcclain & Pfeiffer, 2012). Exceptionally talented children share several characteristics. Not only are they smart, but their ability, whether in music, math, or other, is substantially above average (Subotnik, Olaszewski-Kubilius, & Worrell, 2011). Moreover, gifted children translate their intellectual abilities and talents into outstanding performance and innovation in areas in which they are passionate. Finally, perhaps most essential to exceptional performance is creativity. Gifted persons are creative, meaning that they are able to come up with new thoughts and actions leading them to produce work that is original—that is, something that others have not thought of, and that is useful (Kaufman, Plucker, & Russell, 2012). Gifted children show creativity in identifying problems, generating ideas, choosing the most promising ideas, and applying their knowledge to understand and solve problems (Guignard & Lubart, 2006).

Many experts view giftedness as a talent that must be developed and nurtured (Pfeiffer, 2012). Without encouragement, support, and stimulation, talent may deteriorate. Talented children require home and school environments that are challenging and supportive, with stimulating peers (Subotnik et al., 2011). There are two general approaches toward educating gifted children: enrichment and acceleration. The enrichment approach covers the same curriculum as a typical class, but in greater depth, breadth, or complexity. Students may share the classroom with their average-ability peers and receive enriched content after school, on Saturday, during the summer, or through more challenging assignments (Kim, 2016). In contrast, an accelerated program covers the curriculum at a more advanced pace, in conjunction with student mastery. A student might skip grade levels in particular subjects, such as mathematics, or may skip a grade entirely.

Some parents and teachers fear that students who accelerate their education may not be emotionally or socially ready to enter college at a young age, but research suggests that gifted children in accelerated programs generally do not report feeling isolated from their peers and do not show
negative social or emotional outcomes (Boazman & Sayler, 2011). Instead, some research suggests that they experience fewer emotional problems than their peers and display more emotional maturity (Simonton & Song, 2009; Subotnik et al., 2011). One study of first- through sixth-grade students found that the gifted students scored higher on measures of theory of mind, suggesting that they have greater social understanding than their average-ability peers (Boor-Klip, Cillessen, & van Hell, 2014). As adults, gifted children who accelerated their education report satisfaction with their career, relationships, and life (Lubinski, Benbow, Webb, & Bleske-Rechek, 2006). Longitudinal research following gifted young adolescents through adulthood found that they tend to be, as adults, extraordinarily successful in school and in their careers. For example, more than 15% had been awarded patents and over one-third earned doctorates by age 40 (Kell, Lubinski, Benbow, & Steiger, 2013; Makel, Kell, Lubinski, Putallaz, & Benbow, 2016). Like all children, however, gifted children require supportive environments to help them reach their intellectual potential.

**Educating Children With Special Needs**

School systems must meet the needs of a diverse population of children, many with special educational needs. Children with intellectual and learning disabilities require assistance to help them overcome obstacles to learning. Special education is tailored to a child’s specific needs. It is individually planned, specialized, goal directed, and guided by student performance (Heward, 2018). In the United States and Canada, legislation mandates that children with disabilities are to be placed in the “least restrictive” environment, or classrooms that are as similar as possible to classrooms for children without learning disabilities. Whenever possible, children are to be educated in the general classroom, with their peers, for all or part of the day. Teachers must be sensitive to the special needs of students with learning disabilities and provide additional instruction and extra time for them to complete assignments. When children are placed in regular classrooms with peers of all abilities, they have multiple opportunities to learn from peers and may be better prepared to learn and work alongside people of all abilities.

A special education approach known as inclusion integrates children with learning disabilities in the regular classroom and provides them with a teacher or paraprofessional specially trained to meet their needs (Mastropieri & Scruggs, 2017). Inclusion may take different forms for different children or may vary depending on academic subject. For example, one child with a learning disability may attend class with peers all day, receiving additional handouts, guidance, or extra time to complete assignments. Another student with a learning disability might be placed in the regular classroom, but may receive special instruction for part of the day (or for a specific subject) in a resource room (Salend, 2015).

Children’s responses to inclusion vary with the severity of their disabilities as well as the quality and quantity of support provided in the classroom (Lewis et al., 2017). Most experts agree that inclusion works best when children receive instruction in a resource room that meets their

**THINKING IN CONTEXT 11.5**

1. In your view, what is the purpose of first grade? What kinds of learning experiences are most important for children to have when they start school? Why?

2. Suppose you were tasked with creating a class environment that would address the needs of children with intellectual disabilities and learning disabilities as well as children without disabilities. What would your environment include? What are some of the challenges in creating such an environment?

3. What school and community resources might support children with special education needs and their families? Recalling from Chapter 1 that development is multidimensional, consider resources that support multiple domains of development—physical, cognitive, and socioemotional—relevant to children with special needs.
specialized needs for part of the school day and the regular classroom for the rest of the school day (Heward, 2018). Children with learning disabilities report preferring combining time in the regular classroom with time in a resource room that is equipped with a teacher who is trained to meet their special learning needs (Vaughn & Klingner, 1998). Interaction with peers and cooperative learning assignments that require children to work together to achieve academic goals help students with learning disabilities learn social skills and form friendships with peers.

Although children with disabilities learn strategies to succeed, the disabilities themselves and the academic and social challenges posed by them do not disappear. Like all children, children with disabilities often need to adapt their learning strategies as they gain competence. Parents and teachers who are sensitive to children's changing needs will be better able to help them. Parents and teachers are most helpful when they understand that learning disabilities are not a matter of intelligence or laziness but rather a function of brain differences and when they help children to learn to monitor their behavior.

