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2

THEORY AND RESEARCH IN DEVELOPMENT

TEST YOUR KNOWLEDGE

Test your knowledge of child development by deciding whether each of the following statements is *true* or *false*, and then check your answers as you read the chapter.

1. Well-designed research can tell us whether a theory is true or false.
2. Freud's psychoanalytic theory is based on outdated ideas, so it is not relevant to the field of child development today.
3. The best way to get rid of a child's undesirable behavior is to punish the child for doing it.
4. Students learn best when teachers clearly explain each step they expect students to take in solving a problem.

5. Infants must have skin-to-skin contact with their mother within the first few hours after birth for bonding, or love, to develop.
6. A good theory should be universal, applying to all children in all situations.
7. When conducting research by doing an observation, it is important that the person who is doing the observation does not know the purpose of the research.
8. Today over 1,600 colleges do not require the SAT or ACT for admission.
9. There is little scientific value in the study of single individuals.
10. Even if research consistently finds that children whose mothers talk to them a great deal have high self-esteem, we should not conclude that frequent conversations with parents build self-esteem in children.

Correct answers: (1) F, (2) F, (3) F, (4) F, (5) F, (6) F, (7) T, (8) T, (9) F, (10) T

LEARNING QUESTIONS

- 2.1 How do developmental theories help us understand children's growth and development?
- 2.2 How do Freud and Erikson describe the stages of child development?
- 2.3 What are the basic principles of behaviorism and social cognitive theory?
- 2.4 How do the theories of Piaget, Vygotsky, and information processing describe cognitive development?
- 2.5 How do the theories of ethology, ecological systems, and dynamic systems apply to the study of child development?
- 2.6 How are developmental theories influenced by culture?
- 2.7 What methods and measures are used to study children's development?
- 2.8 What are the advantages and disadvantages of the different research designs used to study development?
- 2.9 What ethical considerations apply to research with children and adolescents?

When we observe and work with children and adolescents, we want to make sense out of what we see. The explanations we develop about why children behave in certain ways can become theories. In this chapter, we describe some of the major theories that have influenced how we understand child development today. As we said in Chapter 1, we all have our own personal theories about human behavior, but the theories we use to build a scientific understanding about child and adolescent development must be public and testable, so in the second half of the chapter we describe a variety of methods used to test these theories and to build our knowledge base. We begin with a discussion of why theories are important for our understanding of development.

WHY THEORIES OF DEVELOPMENT ARE IMPORTANT

To understand how and why children develop the way they do, it is not enough simply to observe them. Our observations should lead us to explanations that let us make predictions about how they will develop. These explanations can be organized into a systematic, coherent model called a

developmental theory. Theories in any science serve two important functions: They help us *organize* the knowledge that we already have, and they help us *make predictions* that we can investigate and test.

Although most theories can never be proved beyond a shadow of a doubt, the scientific process allows us to provide evidence that supports or opposes the truth of these ideas and helps us form questions for future research (T/F Q1). For example, some say Darwin's theory of evolution is not a proven fact, and technically this is true. However, the enormous body of evidence that supports its ideas outweighs the evidence against it. Consequently, evolutionary theory is widely accepted in scientific circles today. We discuss how evolutionary theory has been applied to the study of child development later in the chapter. On the other hand, other theories have come and gone as evidence piled up that did not fit with the predictions that emerged from them. For example, from the 1930s until the 1970s adherents to psychoanalytic theory, which you will learn about in the next section, proposed that inadequate early mothering was the cause of the severe mental illness known as schizophrenia (Harrington, 2012). However, as research continued, it became clear that the more likely cause of schizophrenia is a combination of genetic endowment and environmental influence (Jaffe et al., 2016). You will learn more about how theories have changed as research evidence confirmed or disconfirmed their ideas when you read the **Journey of Research** features found throughout this book.

