Cognitive Development

5

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Learning Objectives

By the end of this chapter, you will be able to:

- Understand the concept of cognitive development.
- Describe the various stages and substages of Piaget's theory of cognitive development.
- Recognize the contributions and key concepts proposed by Vygotsky.
- Identify the types of attention and factors related to memory across the lifespan.

Introduction

Cognitive development places specific emphasis on an individual's ability to actively construct his or her thinking. In fact, this is the very definition of **cognition**—the active construction of thought. The foundation of cognitive development rests upon the various ways in which individuals construct their knowledge of the world around them. However, the ability to think and process information changes dramatically and often becomes more complex throughout the lifespan. As such, the ability to understand, conceptualize, think about, and interact with our environment depends upon our current stage of cognitive development.

In this chapter, we will explore the stages of cognitive development proposed by Jean Piaget. Next, we will describe Vygotsky's zone of proximal development, his concept of scaffolding, and his idea regarding private speech. In addition, we will explore the changes associated with memory and attention throughout the lifespan.

5.1 Piaget

The pioneering Swiss psychologist, Jean Piaget (1896–1980) championed the idea that infants come to understand their world through action. Piaget developed his theory of cognitive development through intense observation of children in their "natural habitat." Trained as a biologist, philosopher, and zoologist, Piaget drew upon the various methodologies associated with these fields to create a theory of how children produce a working knowledge of their environments. In this effort, Piaget often observed his own offspring; he frequently watched his children playing games in an effort to understand the complex process of their developing knowledge.

Through meticulous observation, Piaget (1954) argued that infants and children, behaving like "young scientists," actively organize knowledge through the development of mental representations based upon their actions. He called these **schemes**. Piaget believed that the basic building blocks of cognition or schemes within infancy were based upon the five senses (touch, smell, taste, sight, and hearing). During infancy, these schemes are developed based upon the simple actions and interactions of the infant with objects in his or her immediate environment. For example, sucking, grasping, and looking at a ball would all be examples of simple physical actions. However, as children develop, their schemes take on the mental characteristics associated with thought. Older children can develop plans and strategies for action based upon thought, without direct physical experiences. That is, they can imagine scenarios as opposed to having to view them directly and, as such, can act accordingly. Piaget argued that two underlying processes contributed to a child's growing cadre of schemes: assimilation and accommodation.

Assimilation is defined as the process by which children use their present schemes or organized knowledge, existing stage of cognitive development, and current way of thinking to understand an experience. For example, when a toddler has learned the word "dad," he may call every male that he encounters "dad." This is because he is limited by his existing organized knowledge regarding the word "dad"; for this child "dad" equals "male." Similarly, if a toddler understands the word "airplane," he may call any flying object, such as a bird or helicopter, an "airplane." The existing scheme reflects the child's belief that anything that flies must be an "airplane."

Accommodation is defined as the process by which children alter their existing way of thinking in an effort to understand or behave in response to a new event, new information, or a new experience that can no longer be assimilated into existing schemas. For example, once the toddler in the previous example has experience with both birds and planes, he may begin to adjust his conceptualization of an "airplane" and begin to call a bird a "bird" because he understands that there is a difference between the two.

Piaget believed that the schemes that are developed during infancy are quickly altered via assimilation and accommodation. For example, infants' inclination to put any object into their mouths occurs as a result of assimilation. However, they will quickly realize through accommodation that not everything tastes good. An infant may suck on her fingers and like the taste, keeping them in her mouth throughout the day. However, as soon as she puts her fuzzy blanket in her mouth, she will realize that she does not like the taste of the blanket nearly as much. As children start to explore and interact with their environment, the process of assimilation and accommodation become much more apparent.

Piaget believed that infants and children progressed through stages of cognitive development. He believed that there were four stages of cognitive development: sensorimotor, preoperational, concrete operational, and formal operational. Piaget's stages are discussed in the sections that follow.

Sensorimotor Stage

Piaget argued that the first stage of cognitive development lasted from birth to around age 2. He labeled this the sensorimotor stage. He believed that infants constructed their understanding of their environments through the coordination of sensory experiences. The sensorimotor stage is further broken down into six distinct substages (see Table 5.1): the use of reflexes, primary circular reactions, secondary circular reactions, the coordination of secondary circular reactions, tertiary circular reactions, and mental combinations.

Table 5.1: Six substages of Piaget's sensorimotor stage

Substage	Age	Description
Use of reflexes	Birth to 1 month	Infants use their reflexes to interact with their world and the objects around them
Primary circular reactions	1 to 4 months	Infants explore their bodies and their environment
Secondary circular reactions	4 to 8 months	Infants engage in repetitive behavior simply because of the consequences of engaging in the behavior
Coordination of secondary circular reactions	8 to 12 months	Infants are able to coordinate multiple senses and, as a result, are able to interact with objects in their environment intentionally
Tertiary circular reactions	12 to 18 months	Infants will "experiment" with new possibilities as they alter the way in which they play with and interact with objects and their environment
Mental combinations	18 to 24 months	Infants are able to think about and even anticipate the consequences of their actions even if no action is taken

Sources: Adapted from Piaget, 1952, 1954, 1964

Simple Reflexes

The first substage of Piaget's sensorimotor stage lasts from birth to around 1 month. During this time, infants engage in reflexive behavior. Rooting, sucking, and instinctively grasping objects are typical behaviors seen during this time. For example, a child will reflexively suck the nipple of a breast or bottle when it directly touches his or her lips. However, soon this reflexive behavior will occur even when the child sees the nipple, but does not have direct physical contact with it. This is an indication of even a newborn infant's ability to actively structure experience primarily as a result of assimilation.

Primary Circular Reactions

The second substage of Piaget's sensorimotor stage lasts from around 1 month to around 4 months and is characterized by infants exploring their environment and their bodies. During this substage, two types of schemes become increasingly apparent: habits and primary circular reactions. A **habit** is defined as a scheme that is rooted in reflexes that has become common and separated from the primary eliciting stimulus. For example, an infant may now often begin sucking when no bottle or breast is within eyesight, continuing and repeating the behavior with no clear stimulus.

Secondary Circular Reactions

The third substage of Piaget's sensorimotor stage begins around 4 months and lasts until the infant is approximately 8 months old. At this point in the child's cognitive development, the child is no longer preoccupied with him or herself and the focus has shifted to the consequences of repeated action. Although their behavior is not goal-directed or intentional, the repetitive behavior becomes quite commonplace simply because of the consequences of engaging in a behavior. For example, a child may engage in persistently pushing a spoon off the table simply because the resultant sights and sounds are fascinating.

Coordination of Secondary Circular Reactions

The coordination of secondary circular reactions is the fourth substage of Piaget's sensorimotor stage. This stage begins around age 8 months and lasts until the infant is approximately 1 year old. The defining characteristic of this stage is intentionality. At this point in their cognitive development, infants are able to coordinate multiple senses and, as a result, are able to purposefully interact with objects in their environment. For example, an infant may see an object and intentionally reach for it; behavior is now a result of the combined efforts of sight and touch. The infant combines several different schemes in an effort to reach a desired behavior or action.

Tertiary Circular Reactions

The fifth substage of Piaget's sensorimotor stage occurs between the ages of 12 and 18 months. During this stage, infants are increasingly fascinated by the various objects around them and the numerous consequences of their actions. Infants at this stage in their cognitive development will "experiment" with new possibilities as they alter the way in which they play with objects. For example, an infant may push a ball off the table, spin a ball on the carpet, and drop a ball onto the floor, all for the sake of seeking the different outcomes associated with these actions. This is markedly different from the simple repetitive pushing of an object off a table seen in secondary reactions.

Mental Representation

Piaget's sixth and final substage of the sensorimotor stage occurs between the ages of 18 and 24 months. During this substage, the infant is able to think about and even anticipate the consequences of his actions even if no action is taken. This newfound ability marks the beginnings of the use of primitive symbols, which, according to Piaget, are internalized mental representations of objects and events. For example, an infant may see someone throwing a ball at the park and, upon returning to his house, pick up and throw a ball to his dad. The child has remembered the event and is able to engage in the behavior whenever he has the opportunity.