Five-year-old Kira instructed 3-year-old Romeo how to play hopscotch: “You throw the rock onto the first square, then on one leg, hop over it and onto all of the other squares. Come back and, on one leg, pick up the rock, then jump over the first square back to the beginning.” Romeo looked puzzled as he jumped onto the square with two feet. “No! That’s against the rules!” Kira argued.

“Romeo’s younger and his balance isn’t good,” advised Kira’s 9-year-old sister, Mira. “Let him play this way,” she said. “No! It’s a rule and you can’t play it that way. No breaking the rule,” insisted Kira. Mira shook her head at her younger sister and said, “We can make a new rule.”

In her room, Mira pulled out her big box of seashells. “What kinds of rules can I use for ordering these?” she wondered. Sometimes she organizes her shells by color, other times by size. Sometimes she sorts them by both color and size. Recently Mira discovered a website that has pictures and names for all kinds of seashells. Mira identified each of her shells and memorized the names. Now she organizes shells by class or type.

1. Contrast Kira and Mira’s perspectives on the rules of hopscotch. How does their understanding of rules differ?
2. Compare Kira and Mira’s reasoning with the cognitive-developmental approach to morality.
3. Discuss Mira’s cognitive development from Piaget’s perspective. Give examples.
4. What information processing skills influence how Mira plays with her seashells?

Get the tools you need to sharpen your study skills. SAGE edge offers a robust online environment featuring an impressive array of free tools and resources. Access practice quizzes, eFlashcards, video, and multimedia at edge.sagepub.com/kutherchild1e.

**KEY TERMS**

Concrete operational stage of reasoning 296
Classification 296
Transitive inference 296
Seriation 296
Class inclusion 296
Metamemory 300
Rehearsal 300

Organization 300
Elaboration 300
Intelligence test (IQ test) 301
Flynn effect 303
Multiple intelligence theory 304
Triarchic theory of intelligence 304
Autonomous morality 306
Conventional moral reasoning 306

Distributive justice 306
Pragmatics 310
Dual-language learning 310
Giftedness 315
Special education 316
Inclusion 316
11.1 Examine school-age children’s capacities for reasoning and processing information.

At about age 7, children enter the concrete operational stage of reasoning, permitting them to use mental operations to solve problems and think logically and to demonstrate several different kinds of classification skills and make advances in solving conservation tasks. Concrete operational reasoning is found in children around the world; however, experience, specific cultural practices, and education play a role in development. Brain maturation leads to improvements in executive functioning and attention, memory, response inhibition, and processing speed. As children’s understanding of their own thinking and memory increase, they get better at selecting and using mnemonic strategies and become more planful. Experience influences how children organize information and the strategies they use.

11.2 Summarize views of intelligence, including the uses, correlates, and criticisms of intelligence tests.

IQ tests measure intellectual aptitude and are often used to identify children with special educational needs. IQ predicts school achievement, how long a child will stay in school, and career attainment in adulthood. Persistent group differences are found in IQ scores, but contextual factors, such as socioeconomic status, living conditions, school resources, culture, and life circumstances, are thought to account for group differences. Multiple intelligence theory and the triarchic theory of intelligence conceptualize intelligence as entailing a broader range of skills than those measured by IQ tests.

11.3 Discuss patterns of moral development during middle childhood.

Until about age 9, children demonstrate preconventional reasoning in Kohlberg’s theory of moral development, moving from concern with punishment as a motivator of moral judgments (Stage 1) to self-interest and concern about what others can do for them (Stage 2). In late childhood, children advance to conventional moral reasoning in which they internalize the norms and standards of authority figures, becoming concerned with pleasing others (Stage 3) and maintaining social order (Stage 4). School-age children’s views of fairness become more sophisticated; they differentiate social conventions from moral rules, and they become more likely to consider the situation and weigh a variety of variables in making decisions about distributive justice.

11.4 Explain processes of language development during middle childhood.

Vocabulary expands fourfold during the elementary school years. School-age children learn words through contextual cues and by comparing complex words with simpler words. Understanding of complex grammatical structures, syntax, and pragmatics improves in middle childhood with experience with language and exposure to complex constructions, and children become better communicators. Many children speak more than one language, and bilingualism is associated with cognitive benefits. Dual-language approaches to language learning are more effective than immersion approaches at teaching language and promoting academic achievement in children.

11.5 Discuss children’s learning at school.

Teacher-centered classrooms emphasize direct instruction, whereas constructivist classrooms involve students in their own learning. Although phonics methods are highly effective in teaching reading, most schools employ the whole-language approach. However, a substantial number of U.S. children are poor readers and about one in five is deficient in math skills. First grade is often the foundation for children’s academic career. Although all schools offer access to technology, quality varies and children’s home access to technology varies with geography and socioeconomic status. In the United States and Canada, legislation mandates that, whenever possible, children with developmental learning disabilities are to be educated in the general classroom, with their peers, for all or part of the day. The nature of inclusion varies with the severity of the disability as well as the quality and quantity of support provided in the classroom.

### REVIEW QUESTIONS

11.1 What abilities mark concrete operational reasoning?

- How do changes in working memory, executive function, and metacognition influence children’s thinking and memory?
- What is the role of context and experience in cognitive development in middle childhood?

11.2 What is intelligence?

- What is the most common IQ test, and how does it define intelligence?
- What are contextual influences on IQ scores?
- What are two alternative theories of intelligence?
11.3 What is autonomous morality?
   - What is conventional moral reasoning?
   - What is distributive justice reasoning?
   - How do children distinguish moral and conventional rules?
   - What factors influence moral development?

11.4 What advances in vocabulary and grammar take place during middle childhood?
   - Provide an example illustrating the development of pragmatics.
   - What are the developmental correlates of bilingualism?

11.5 What approaches are used to teach reading and mathematics?
   - What are some common disabilities that are aided by special education?
   - What are some methods for educating children with special needs?