Developmental theories differ from one another in several ways. One of those ways, as you learned in Chapter 1, is whether development occurs in a series of quantitative changes that happen little by little, smoothly over time, or as a series of large qualitative changes that occur at certain ages and alter the nature of the child or adolescent in significant ways. Another characteristic is whether the theories describe developmental change as resulting from internal processes such as biological and cognitive development or from external processes as the environment shapes how children develop. As we describe some of the central theories that have been influential in our thinking about children's development, keep these questions in mind:

1. How does the theory describe development? Does change occur quantitatively, in small steps, or qualitatively, in distinct stages?
2. What drives development? Is it the product of internal processes such as biological and cognitive growth, the result of environmental influences, or a combination of these factors?

You will be able to check your answers to these questions using Table 2.3 after you have read about the different theories.

As we begin this description of developmental theories, it is important for you to understand that theoretical ideas do not appear in a vacuum. The influential theorists in our field all have developed their ideas in a particular culture and at a particular point in historical time, and their ideas about child development reflect these influences. However, each of these theories has been tested over time, and as we described earlier, we have retained those concepts and principles that have continued to be useful and lost or changed those that have not. Each of these theories has helped shape the type of questions we ask, the type of research we conduct, and the interpretations we place on our findings.

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. What two functions do theories serve in science?
2. What are two ways in which theories of development differ from each other?

Critical Thinking

What is the relationship between theory and truth?

PSYCHOANALYTIC THEORY

We begin our discussion of theories with **psychoanalytic theory** (*psyche* = the mind; *analysis* = looking at the parts of something to see how they relate) because it was the first theory to describe stages of development through childhood. In this theory, developed by Sigmund Freud (1856–1939), biological urges move each person through a series of stages that shape the personality. Although psychoanalytic theory has been controversial throughout its existence, many of its concepts have influenced current ideas about how the mind works.




Freud theorized that personality is made up of three parts: the id, the ego, and the superego. According to Freud, we are all born with an **id**, which consists of our basic instinctual drives. The id seeks immediate gratification for all its urges. Infants want *what* they want, *when* they want it. As children grow older, they begin to become aware of the reality of the world around them and begin to develop the ability to think and control their emotions. The ability to negotiate between the demands of basic drives and the real world is the job of the **ego**. As the ego develops, children are still motivated by their basic drives, but they are now able to interact in the real world to get their needs met. Finally, sometime between the ages of 5 and 7, children begin to incorporate moral principles that work against the drive-motivated functioning of the id. These moral principles are maintained by the **superego**. Freud believed that children do not have any conscience, or internal sense of guilt that guides their actions, until they develop a superego. Figure 2.1 illustrates these three parts of the personality.

Sigmund Freud's Psychosexual Stages

Freud thought our most basic drive is the sex drive. If you believe that the biological goal of our lives is to pass on our genes, then you might agree with Freud that the sex drive is central to everything else. Freud also believed that many of our thoughts and feelings about sexuality are hidden in our *unconscious mind*, the thoughts of which we are unaware.

He outlined five stages in child and adolescent development, which he called **psychosexual stages**. At each of these stages, sexual energy is invested in a different part of the body, and gratification of the urges associated with those areas of the body is particularly pleasurable. Freud believed that the way these urges are handled during each stage determines the nature of an adult's personality and character.

FIGURE 2.1 ■ Id, ego, and superego. In Freud's theory, the id is the part of the personality that wants immediate gratification of all its desires. The ego has the job of finding a realistic way to satisfy those needs. The superego contains the moral guides and restrictions on those desires.