Object Permanence

Around the middle of the sensorimotor stage (between 8 and 10 months), infants are able to differentiate themselves from others and, as such, understand that objects are separate from themselves. In addition, infants are able to understand that objects still exist, even when they are unable to touch, hear, or see them. This concept is called **object permanence**. For example, an infant without object permanence will stop looking for a toy once it has been placed under a blanket even if the infant watches the toy being covered up. An infant with object permanence will immediately reach under the blanket to retrieve the toy that has been hidden. According to Piaget, the acquisition of object permanence is one of the crowning achievements of infancy and one of the major developmental milestones as the infant approaches the next stage in Piaget's theory of cognitive development.

Doug Goodman/Photo Researchers/Getty Images

A child without object permanence doesn't look for the toy monkey once it is blocked from view.

Preoperational Stage

Piaget's second stage of cognitive development is called the preoperational stage. This stage usually begins around age 2 and continues until the child is approximately 7. One of the hallmarks of the preoperational stage is children's use of language in their attempts to understand the world around them. Words, images, and drawings all take on increasing significance as children engage in activities that represent their ideas about their environment. This **symbolic function** is central to this stage; it is defined as a child's ability to use mental representations, such as words and numbers, to attach meaning to an object that may not be present. In addition, symbolic play becomes readily apparent. **Symbolic play** is defined as a child's ability to imagine that an object or a person has properties or abilities other than those that it actually has. For example, a girl who is in the preoperational stage may pick up a shoe, pretend it is a phone, and engage in a conversation with her grandmother, who lives hundreds of miles away.

Although children in the preoperational stage of cognitive development have acquired increasingly sophisticated abilities to think about and interact with their environments, such as those seen in symbolic play, Piaget believed that they were still unable to perform what he called operations. **Operations** are the ability to perform reversible actions mentally without the assistance of physical maneuvering or manipulation. For example, Piaget would argue that adding and subtracting numbers mentally (instead of counting physical blocks) is an operation. Piaget believed that preoperational thought was the beginning of the ability to do in thought what was once only possible to do with action. However, Piaget (1952, 1964) identified seven limitations of preoperational thought: centration, irreversibility, transduction, egocentrism, animism, and the inability to distinguish appearance from reality.

Centration

According to Piaget, **centration** is defined as a child's tendency to exclusively focus on one particular aspect of a situation. A child may focus so singularly on one aspect that they miss other important and relevant information. For example, as part of his morning routine for getting ready for school, Zion is asked to go retrieve his hat, coat, gloves, and boots. Zion returns with only his hat. This scenario illustrates the concept of centration in that Zion only focused on one part of the message and neglected other important and relevant information.

Irreversibility

Irreversibility is defined as a child's inability to comprehend that certain operations and actions can be reversed. For example, Zion is now at his preschool and is playing with play-dough. He has spent a considerable amount of time making a giraffe out of the play-dough. His friend, Max, asks if he can see the giraffe, and when he does, he flattens it out into a pancake. Zion is devastated and runs to the teacher. The teacher tells Zion that he can make the giraffe again, but Zion tells the teacher that the giraffe has been made into a pancake. Zion does not understand that this action can be reversed.

Focus on States Rather Than Transformation

Piaget believed that children in the preoperational stage of cognitive development typically failed to understand the significance of when something is transformed into something else. He argued that children tended to focus on the state rather than the transformation. For example, Zion and his older sister Sahara have been asked to clean their neighbor's garage. When they are finished, their neighbor offers them either a dollar bill or four quarters. Sahara takes the four quarters and Zion is livid. He does not understand that a dollar bill can be transformed into four quarters. He only understands that *four* quarters are more than *one* dollar. Zion is focused on the state rather than the transformation.

Transduction

Transduction is defined as a child's tendency to mentally link various experiences or events even if there is no logical reason for their association. For example, Zion and his mother get into an argument before school. Zion's mother had wanted Zion to clean his room, but Zion had refused to do so. Zion's mother tells Zion that he must clean it up after school and Zion rushes to meet the school bus. After school, Zion returns home to see his mother visibly upset

at the dining room table. She explains that she has been let go from work. Zion is convinced that not cleaning his room that morning caused his mother to lose her job.

Egocentrism

Egocentrism is defined as a child's inability to distinguish his own perspective or level of understanding from anyone else's. Children in the midst of egocentrism may actually believe that everyone they meet feels the way they do, sees the things that they do, believe the things that they believe, or think the things that they do. They do not understand that the people around them are unique and have their own perspectives. For example, Zion is currently playing with his toys in his room. At one point, Zion calls out to his father asking for help because his car has broken. Zion's father is in the living room and cannot see Zion. His father asks him what is wrong with his car, to which Zion replies, "Can't you see, dad? The back wheel fell off." Zion is unable to understand that his father cannot see what he sees.

Animism

Animism is defined as the tendency to attribute inanimate objects with human or lifelike qualities. Piaget argued that children in the preoperational stage of cognitive development often believed that inanimate objects were capable of thought or action. For example, Zion is walking to the bus stop with his father when he sees that a tree's leaves are falling to the ground. Zion mentions to his father that the tree is tired of these old leaves and has decided to throw them away. Zion has attributed a human-like feeling and action to a tree. In this regard, children often fail to distinguish effects that result from human behavior or perspective from those that do not (Opfer & Gelman, 2011).

Inability to Distinguish Appearance From Reality

The seventh limitation of preoperational thought, according to Piaget, is a child's inability to distinguish appearances from reality. For example, during breakfast with his family, Zion looks outside and sees that the sun is shining through the window. Zion's mother gives him a pair of sunglasses and Zion puts them on and immediately exclaims, "It is dark out, it isn't time for breakfast." Zion does not understand that the glasses have darkened everything. He simply believes that by putting on the glasses, it has become dark outside. He is unable to distinguish between reality and appearances.

Concrete Operational Stage

Piaget (1952, 1964) argued that the concrete operational stage of cognitive development usually occurred between the ages of approximately 7 to 11. He suggested that by the age of 7, children are able to perform **concrete operations**—to use mental operations and logic to solve specific, concrete, or actual problems. For example, when a child is able to add three blocks that are laid out on a table to six blocks that are laid out on a table and conclude that there are nine blocks, the child is able to perform concrete operations. Piaget further suggested that this crucial time of cognitive development was associated with a number of abilities that suggest a much higher level of thinking than the child experienced during the preoperational stage of development. He reasoned that advances in spatial thinking, cause-and-effect

reasoning, the ability to categorize and conserve, and the ability to engage in inductive and deductive reasoning marked the passage of a child from preoperational thought to concrete operational thought.

Spatial Thinking

Spatial thinking is defined as a child's ability to analyze, interpret, and problem solve using pattern recognition and the spatial relationships between objects. Children in the concrete operational stage typically have acquired this ability. For example, a child who has entered Piaget's concrete operational stage of cognitive development is able to navigate her neighborhood and perhaps even offer directions from her house to school—and also from school to her house. Children at this age are able to recognize streets, landmarks, and roads because of their increased ability to understand patterns and the way objects are related to one another.

Cause-and-Effect Reasoning

The ability to engage in cause-and-effect reasoning is also a hallmark of Piaget's concrete operational stage of cognitive development. **Cause-and-effect thinking** is defined as the ability to understand a logical sequence of ordered events. If Zion were given a balance scale and one ten-pound weight, one five-pound weight, and five one-pound weights and was asked to balance the scale before he developed cause-and-effect thinking, he would be unable to perform the task. However, a child with cause-and-effect thinking would understand that the ten-pound weight would need to be on one side and the other weights would need to be on the other side in order for the scale to be balanced.

Categorization

Categorization is defined as the ability to organize objects according to one dimension. Children in the preoperational stage are able to do this. For example, a 3-year-old child is able to pick out all of the blue blocks from a pile of assorted blocks. However, as children progress into the concrete operational stage of cognitive development, their ability to categorize objects becomes more advanced in that they can now categorize objects based upon two or more dimensions.

The ability to order and organize objects into a series based upon one or more characteristics or dimensions is called **seriation**. Ordering a series of objects based upon length or color is an example of a categorization task involving seriation. For example, Zion is asked to arrange 10 pencils from shortest to tallest. If Zion were in the preoperational stage of cognitive development, he might make two different piles of pencils: one that he labels "big" and one that he labels "small." However, if Zion were in the concrete operational stage of cognitive development, he would be able to line the pencils up from shortest to tallest. This is because he can focus on the feature of height and ignore irrelevant features such as color.

Another categorization ability that is found during the concrete operational stage of cognitive development is the ability to engage in transitive inference. **Transitive inference** is defined as the ability to logically combine relationships between objects to understand a certain conclusion. For example, if Zion is given three pencils (pencils A, B, and C, where A is the tallest, B is in the middle, and C is the shortest), Zion will be able to say that A is taller than B and that

B is taller than C. If he has the ability to make transitive inferences, Zion will also be able to say that A is taller than C.

Conservation

Conservation is defined as the ability to understand that so long as nothing has been added or taken away, the altering of an object's appearance does not alter its basic properties. One of the primary ways in which lifespan developmentalists determine whether or not a child has entered the concrete operational state of Piaget's cognitive development is by their ability to pass a conservation task. For example, Zion is presented with three different containers. One is short and fat, the second is short and fat and identical to the first, and the third is tall and skinny. His mom pours milk into the first two glasses up to the exact same point and asks which container has more. Zion says that they both have the same amount of milk. Then, Zion's mother pours the contents of one of the first two containers into the third container. She then asks Zion to compare the two containers with milk and determine which has more. If Zion were in the preoperational stage of development, he would likely say that the tall and skinny container contained more milk. However, if Zion were in the concrete operational stage of development, he would recognize that changing the shape of the container did not alter the contents and that both containers held the same amount of milk.

Inductive and Deductive Reasoning

Inductive reasoning is the ability to draw a logical and general conclusion from particulars, specifics, and unique experiences. **Deductive reasoning** is the ability to make specific and particular conclusions from a general principle, experience, or statement. For example, if Zion has a pet dog that sometimes barks, and he hears barking from inside his new neighbor's house, Zion could inductively conclude that the new barking pet next door must be a dog. An example of deductive reasoning occurs if Zion knows from years of smelling flowers in gardens and stores that flowers smell good. He wants to buy his mom flowers, but cannot afford the roses in the front of the store display. Zion picks the carnations in the back of the display because he knows they are flowers and, thus, will still smell good.

Formal Operational Stage

The fourth and final stage of cognitive development, according to Piaget, is the formal operational stage. Piaget believed that this stage began when an individual was between the ages of 11 and 15 years old. Individuals who have progressed from concrete operations to formal operations are now able to think in increasingly more abstract ways. Formal operational thinkers are able to apply logic and abstract thinking in systematic ways merely through verbal presentation while their concrete operational thinking peers need to see elements to make logical inferences.

The major achievement associated with the formal operational stage of development is hypothetical thinking—engaging in thought concerning "what might be." By the time people reach formal operations, they can project themselves into various situations. For example, Zion, when he reaches this stage, will mentally consider various possibilities concerning which crowd at school he wishes to be associated with. Zion knows that he is smart, but he is also

athletic and enjoys drama. Zion can now mentally consider the repercussions of "joining" the other groups of students in honors classes, on sports teams, or in the drama club.

The Imaginary Audience

During adolescence, preoccupation with how one is viewed by others is very common. In fact, many adolescents experience and exhibit a new kind of egocentrism. Unlike the egocentrism exhibited during the preoperational stage of cognitive development, teenagers who are in the formal operational stage of cognitive development are able to view the world from another person's perspective. However, they often believe that other individuals are much more focused on them (and especially their looks and behaviors) than they actually are (Martin & Soko, 2011).

In fact, many teenagers who enter the stage of formal operations begin to behave, think, and perceive the world as if they are being constantly monitored by an imaginary audience. However, this preoccupation with how others view them can sometimes be associated with extreme self-consciousness (Senan, 2013).

Jupiterimages/Goodshoot/Thinkstock

Preoccupation with appearance is a hallmark of adolescence.

The Personal Fable

The period of adolescence is also marked by the **personal fable**—the belief that one is special and that one's experience is unique when compared to others. Unfortunately, the personal fable is often associated with feelings of invulnerability (Hill, Duggan, & Lapsley, 2012), which leads to increased risk-taking during this time. For example, adolescents often do not consistently take necessary precautions when engaging in sexual activity to prevent them from contracting a sexually transmitted infection (Jones, Modeste, Marshak, & Fox, 2013).

5.2 Vygotsky

Lev Vygotsky (1896–1934) was a pioneer who studied cognitive development and developed a different theory from Piaget. Vygotsky was born in Orsha, Russia, and he attended Moscow State University, where he graduated with a degree in law. Vygotsky did not begin his formal work in psychology until 1924 when he attended the Institute of Psychology in Moscow. While Vygotsky was only in the field of psychology for 10 years, his contributions to the study of cognitive development were immense. Vygotsky agreed with Piaget that children are

active thinkers, but where Piaget emphasized children's independent efforts to figure out the world around them, Vygotsky viewed cognitive development as a socially mediated process, in which children depend on assistance from those around them to take on new challenges. He introduced the idea of sociocultural theory, as well the concepts of the zone of proximal development, scaffolding, and private speech. In this next section we will explore each of these ideas in more detail.

Sociocultural Theory

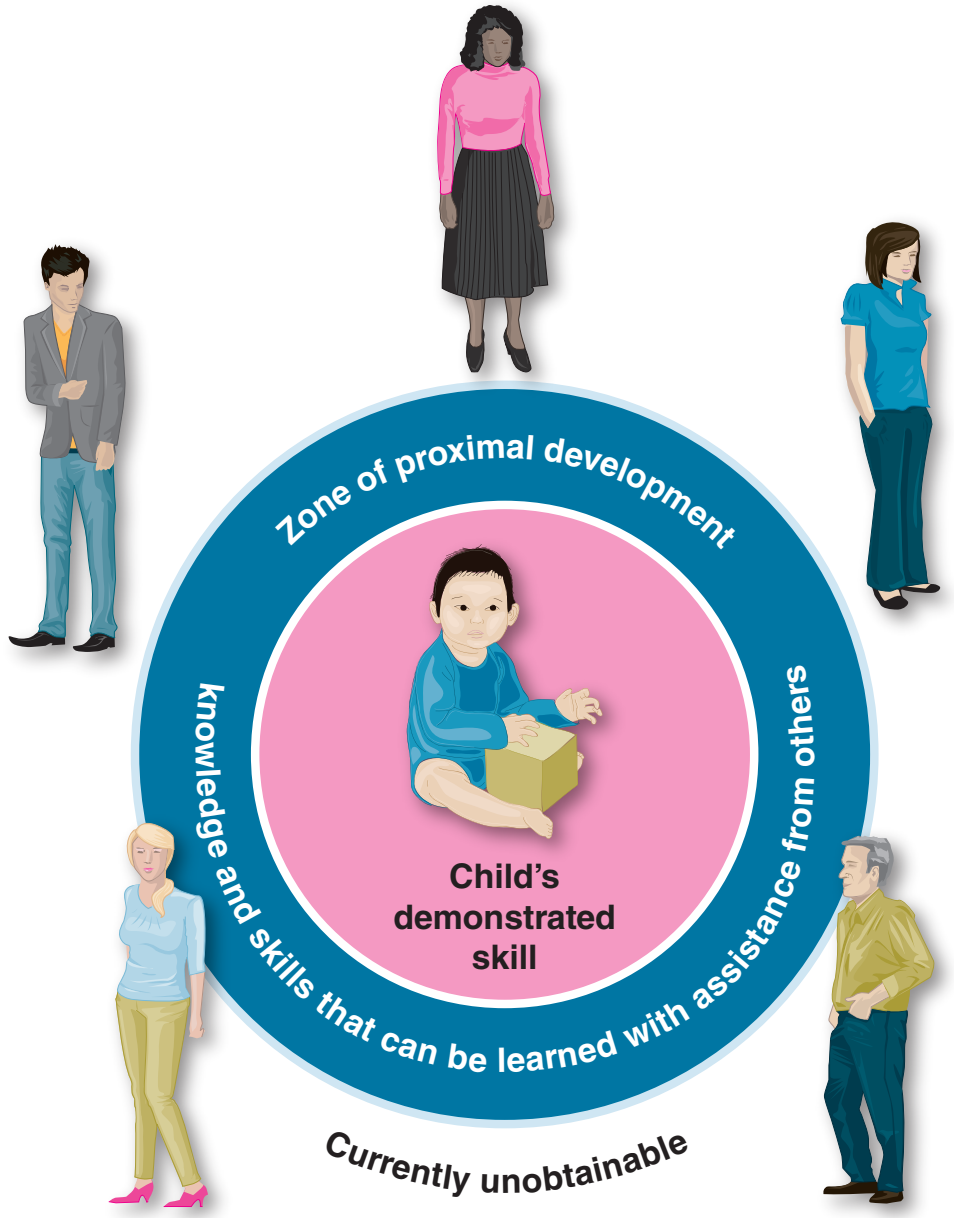
Sociocultural theory focuses on how culture, which is made up of the values, beliefs, customs, and skills of a particular social group, is passed on to the next generation. According to Vygotsky (1962), it is social interaction, or the dialog between children and more knowledgeable members of society, that makes it possible for children to acquire new ways of thinking and behaving and makes up the community's culture. Vygotsky (1962) believed that adults and more skilled peers help children master culturally meaningful activities. The communication between a child and another person shapes the child's thinking. Vygotsky (1962) believed that, for the most part, these interactions occurred in the home (however, they could occur outside of the home in places such as schools) and organized the child's learning experiences in such a way that he or she could obtain cognitive skills, such as solving a puzzle, using a computer, or reading. For example, a 3-year-old may sit on the floor with a puzzle, begin to play with its pieces, and become overwhelmed, not knowing where to begin. However, an adult can sit down next to the child and demonstrate how to put the outer pieces together first before filling in the rest. Then child will then approach a puzzle differently next time. Very much like Piaget, Vygotsky believed that children's functioning was adaptive, and the child adapts to his or her own social and cultural experiences. Within this theory there are three main concepts: the zone of proximal development, scaffolding, and private speech.