Id	Ego	Superego
 <p data-bbox="424 1562 440 1833">©iStockphoto.com/Anatoliy Samara</p> <p data-bbox="456 1850 647 1902">"I want to eat all this candy—right now!"</p>	 <p data-bbox="762 1598 778 1833">©iStockphoto.com/pick-uppath</p> <p data-bbox="794 1850 1050 1923">"Lots of candy will make me sick. One lollipop will be all right."</p>	 <p data-bbox="1086 1650 1102 1833">©iStockphoto.com/soleg</p> <p data-bbox="1106 1850 1329 1902">"A good girl wants to eat vegetables, not candy."</p>

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During the **oral stage**, which lasts from birth to about 18 months of age, infants derive a great deal of satisfaction from activities that stimulate their mouth, lips, or tongue. This is why infants often immediately put anything they get their hands on into their mouth. The **anal stage** lasts from 18 months to 3 years. At this age the pleasure center moves to the anus, and issues of toilet training become central as children are expected to learn to control their bodily urges to conform to society's expectations. The **phallic stage** lasts from 3 to 6 years of age. Sexual energy becomes focused on the genitals, and boys and girls develop what has been called "the family romance." Boys imagine marrying their mother when they grow up, and girls imagine marrying their father. Children must learn to give up these desires and begin to identify with the parent of the same sex.

The **latency stage** occurs between 6 and 12 years of age. *Latent* means inactive, and Freud (1953) believed that during this time the sex drive goes underground. Children move from their fantasies of marrying their parent to a new realization that they must learn how to become a grown-up. The sex drive provides energy for the learning that must take place, but the drive itself is not expressed overtly. Children transfer their interest from parents to peers (A. Freud, 1965). At this age, children often abandon any cross-sex friendships they have and turn to same-sex peers. They may even express an active dislike for opposite-sex peers. This separation of the sexes begins to change at age 12, when young adolescents enter the **genital stage**. At this point, sexual energy becomes focused on the genital area, and a more mature sexual interest occurs between peers.

Freud believed that emotional problems in adulthood derived from difficulties with resolving issues that arise in each of these stages during childhood. In his view, those problems could best be handled when these earlier difficulties were made conscious through the process of "the talking cure," called *psychoanalysis*.

Erik Erikson's Psychosocial Stages

Freud had many colleagues who further developed his theory, but one of the most influential was Erik Erikson (1902–1994). Erikson believed that issues of the ego are more important than those linked with the id and that the development of identity is the central issue for children and adolescents. At each stage in his theory, a conflict arises rooted in the social experiences typical at that stage of development. For this reason, Erikson (1963) described **psychosocial stages** (as opposed to Freud's psychosexual stages). The way in which we resolve each conflict lays the groundwork for the stages of development that follow.

Erikson's psychosocial stages are described briefly in Table 2.1. We describe each stage more fully in later chapters in this book that describe social and emotional development for each age group. To illustrate how Erikson's theory reflects a developmental crisis at each stage, we describe here his first stage, *trust versus mistrust*, in which infants establish trust in the world around them. Infants are totally dependent on the adults who care for them. When caregivers are dependable and reliably meet the infant's needs, the infant learns to trust the world and feel safe and secure in it. However, when caregivers are inconsistent in providing care or are emotionally unavailable, the infant develops a sense of mistrust in the world. Of course, none of us have a completely positive or completely negative set of experiences at any of the stages; therefore, we can think of the two possible outcomes of each stage as two sides of a seesaw, with one side higher than the other but both actively in play. The way infants resolve the issue of trust versus mistrust sets the stage for the way they will go on to deal with the next psychosocial stage, called *autonomy versus shame and doubt*, as toddlers.

Another important aspect of Erikson's theory is that he believed development does not stop in adolescence. He went beyond Freud's stages to add three stages of adulthood, becoming the first theorist to recognize that we continue to grow and develop throughout our lives. You can use Table 2.1 to review and compare Erikson's eight psychosocial stages and Freud's five psychosexual stages.

Modern Applications of Psychoanalytic Theory

Although Freud's psychoanalytic theory has been controversial, ideas that come from it are still very influential, particularly in the study of development of mental and emotional disorders (T/F Q2) (for example, see Behrendt, 2012). Many psychotherapists continue to practice therapy based on Freud's idea that inner

TABLE 2.1 ■ A comparison of Freud's and Erikson's stages of development.