The Zone of Proximal Development

Vygotsky (1962) believed that children's learning takes place within the zone of proximal development (illustrated in Figure 5.1), which is defined as a range of tasks too difficult for the child to do alone but possible with the help of an adult or a more skilled peer. The lower limit of the zone of proximal development is the level of skill reached by that child independently. The upper limit is only reached when the child is given some assistance from an adult or more skilled peer. The zone of proximal development captures the child's cognitive skills that are in the process of maturing but have not fully matured yet (Vygotsky, 1962). For example, Thaddeus is at school, and his class is eating yogurt tubes for a snack. Thaddeus is struggling to get the yogurt out of the bottom of the tube because he does not know that he needs to squeeze the bottom of the tube to make the yogurt rise to the top; instead, he keeps squeezing the very top of the tube. Sitting next to him is his teacher, who can see he is getting frustrated. She looks at Thaddeus and says, "Try squeezing it from the bottom," and then points to the bottom of his yogurt tube. Thaddeus starts squeezing from the bottom and sees the yogurt rise to the top of the tube. He yells out to the teacher, "I did it! I got the yogurt out!" As you can see here, Thaddeus used the assistance from his teacher to get the rest of his yogurt out of the tube.

Figure 5.1: Vygotsky's zone of proximal development

Vygotsky's zone of proximal development (ZPD) is a theoretical area of skill between what a child can accomplish alone and what a child cannot accomplish, even with help.



Source: Based on Vygotsky, L. (1962). Thought and language*. Cambridge, MA: MIT Press.*

Scaffolding

Another important feature of social interaction is scaffolding, which is defined as adjusting the support offered during a teaching session to fit the child's current level of performance. Scaffolding occurs when an adult or more skilled peer uses direct instruction when it is clear

that the child is not sure how to proceed. The adult then will break the task down into more manageable parts, offering suggestions, strategies, and even rationale for them (Vygotsky, 1962). As a child becomes more skilled at this task, the amount of scaffolding that needs to take place will decrease. For example, Maxine is working on a 24-piece puzzle with her mother at home, and she is struggling to fit all of the puzzle pieces into the correct spaces. As she and her mom first start working on this puzzle together, her mother offers her many tips and suggestions, such as "Which piece might go down here?" and "Where do you see this color blue on another piece?" It takes a while, but eventually Maxine and her mother are able to complete the puzzle together. Maxine's mother notices as the days pass that the amount of help that Maxine needs while doing the puzzle is decreasing. Eventually, Maxine is able to do the entire puzzle by herself. While these interactions occur between Maxine and her mother, Maxine takes in the language of these dialogues; she will make them a part of her private speech, which is the next concept of this theory.

Private Speech

Vygotsky believed that language helps children think about mental activities and behaviors and select a course of action; in fact, Vygotsky thought that language was the foundation of all higher cognitive processes. According to Vygotsky (1962), children talk to themselves as they try to figure out how to do a task. This **private speech** is self-directed, used to guide thinking and behavior and not intended for anyone else to hear. Maxine, for example, has taken the dialogue that she has gotten from her mother while doing the puzzle and has begun to use it to direct her own actions as she works on the puzzle. From the other room, Maxine's mother can hear her say, "No it does not fit there, but what if I turn it around? Yes, it fits right there." This self-guidance usually disappears as children get older and as tasks become easier for them. When this happens, the dialogue they have with themselves becomes internalized. These are the internal conversations that we carry on with ourselves while thinking and acting in everyday situations.

Research shows that children tend to rely on private speech when a task is difficult, after they make a mistake, or when they are not sure what to do next. A study done by Fernyhough and Fradley (2005) found that 5- and 6-year-olds' private speech increases as tasks become moderately difficult, but decrease when the tasks become too difficult for them to do. In the beginning of their experiment, the tasks that were given to the children to do were quite simple and the children did not use private speech. As the experiment went on, the tasks that were given to the children got harder and harder, and the researchers observed the children using private speech. By the end of the experiment, the tasks had become so difficult that the children no longer used private speech, but just gave up on the task altogether. As children age, Vygotsky believed that this private speech would transform into whispers or even silent lip movements (Winsler & Naglieri, 2003).

Evaluating Vygotsky

Critics of Vygotsky's theory have surfaced. Some critics believe that Vygotsky was not specific enough about age-related changes. In addition, they also believed that Vygotsky did not adequately describe how changes in social and emotional development contribute to cognitive development (Gauvain, 2008). For example, unlike Piaget, Vygotsky does not suggest what

a child's zone of proximal development is; he just informs us that all children have a zone of proximal development. This leaves the interpretation of the child's zone of proximal development to the parent or teacher of the child. Others believe that he overemphasizes the role of language in thinking. Also, his emphasis on collaboration and guidance has potential issues as well. For example, while we know that scaffolding is something that we need to do when working or interacting with children, how does one scaffold? Is scaffolding merely giving the child guidance, or it is hand-over-hand instruction?

Comparing Piaget and Vygotsky

Despite having been introduced at around the same time (the first half of the 20th century), most are more familiar with Piaget's theory of cognitive development than Vygotsky's. Thus, Vygotsky's theory has not yet been thoroughly evaluated. Vygotsky's belief in the importance of sociocultural influences on children's development is consistent with the current belief that it is important to evaluate the outside factors of learning, meaning, and how the environment plays a role in cognitive development (Gauvain & Parke, 2010).

When comparing Piaget to Vygotsky, the first thing that we can see is that the emphasis goes from the individual being responsible for his or her learning (Piaget) to collaboration and social interaction being responsible for learning (Vygotsky). The culmination of Piaget's cognitive development theory ends when an adolescent reaches formal operations. On the flip side, Vygotsky does not offer an end point, which he claims could be middle childhood, adolescence, or even adulthood. He believes that the culmination of his theory can be different, depending on which skills are considered to be the most important for a particular culture. For Piaget, children construct knowledge by transforming, organizing, and reorganizing previous knowledge. For Vygotsky, children construct knowledge through social interactions (Daniel & Auriac, 2011). The implication of Piaget's theory for teaching is that children need support to explore their world and to discover knowledge. On the other hand, Vygotsky's theory for teaching focuses on a student's need for many opportunities to interact with teachers and more skilled peers. However, in both of these theories, teachers serve as facilitators and guides, rather than the directors of learning.

Think About It: Using Private Speech as Adults

Vygotsky explored how children use private speech when there is a task that is difficult for them to do. Do find yourself using private speech when you have a task at hand that is difficult? For example, when you were learning to drive a car, did you use private speech the first few times out on the road? Has this decreased as driving has become easier and more familiar? Do you still use private speech when you are driving in conditions that you are not used to?

5.3 Attention and Memory

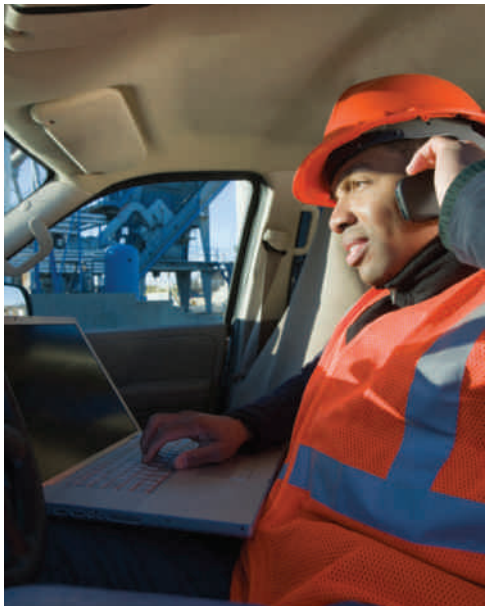
Attention and memory are two other concepts that fall under the realm of cognitive development. As we grow, so does our attention and memory. In fact, your ability to read and remember certain parts of this textbook is a testament to your attention and memory. However, as we continue to grow into middle and late adulthood, we start to lose some of the attention and memory that we once had when we were younger. In this next section, we are going to explore different types of attention, different ways we remember things, and how that changes throughout the lifespan.

Type of Attention

Attention is defined as the focusing of mental resources. As we progress from childhood to adulthood, we are able to focus our attention onto more things at one time. For example, you may be reading your textbook while keeping an eye on your children or while listening to music. However, no matter how hard we try to pay attention to several things at once, there is only a limited amount of information that we can focus our attention on.

According to Columbo, Kapa, & Curtendale, there are four different types of attention (2011). The first type of attention is **selective attention**, which involves directing one's attention to one particular aspect of a situation or experience and ignoring all others that are irrelevant. For example, you are sitting in class listening to the professor talk about attention, while next to you, two students are having a conversation about their upcoming weekend plans. The ability to focus only on what the professor is saying, and ignore what your neighbors are discussing, is selective attention.

Divided attention is the second type and this involves concentrating on more than one activity at a time. For example, if you are reading your textbook and at the same time listening to music, you are engaging in divided attention.



Huntstock/Thinkstock

Divided attention is required for multitasking.

Sustained attention is another type of attention, and this is the ability to maintain attention to selected stimuli for a prolonged period of time. This type of memory is also commonly referred to as vigilance. For example, 5-year-old Millie tells her parents that she wants to go to the movies to see the latest animated film. Her parents are reluctant at first because they are not sure that she will be able to sit that long, but they decide to try it. Millie sits through the entire movie, never getting up or walking around, but instead concentrating on the movie. Millie is engaging in sustained attention.

Executive attention involves planning a goal, providing attention to that goal, working through any errors that may occur, and finally monitoring the progress that one has made. For example, Lulu spends hours in the spring and summer tending to her garden. She spends several hours a day planting, weeding, watering, and pruning her vegetables and flowers. When one of her plants begins to be eaten by an unfamiliar bug, Lulu researches it to figure out how to get it out of her garden. Lulu is using her executive attention.

Changes in Attention Over the Lifespan

Now that we have discussed the different types of attention, it is time to examine how attention changes over the course of one's lifespan. We know that an infant cannot pay attention to something as long as an adolescent, but what changes occur and when?

Infancy

Attention during the first 12 months of life is dominated by an orientating/investigative process (Posner & Rathbart, 2007). This type of attention involves directing our attention to potentially important locations in the environment and recognizing objects and their features (Richards, 2011). It is during infancy, especially during the 3rd to 9th months, that infants can use their attention in a more flexible and quick manner.

We also know that an infant's attention is linked to new stimuli and environments. When infants see or interact with a new toy for the first time, the toy holds their attention for a longer period of time. However, as soon as that toy or stimulus becomes familiar, their attention to the toy decreases, making it more likely that they will be distracted by another stimulus (Snyder & Torrence, 2008).

It is also important to know that this attention that infants give to toys is the same attention they will give to adults who are interacting with them. For example, Trent, a 9-month-old, laughs hard the first few times his mother engages him in peek-a-boo. His mom knows that when he is getting crabby, peek-a-boo will make him laugh. However, the last time she tried to play peek-a-boo with him he did not laugh; instead, he just turned his head away. His mom now realizes that in order to keep Trent's attention or to keep him engaged, she will have to interact with him in a new way.

Susanne Dittrich/Fuse/Thinkstock

Joint attention begins in infancy.

Infants also engage in what is called **joint attention**. This is when two or more individuals focus on the same object or event. Joint attention requires three different things: the first is the ability to track another person's gaze, the second is the ability to direct another person's attention, and the final is to have a reciprocal interaction. When an infant is only a few months old, joint attention involves a parent or a caregiver pointing out or using words to get the infant's attention. However, as the infant gets closer to the 12-month mark, joint attention skills are frequently observed, and we begin to see the infant engage or direct the caregiver's attention by pointing at something (Kawai et al., 2010).

Childhood and Adolescence

A child's ability to pay attention improves significantly during the preschool years (Rothbart, 2011). While toddlers wander around and shift attention from one activity to another, a preschool child may be able to sustain attention long enough to watch a 30-minute television program. Young children are making advances in both executive and sustained attention. However, while those two areas of attention are advancing, there are two areas of attention that are still underdeveloped: salient versus relevant-distractibility and depth of analysis.

Preschool children are more likely to pay attention to toys or stimulus that stand out to them, or are *salient*, even if that stimulus is not *relevant* to solving a problem or completing a task. For example, if Finn is watching TV and just as his mother comes into the room and tells him that he needs to pick up his toys, a commercial for a new Lego set comes on, Finn will pay more attention to the commercial than to his mom. However, around the age of 6 or 7, children will begin to pay more attention to the task that is relevant, such as the instruction to clean up toys. This reflects a cognitive shift that allows children to control their attention better so children begin to act less impulsively.

In terms of depth of analysis, we know that in general young children's planning improves as their executive attention improves. We also know that children are still engaging in playful behavior. For example, if you were to show a preschooler two pictures that were basically the same with only a few differences, he or she would haphazardly examine the pictures and give their answers quickly. It is not until children reach school age that when given this same task, they are more likely to systematically compare both of the photos one detail at a time and then give their answer.

Another important aspect of attention is the ability to shift from one activity to another as needed. For example, Sid, a 14-year-old, is working on putting together a scale model of an airplane. He must be able to shift his attention from reading the directions, to putting the pieces of the airplane together using the right schematics, as well as making sure that each part is affixed properly. In order to do this activity, Sid must constantly shift his attention from one area to another; the ability to do this shows that Sid has both selective and executive attention.

The ability to multitask, or divide one's attention between three or more tasks, is also developed during adolescence (Bauerlein, 2008). In modern society, more and more teens are multitasking because of the availability of electronic media. Some adolescents work on homework, message their friends, check Facebook, and listen to music, all at the same time.