Ages	Freud's Psychosexual Stages		Erikson's Psychosocial Stages	
Infancy	Oral	Pleasure is focused on the mouth and "taking in."	Trust versus mistrust	Infants develop trust in parental care and in their own ability to cope or a sense that the world is not a safe or predictable place.
Toddlerhood	Anal	Pleasure is focused on the anal region and control of one's own body and its products.	Autonomy versus shame and doubt	Toddlers develop more independence and self-control or a lack of confidence in their abilities.
Early childhood	Phallic	Pleasure is focused on the genital area; development of the "family romance."	Initiative versus guilt	Children exhibit exuberant activity or overcontrol.
Middle childhood	Latency	Sexual energy goes underground as the child focuses on peers and learning.	Industry versus inferiority	Children learn the tasks of society or develop a sense of inadequacy.
Adolescence	Genital	Sexual energy reaches adult level, with focus on intimate relationships.	Identity versus role confusion	Adolescents integrate previous experiences to form an identity or feel confused about their role in society.
Early adulthood			Intimacy versus isolation	Young adults develop an ability to form close relationships or fear and avoid relationships.
Middle adulthood			Generativity versus stagnation	Adults guide the next generation or are preoccupied with their own needs.
Later adulthood			Ego integrity versus despair	Older adults achieve a sense of meaning in life or feel their life has not been worthwhile and fear death.

Adapted from Kahn (2002) and Erikson (1963).

conflicts from earlier life experiences, especially early trauma, form the basis for later psychological symptoms, and that bringing those inner conflicts from the unconscious mind into consciousness will be therapeutic. On the other hand, Freud's theory, including his psychosexual stages, is generally not the subject of current research in child development.

Erikson's ideas about the effect of social experiences on development have influenced our understanding of the way development occurs as a series of interrelated experiences. For instance, we better understand the challenge of adolescence when we see it as a struggle to establish a coherent sense of individual identity that emerges from the previous stages of development (Becht et al., 2016; Meeus et al., 2012). In addition, research has shown that successfully resolving the developmental crises at each of Erikson's stages has been linked to resilience, which includes the ability to cope with stress (Svetina, 2014). Throughout this book, you will read about resilience and stress as it affects children throughout infancy, childhood, and adolescence. Erikson's theoretical ideas also have been used as a framework for parenting advice (Fletcher & Branen, n.d.) and in the treatment of children with emotional disturbances (Turns & Kimmes, 2014).

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. What are the three parts of the personality according to Freud?
2. Which drive does Freud say is most important for human development?
3. How do the stages in the theories of Freud and Erikson differ?

Critical Thinking

Many 2-year-olds can be quite stubborn, resulting in what is often called the “Terrible Twos.” How do you understand this behavior from the different points of view of Freud and Erikson?

LEARNING THEORIES

A different theoretical approach to understanding how children develop is offered by the learning theories. Whereas psychoanalytic theory focuses on internal processes of the mind, the learning theories focus on observable behavior. These theories are based on the link between a stimulus (any event that causes a response) and an individual’s response to that stimulus. In the following sections, we describe the theories known as behaviorism (which is based on principles of classical and operant conditioning) and social cognitive theory (which is based on principles of modeling and imitation).

John B. Watson and Classical Conditioning

John B. Watson (1878–1958) developed the theory he called **behaviorism**. He concentrated on what he could see: behavior, or what people *do*. At the time Watson was developing his theory, the modern academic field of psychology was just emerging, and psychologists in the United States were trying hard to establish the field as an experimental science, with testable predictions based on observable phenomena rather than unseen concepts such as the unconscious mind described by Freud.

Watson studied the ways in which the environment influences human behavior. He described a process called **classical conditioning** and carried out an experiment with a 9-month-old infant, known only as Little Albert, to demonstrate that he could use this process to create fear in a human infant (Watson & Rayner, 1920). Watson found that Little Albert, like many infants, was frightened by sudden, loud sounds, but was not frightened by seeing a white rat.

You can think of conditioning as a type of learning, so when we refer to something as unconditioned, it means you don’t have to learn it. For Little Albert, the link between the loud sound and his fear was unlearned, so the sound was an unconditioned stimulus (UCS) and his fear was an unconditioned response (UCR). However, Albert had no fear of the rat, so that was a neutral stimulus. Watson carried out the process of classical conditioning by making the loud sound every time he showed Albert the white rat. At first Little Albert cried because of the loud sound, but he soon began to express fear by crying as soon as he saw the white rat. Even when Watson stopped making the loud sound, every time he showed Little Albert the white rat, the infant continued to show fear. In this process, the white rat became the conditioned stimulus (CS) because Albert had learned something about it, and Albert’s fear of the white rat became the conditioned response (CR). Figure 2.2 illustrates the process of classical conditioning.

Classical conditioning can be used to establish positive responses as well as negative ones. Children who visit fast-food restaurants with a play area (UCS) have fun there and feel happy (UCR). Although they may have had no initial preference for this type of food (neutral stimulus), they may come to associate that type of food (CS) with the fun they have in the play area and subsequently feel happy (CR) when they have that food (Petrovich & Gallagher, 2007).

To check whether you understand the steps of the classical conditioning process, try **Active Learning: Understanding the Process of Classical Conditioning**.

Active Learning: Understanding the Process of Classical Conditioning

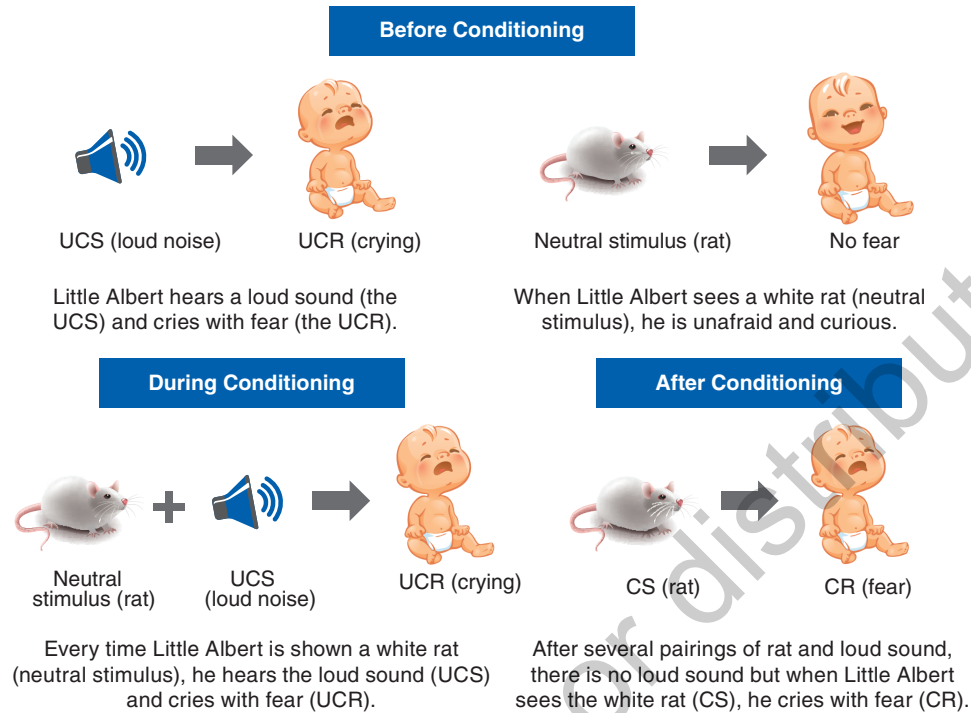
Read the following paragraph and then answer the questions that follow.

Every time your roommate leaves the room, he says, “Goodbye!” and loudly slams the door, making you flinch. After this happens a number of times, your roommate says to you, “Gotta go now. Goodbye!” and you realize that you are flinching even before you hear the door slam.