Web Field Trip: Multitasking

More and more people today claim that not only do they multitask almost every day, they are actually very good at it. Read the article below to find out just how effective people really are when they multitask.

http://www.huffingtonpost.com/2009/08/24/study-people-who-multitas_n_267774.html

Do you engage in multitasking? How do you do at it? What does this study say about those who are trying to multitask throughout their day to save themselves time? Do you agree or disagree with this article?

Adulthood

Attention skills are most often at their peak during early adulthood. However, as we age we may no longer be able to focus on relevant information as effectively as we could when we were younger adults (Madden, 2007). One study examined the interaction between visual attention, or how well someone pays attention to their surroundings, and driving skills

(Richardson & Marottoli, 2003). Thirty-five drivers, aged 72 and older, underwent an on-road driving evaluation involving parking maneuvers and urban, suburban, and highway driving. In addition to the driving evaluation, these individuals were also given tests that examined their visual attention. The study found that the drivers with the worst scores on their on-road evaluations also received the lowest visual attention scores. These drivers failed to give other drivers the right of way and experienced difficulty making safe turns and merging into traffic. This study demonstrates that as we age, we have a harder time paying attention to the things that are around us (e.g., curbs and other cars and drivers).

Older adults may also experience deficiencies in executive attention (Mahoney, Verghese, Goldin, Lipton, & Holtzer, 2010). Studies have also found that older adults tend to be less adept than younger adults at selective attention (Rogers & Fisk, 2001). For example, a 25-year-old may be able to run to the grocery store without having a list written down and remember all of the items needed. Older adults may find themselves forgetting some of what they came to the store to buy if they do not have a grocery list with them.

One area of attention that does not seem to be affected by age is sustained attention or vigilance. On tests of sustained attention, older adults performed just as well as younger adults. In fact, one study found that sustained attention increased during early adulthood, but remained constant through older adulthood until that person reached the age of 77 years old (Carriere, Cheyne, Solman, & Smilek, 2010).

Thye Aun Ngo/iStock/Thinkstock

Sustained attention remains consistent throughout older adulthood.

Memory

As we have seen, our attention increases from infancy into adulthood, and by late adulthood it begins to decline. Does the same pattern hold true for memory? **Memory** is defined as the retention of information over a period of time. Without our memory, not many things in our life would make sense. Could you imagine waking up every day and not knowing what you have to do that day, or who the people around you are, or the roles that they play in your life? Memory is vital.

Long term memory is a relatively permanent and unlimited store of information. Memories of childhood, favorite teachers and classes, past vacations—these are all long term memory. Short term memory, on the other hand, is the retention of information for 15–30 seconds. Memorizing a phone number for a few seconds until you can grab a phone and dial the digits is an example of short term memory, which has a very limited capacity. Much of the research on memory focuses on how humans encode information in their brains, how they retain or store it, and, finally, how they retrieve it. If any of these three parts of the process fails, individuals may not be able to retrieve the information that they have stored.

Memories can be inaccurate for a number of reasons (Sabbagh, 2009). Unlike a video recorder or computer memory, people construct and then reconstruct their own memories (Gaesser, Sacchetti, Addis, & Schachter, 2011). According to schema theory, people mold memories to fit information that already exists in their minds. This process is fostered by schemas, which are mental frameworks that organize concepts and information (Gaesser et al., 2011). For example, Sophia, who is 27, is telling her co-workers at lunch about how her boyfriend had proposed to her over the weekend. She tells everyone that he took her out to her favorite restaurant, they ordered lobster for dinner, he had even ordered fancy champagne, and he had the ring placed in her dessert. After the proposal, they went on a romantic carriage ride around the city. The next day, Sophia overhears one of her co-workers retelling the story, and she notices that she is saying Sophia got engaged on the carriage ride and then went out to dinner to celebrate. She knows that her co-worker is not intentionally lying about this story; she is just reconstructing it as she remembers it. Many childhood memories are often reconstructed through family pictures or stories. For example, Eileen, who is now 35, recalls many of the details of her third birthday party. When she tells the story to others, many think she is making it up because there is no way she could remember that many details about something that happened 32 years ago. Eileen has based her story on not only the pictures that were taken that day but also on her parents' retelling of the story.

Infancy

How much memory do infants have? Do they have the same memory capacity as a 3-year-old child? What are their first memories? In a study of memory in infants, Rovee-Collier (2007) placed an infant in a crib with an elaborate mobile hanging over her head. She then took a ribbon and tied the baby's leg to the mobile so that when the infant kicked, the mobile moved around. She then had the infant come back a few weeks later and placed her back in the crib with the elaborate mobile hanging over her head, except this time, she did not tie the ribbon around her leg. However, the infant still kicked her leg to get the mobile to move even though this time the mobile would not respond. Rovee-Collier also noticed that if she put the infant in the crib and anything was changed, even slightly, the infant would not kick her legs. However, if she put the ribbon back on the child's leg, she would immediately start kicking to move the mobile. After conducting this experiment multiple times, Rovee-Collier found that infants even as young as 2.5 months have a memory that is full of incredible detail.

The infants in the Rovee-Coller study only had to remember what to do for a few weeks. However, studies have found that infants who are only 2 to 6 months old are able to remember some things until they are 1½ to 2 years old (Rovee-Collier, 2007; Rovee-Collier & Barr, 2010). However, another researcher, Jean Mandler, believes that the infants that participated in Rovee-Collier's study were only displaying implicit memory. **Implicit memory** is defined as memory with unconscious recollection; it is merely a memory of skill and routine procedures that are performed automatically. **Explicit memory**, on the other hand, refers to the conscious memory of facts and experiences.

Some researchers have found that babies do not have explicit memory until the second half of the first year, and then memory improves threefold during the second year of life (Bauer, Larkina, & Deocampo, 2011). In one longitudinal study, infants were assessed several times during the second year of life (Bauer et al., 2000). Older infants showed more accurate memory and required fewer prompts to demonstrate their memory than younger infants. Researchers have documented that 6-month-olds can remember information up to 24 hours,

but by 20 months of age infants can remember information they encountered 12 months earlier. In general, we find that most young infants' conscious memories are delicate and fade rather quickly until they are at least 2 years old.

Childhood

During childhood, there are significant advances in short and long term memory as well as the use of memory strategies. A common assessment of short term memory involves listing several numbers in quick succession, then asking the individual to recall them. Children between the ages of 2 and 3 are only able to remember about 2 numbers; however, 7-year-olds are able to remember 5–7 numbers, and children between the ages of 8 and 13 are able to remember around 8–9 numbers (Dempster, 1981).

During childhood, we also have what is called a working memory. A **working memory** is defined as the structure of memory that can accommodate information for a short period of time. Working memory is often more active and powerful in modifying information than short term memory. A child who is working on a puzzle that he has done previously will use his working memory rather than his short term memory to put the puzzle together.

We also know that working memory is tied to many aspects of a child's development (Baddeley, 2012). In fact, research has recently examined the importance of working memory in children's cognitive and language skills. One study found that working memory and attention control predicted growth in emergent literacy and number skills in young children in low-income families (Welsh et al., 2010). Another study found that working memory capacity of a 9- and 10-year-old children predicted foreign language comprehension two years later at 11 or 12 years of age (Andersson, 2010).

Once children are in school, many of them will begin to use memory strategies to remember things that they need to know or will be tested on. There are several different memory strategies that we all use; some are better suited for short term memory and some are better suited for long term memory. For short term memory, people may use rehearsal, which is the repetition of information. For example, if you are trying to remember which 3 items you need to buy at the grocery store, you may repeat those items over and over in your head until you have gotten all three of your items in your basket. However, if you are looking to store something in your long term memory, you are more likely to use organization or elaboration. Both of these strategies make the information personal, making it more likely that you will store the information in your long term memory. Organization involves grouping items together to make them easier to remember. For example, when a child is being tested on the material in the chapter of a book, she will likely study and remember the information in the same order it was presented in the text. If the Civil War was presented first, followed by the World Wars, then the Viet Nam War, this is how she will remember them. During middle childhood, children are more likely to use **elaboration**, which involves creating relationships or shared meaning between two or more pieces of information that do not belong in the same category. For example, how do you remember the colors in the rainbow? For many of us, we associate the letters ROY G BIV with each color.