Can you identify all the elements in this classical conditioning paradigm?

Unconditioned stimulus (the stimulus that leads to an automatic response)

Unconditioned response (the response that is automatic)

FIGURE 2.2 ■ Classical conditioning.

Neutral stimulus (does not naturally provoke a response)

Conditioned stimulus (the stimulus that starts out neutral but is paired with the unconditioned stimulus)

Conditioned response (the response to the conditioned stimulus)

Answer:

Unconditioned stimulus: door slamming

Unconditioned response: flinching

Neutral stimulus: "Goodbye!"

Conditioned stimulus: roommate's "Goodbye!" after being paired with door slamming

Conditioned response: flinching in response to "Goodbye!"

Modern Applications of Classical Conditioning

One of the dangers of a negative classically conditioned response is that once it has been established, people understandably avoid the stimulus that produces it. For example, if you once got very sick after eating asparagus, you might avoid ever eating it again, so you never find out that it is an enjoyable food and had nothing to do with your illness. Classically conditioned fears can be so powerful that they begin to limit what people who experience them are able to do. This type of unreasonable fear is called a **phobia**.

Phobias can be treated by exposing people to their feared situations in a controlled way using the process of *deconditioning*. People are first trained in relaxation techniques. Next they are exposed to the object or situation they fear in a series of gradual steps from least frightening to most frightening, and they use their relaxation techniques to reduce their anxiety at each step until the stimulus no longer evokes the fear response.

Today, virtual reality has been used in the treatment of children with anxiety disorders to expose them to feared stimuli in a controlled way that they can tolerate. Rather than placing the child in a completely virtual environment, it is also possible to add images of feared elements, such as a spider, to a child's view of the real environment, a technique that is known as *augmented reality* (Baus & Bouchard, 2014). Although the amount of research on this approach is limited, it has been found to be helpful for children with school phobias and phobias of spiders (Bouchard, 2011; Bouchard et al., 2014) and is a promising new way to treat phobias.



Treating phobias with augmented reality. If you had an unreasonable fear of spiders, would the image of this spider superimposed on your hands via augmented reality help you to overcome that fear?

B. F. Skinner and Operant Conditioning

B. F. Skinner (1904–1990) further developed the theory of behaviorism by introducing the idea of **operant conditioning**. While studying rat behavior, he noticed that the rats were affected not by what came before their behavior, as was true of classical conditioning, but by what came after (B. F. Skinner Foundation, n.d.). He concluded that spontaneous behaviors are controlled by the environment's response to them. He defined a **reinforcement** as anything that occurs after a behavior that increases the likelihood the behavior will continue or happen again.

Positive reinforcement occurs when you get something you like and want. **Negative reinforcement** occurs when something disagreeable is removed following a behavior. Both types make a behavior more likely to happen. While it is easy to think of examples of positive reinforcement, understanding negative reinforcement is more difficult. For instance, when a parent picks up a crying baby and the baby stops crying, stopping the unpleasant sound of the infant crying reinforces the parent's behavior and makes it more likely the parent will respond this way again when the baby cries. Figure 2.3 illustrates the difference between these two types of reinforcement.

Skinner described several concepts related to operant conditioning that help us understand how the process works. The first is the process of **shaping behavior**. You cannot reinforce a behavior unless that behavior occurs. For example, you cannot reinforce positive peer interaction with a child who does not interact with peers. However, Skinner developed the idea that behavior can slowly be “shaped” through reinforcement of behaviors that progressively get more and more like the behaviors desired. To shape the behavior of a child who does not interact with peers, you could begin with a reward when

FIGURE 2.3 ■ Illustration of positive reinforcement and negative reinforcement.

Positive Reinforcement	
	
Positive reinforcement makes a behavior more likely to continue. Awarding a trophy for academic performance will make it more likely that this boy will continue to work hard in school.	
Negative Reinforcement	
	
Negative reinforcement also makes a behavior more likely to continue. Listening to a crying baby is difficult. When this mother finds that holding her baby stops the crying she is likely to continue to hold her baby.	

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the child is simply near another child. The next step might be that the behavior is reinforced only when the child looks at the other child, and finally the reinforcement might be provided only when the child speaks while looking at the other child. Eventually, the reward would be contingent only on true interaction with a peer.

If reinforcement increases the likelihood that a behavior will occur, you might think that the most effective way to establish and maintain a behavior would be to reinforce children every time they perform that behavior. However, although continual reinforcement does a great job of establishing a behavior, when the reinforcement stops the behavior is likely to stop as well. Skinner found that less frequent reinforcement is more effective for maintaining a behavior. For example, gamblers at a slot machine are reinforced with winnings on a random schedule, and this is very effective at prolonging their gambling.

If reinforcement increases the likelihood of a response, punishment is intended to decrease it. **Punishment** consists of administering a negative consequence (such as a scolding) or taking away a positive reinforcement (such as “no dessert because you didn’t eat your dinner”) in response to an unwanted behavior. However, *Skinner (1953) believed that a more effective way to control behavior is to ignore an undesirable behavior rather than punish it, a process he called extinction* (T/F Q3). If children are looking for *any* response from a parent, even yelling or spanking may unintentionally reinforce the undesirable behavior because behaving this way gets them the parental attention they want. In this case, ignoring the misbehavior, but giving attention for an appropriate behavior, should help extinguish the misbehavior. Figure 2.4 shows examples of punishment and extinction.

FIGURE 2.4 ■ Punishment and extinction.

Punishment 1:
Negative Consequence—This child receives a scolding for misbehaving.



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Punishment 2:
Removal of a reward—This child didn't eat their dinner, therefore they don't receive a dessert.



Ingram Publishing via Getty Images

Extinction: Ignoring temper tantrums leads to a decrease in their occurrence.



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istock/ jeffbergen; Myrleen Pearson / Alamy Stock Photo; istock/ snapphoto

Modern Applications of Operant Conditioning

An approach called **applied behavior analysis (ABA)** has used operant conditioning techniques in schools (Zoder-Martell et al., 2017) and with children in special populations to increase adaptive behaviors and decrease maladaptive ones (Irwin & Axe, 2019). A therapist first observes a child to determine where, when, and how often a problematic behavior is occurring and then identifies the rewards or reinforcements the child is getting from it. After setting a goal for reducing the problematic behavior,

the therapist implements changes in the child's environment that reduce the unintended reinforcement of the undesired behavior and contingently reinforce desired behavior. For example, children might be annoying peers in a classroom because it gets them sent to detention where they don't have to do their class work. In this case, the way this behavior is being dealt with is unintentionally rewarding the misbehavior by getting the students out of doing their work. The intervention might be that the classroom teacher ignores the misbehavior whenever possible so the behavior isn't reinforced, or there might be negative consequences for it, such as being required to do something else the children don't like to do when they are not doing their class work. At the same time, children might receive reinforcement such as positive attention or small rewards for appropriate behaviors, such as paying attention to their work.

Albert Bandura and Social Cognitive Theory

Albert Bandura (1925–2021), who was originally trained as a behaviorist, became dissatisfied with behaviorism because he thought it was difficult or impossible to identify either stimuli or reinforcements for the entire range of human behavior. Bandura (1986) proposed that, in addition to classical and operant conditioning, people can learn new behaviors simply by watching others and imitating them rather than by receiving direct reinforcement of their own behaviors from the environment.