The **Fuzzy Trace Theory**, proposed by Charles Brainerd and Valerie Reyna (1993, 2004), purports that memory is represented by two types of memory representation: verbatim memory trace and gist. Verbatim memory trace consists of the exact details of the situation, whereas the gist refers to the general idea of the information. When the gist memory is used, fuzzy

traces are built up. While all people, no matter what age, use gist memory, young children tend to store and retrieve verbatim traces. However, at some point during middle childhood, children begin to use the gist more and more and, according to this theory, using the gist of your memory contributes to the improved memory and reasoning of older children because fuzzy traces are more enduring and less likely to be forgotten than verbatim traces (Reyna & Rivers, 2008).

Adulthood

As we begin to age, our memory begins to change as well. However, not all memory changes occur at the same time or in the same way. Generally, working memory is the first type to show a decline during late adult years (Ornstein & Light, 2010). One explanation may be that older adults are not able to block out irrelevant stimuli and information from entering their working memory, causing them to be more distracted (Healey et al., 2010). For example, young adults may be able to listen to a speaker even while the people next to them are having a conversation, whereas an older adult might struggle to block out the side conversation in order to focus on the speaker.

Explicit memory, a type of long term memory, can be broken down into three separate categories: episodic memory, autobiographical memory, and semantic. **Episodic memory** is the retention of information about the where and the when of life's happenings. For example, can you remember what you were doing or where you were when you heard about the attack on the World Trade Center on September 11, 2001? This is your episodic memory. **Autobiographical memory** is the personal recollection of events and facts. For example, you may remember a very special birthday, or the first time you went on vacation, or the details of your wedding day. **Semantic memory** is a personal knowledge about the world. It includes a person's field of expertise (such as a historian who knows all about the Civil War); general academic knowledge (such as the capitals of the American states); and everyday knowledge, which could include things like the meaning of a word (such as *copious*) or a famous individual (John F. Kennedy).

Studies indicate that younger adults have better episodic memory than older adults (Gaesser et al., 2011). Older adults also take a longer period of time to retrieve semantic information; however, sematic memory continues to increase through the 50s, and shows little decline during the 60s (Ronnlund, Nyberg, Backman, & Nilsson, 2005). While a large portion of sematic memory remains throughout late adulthood, one of the most common problems that people of this age complain about is the tip of the tongue (TOT) phenomenon. This is where the individual cannot quite retrieve the information but has a feeling that they should be able to retrieve it (Bucur & Madden, 2007). Older adults are more likely to experience TOT than younger adults (Bucur & Madden, 2007).

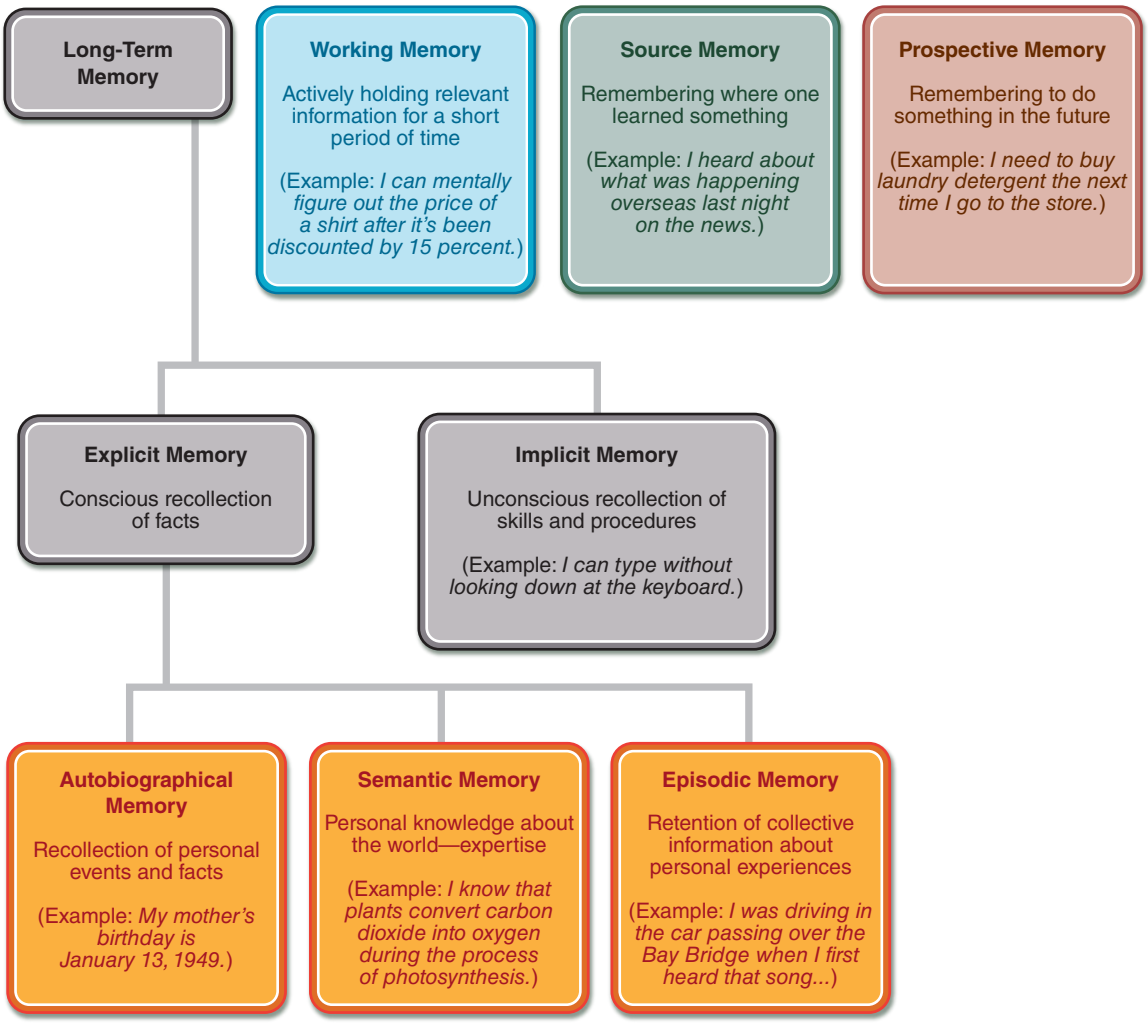
We are less likely to see a decline in late adulthood in implicit memory compared to explicit (Yoon, Cole, & Lee, 2009). People who are in late adulthood are more likely to forget an errand they were supposed to run than they are to forget how to drive a car. They may process the information coming at them while driving slower than someone in young or middle adulthood would, but they can still remember how to do it.

Source memory is the ability to remember where one learned something. As adults age, failures of source memory increase, and they may not remember where or who they learned certain information from. For example, Larry, who is 85, is having dinner with his grandson,

who tells him a very funny joke. Larry finds this joke so amusing that he tells it to everyone he knows. The following week, when Larry is having dinner with his grandson again, Larry proceeds to tell him the joke. Larry's source memory for the joke has failed; his grandson laughs politely at a punch line he already knows.

Figure 5.2: Types of memory

Memory can be broken down into these various subcategories.



The final type of memory that we will discuss is **prospective memory**. Prospective memory involves remembering to do something in the future—for example, remembering to call your friend tomorrow because it is her birthday, or remembering to take meat out of the freezer in the morning for dinner the following night. Some research has found that as we age, our prospective memory begins to decline (Jacques & Marcovitch, 2010). However, there are other studies that show that the decline in prospective memory could be based on many factors,

such as the nature of the task and what is being assessed (Wang, Dew, & Giovanello, 2010; Mattli, Schnitzspahn, Studerus-Germann, Brehmer, & Zöllig, 2013). For example, age related deficits occur more often in time-based tasks, such as remembering to call a friend the next day to wish her a happy birthday, than in event-based tasks, such as remembering to tell a friend the next time you see her to try a new restaurant. (See Figure 5.2 for a summary of the various types of memory.)

Summary and Resources

Summary

Throughout the lifespan, there are several principles associated with development that play important roles in terms of cognitive abilities. In fact, at various stages of life, an individual's ability to understand concepts, use logic, and engage in various cognitive tasks depends upon his or her stage in Piaget's theory of cognitive development. In addition, Vygotsky's zone of proximal development, his concept of scaffolding, and his ideas regarding private speech provide important insights with regard to our ever-changing intellectual abilities. Finally, as we grow and develop throughout the lifespan, our memory as well as attention grows and changes with us.

Key Ideas

- The principles of cognitive development are founded upon the various ways in which individuals construct their knowledge of the world around them.
- The pioneering Swiss psychologist, Jean Piaget (1896–1980) championed the idea that infants came to understand their world through action.
- Piaget believed that the schemes that are developed during infancy are quickly altered via assimilation and accommodation.
- Piaget argued that the first stage of cognitive development lasted from birth to around age 2. He labeled this the sensorimotor stage.
- Piaget's second stage of cognitive development is called the preoperational stage. This stage usually begins around age 2 and continues until the child is approximately 7, and it is characterized by the ability to use symbolic thought.
- Piaget argued that the concrete operational stage of cognitive development usually occurs between the ages of approximately 7 to 11. He suggested that by the age of 7, children are able to perform concrete operations and use logic.
- The fourth and final stage of cognitive development, according to Piaget, is the formal operational stage. Piaget believed that this stage, which is characterized by abstract thinking, begins when an individual is between the ages of 11 and 15 years old.
- Vygotsky, along with Piaget, agreed that children are active thinkers. However, Piaget emphasized children's independent thinking as they learn about the world around them, whereas Vygotsky believed that children acquire new knowledge through the interactions that they have with the adults and more skilled peers around them.
- Vygotsky believed that "children's learning takes place within the zone of proximal development, which is defined as a range of tasks too difficult for the child to do alone but possible with the help of an adult or a more skilled peer" (Vygotsky, 1962, p. 84).

- Vygotsky proposed that in order for children to think about and complete different activities, they need to rely on their language skills. In fact, Vygotsky thought that language was the foundation of all higher cognitive process.
- Attention is defined as the focusing of mental resources.
- There are four different types of attention: selective, divided, sustained, and executive.
- Attention during the first 12 months of life is dominated by an orientating/investigative process.
- A child's ability to pay attention improves significantly during the preschool years.
- Attention skills are often excellent during early adulthood; however, as we age we may no longer be able to focus on relevant information as effectively as we could when we were younger adults.
- Memories can be inaccurate for a number of reasons, such as those proposed by the Fuzzy Trace Theory.
- A child's memory is much better than an infant's memory. It is during childhood that we start to see huge advances in short and long term memory as well as the use of memory strategies.
- As we begin to age, our memory begins to change as well. However, not all memory changes occur at the same time or in the same way.

Critical Thinking Questions

1. What type of game could you play with infants to test whether they had object permanence? What would they do if they did have that skill? How do you know that this game is cognitively appropriate for that child? Make sure that you are backing up your answer to this question with at least one scholarly source.
2. What skill of Piaget's preoperational thought would a child have if, when driving with his parents, he saw the "Golden Arches" and said, "Hey, I want a Happy Meal!"? Explain your answer using at least one scholarly source.
3. Think back to a time when, as a child, you thought that you were not getting as much as someone else because you did not understand conservation. How did someone explain to you that you were getting a fair and equal amount even if it did not look that way? When do children generally begin to understand conservation? Make sure that you explain your answer by backing it up with at least one scholarly source.
4. Your 15-year-old cousin is telling you that she does not want to go to school tomorrow because she has just gotten a bad haircut and she knows everyone will be staring at her and judging her. How would you explain her thoughts to your aunt, who believes she is just overreacting? Use at least one scholarly citation to back up your answer.
5. Think back to a time when you were helping someone with something that they were struggling with. How did you scaffold them?
6. Think of a time in your life when you had to use sustained attention? What did that look like?
7. Think of a time when you overheard someone telling someone a story that you knew was not exactly true. Using schema theory as a guide, how would you explain their behavior? Were they lying? Make sure you use at least one scholarly citation to back up your answer.
8. When was there a time in school that you used one of the memory strategies? Which one did you choose to use? How did you use it?

Key Terms

accommodation The process by which a child alters their existing way of thinking in an effort to understand or behave in response to a new event, new information, or a new experience.

animism The tendency to attribute human or lifelike qualities to inanimate objects.

assimilation The process by which children use their presently organized knowledge and current way of thinking to understand an experience.

autobiographical memory The personal recollection of events and facts.

categorization The ability to organize objects according to one dimension.

cause-and-effect thinking The ability to understand ordered events that follow a logical sequence.

centration A child's tendency to exclusively focus on one particular aspect of a situation.

cognition The active construction of thought.

concrete operations A child's ability to use mental operations and logic to solve specifically concrete or actual problems.

conservation The ability to understand that so long as nothing has been added or taken away, the altering of an object's appearance does not alter its basic properties. For example, four quarters equals one dollar.

deductive reasoning The ability to make specific and particular conclusions from a general principle, experience, or statement.

divided attention The ability to concentrate on more than one activity at the same time.

egocentrism A child's inability to distinguish their own perspective or level of understanding from anyone else's.

elaboration The ability to create a relationship or shared meaning between two or more pieces of information. For example, the letters ROY G BIV are used to remember the colors of the rainbow.

episodic memory The retention of information about the where and the when of life's happenings.

executive attention A cognitive process that involves planning a goal, providing attention to that goal, working through any errors that may occur, and monitoring the progress made.

explicit memory The conscious memory of facts and experiences.

Fuzzy Trace Theory Theory that says that memory is best understood by considering two types of memory representation: verbatim memory trace and gist.

habit A scheme that is rooted in reflexes that has become common and separated from the primary eliciting stimulus.

implicit memory Memory with conscious recollection.

inductive reasoning The ability to draw a logical and general conclusion from particulars, specifics, and unique experiences.

irreversibility A child's inability to comprehend that certain operations and actions can be reversed.

joint attention A process in which two or more individuals focus on the same object or event.

memory The retention of information over a period of time.

object permanence A process in which infants are able to understand that objects still exist even when they are unable to touch, hear, or see them.

operations The ability to perform reversible actions mentally without the assistance of physical maneuvering or manipulation.

personal fable The genuine belief that one is special and that one's experience is unique when compared to others.

private speech Children's self-directed speech, which they use to guide their own thinking and behavior and do not intend for anyone else to hear.

prospective memory A process in which an individual remembers to do something in the future.

schemes Mental representations based upon actions that organize knowledge.

selective attention The ability to direct attention to one particular aspect of a situation or experience, and ignore all others that are irrelevant.

semantic memory Personal knowledge about the world.

seriation The ability to order and organize objects into a series based upon one or more characteristics or dimensions.

source memory The ability to remember where one learned something.

spatial thinking A child's ability to analyze, interpret, and problem solve using pattern recognition and the spatial relationships between objects.

sustained attention The ability to maintain attention to selected stimuli for a prolonged period of time.

symbolic function A child's ability to use mental representations, such as words and numbers, to attach meaning to an object that may not be present.

symbolic play A child's ability to imagine that an object or a person has properties or abilities other than those that they actually have.

transduction A child's tendency to mentally link various experiences or events even if there is no logical reason for their association.

transitive inference The ability to logically combine the relationship between objects A and B and the relationship between objects B and C to conclude something about the relationship between A and C.

working memory The structure of memory that can accommodate information for a short period of time while a person uses that information.

Web Resources

- Examples of assimilation and accommodation (video): http://www.youtube.com/watch?v=xl46c6S6pI0
- The life and work of Jean Piaget: http://www.piaget.org/
- Piaget's theory of cognitive development: http://children.webmd.com/piaget-stages-of-development
- Piaget's theory of cognitive development (video): http://www.youtube.com/watch?v=HcwSlnNPaLY
- Comparison of Piaget and Vygotsky: http://www.mindmeister.com/139274374/piaget-vygotsky-a-comparison
- Lev Vygotsky: http://www.toolsofthemind.org/philosophy/vygotskian-approach/
- Attention and memory: http://psychology.gatech.edu/renglelab/