Bandura's earliest work showed how children learn by direct observation. In his classic experiment, one group of children watched a video of an adult acting aggressively to a Bobo doll (a large inflated figure of a clown that is weighted on the bottom), hitting it, kicking it, throwing it, and striking it with a toy hammer (Bandura et al., 1963). These children and other children who had not seen the video were then brought individually into a room containing the Bobo doll and other toys. The children who had seen the adult attacking the Bobo doll were much more likely to imitate the adult's violent behavior in the video. In contrast, the children who hadn't seen the adult model attacking the Bobo doll were less likely to carry out these aggressive acts. Bandura concluded that observing a model may provoke a more generalized response based on the children's understanding of what was happening. In this case, they may have specifically seen the adult hit the Bobo doll, but they also understood that the generalized idea was to be aggressive.

Bandura initially called his theory *social learning theory* because the learning occurs as the result of watching other people, but later he placed greater emphasis on the cognitive, or thinking, aspects of behavior development. He renamed his theory **social cognitive theory** to emphasize that social experiences people have in their environment are all filtered through the way they think about them.



Bandura's experiment on modeling. In Bandura's experiment, children were more likely to behave aggressively like this boy after seeing a film of an adult hitting a similar Bobo doll.

Mirrorpix / Contributor / Getty Images

Modern Applications of Social Cognitive Theory

Bandura further developed social cognitive theory by saying that people are not passive recipients of environmental influence because they also affect and change their environment. In more recent years, his research focused on **self-efficacy** or "the core belief that one has the power to influence one's own functioning and life circumstances" (Bandura et al., 2001, p. 125). Using social cognitive theory, interventions have been developed to promote self-efficacy in a number of countries. In Mexico, a television drama series was developed that addressed issues of illiteracy, showing people struggling at first, but then successfully reading. At the end of the series, a well-known actor told viewers about a self-study program for literacy development. The next day, 25,000 people showed up to enroll in the program (Bandura, 2008). Clearly, people felt more positive about their ability to learn to read after observing a model doing so successfully.

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. According to behaviorism, what is the most important influence on human behavior?
2. How are classical and operant conditioning similar, and how are they different?
3. What is the basic learning principle of social cognitive theory?

Critical Thinking

Identify a behavior in a child that you think needs to be changed (for example, leaving clothes on the floor). Describe how you could use shaping to move this behavior toward what you want it to be.

THEORIES OF COGNITIVE DEVELOPMENT

Theories of cognitive development focus on the processes of the mind, including thinking and learning. We introduce these ideas in this chapter and then examine them in further detail in Chapters 6, 9, 12, and 15, where we discuss cognitive development at each age.

Jean Piaget's Cognitive Developmental Theory

Jean Piaget (1896–1980) was a Swiss scientist who studied children's thinking using what is called the *clinical method*. He encouraged children to talk freely and learned about their thoughts from a detailed analysis of what they said (Piaget, 1955/1973).

Piaget believed we are constantly learning about and adapting to our environment by organizing the world in ways we can understand. The units we use to organize our understanding are called **schemas**. They consist of a concept and all the associations to that concept that we have developed through our past experiences. For example, we all have a schema for age, which contains all the expectations and associations we activate when we see infants, children, teens, and adults.

According to Piaget, adaptation consists of two processes: assimilation and accommodation. In **assimilation**, we take new information and put it into an existing schema, whether it really fits there or not. Take the example of a little boy who goes to the zoo and sees an elephant for the first time. He turns to his mother and says, "Look, it's a big doggy with two tails." This child does not have a schema that helps him make sense of an animal with both a trunk and a tail, so he tries to fit this new experience into one of his existing concepts. Will he always think the elephant is a strange dog? Of course not, and this is where the process of **accommodation** comes in. As his mother points out the unique features of an elephant, the child accommodates this new information by creating a new schema, one for elephants. In Piaget's theory, a process he called **equilibration** is the constant seesaw between assimilation and accommodation. As we have new experiences and learn new things about the world, we assimilate new information into existing schemas, but if the new information cannot be assimilated, it throws us into a state of disequilibrium. We then need to change our schemas to accommodate the information so we can return to a steady state of equilibrium.



Accommodating new information. This boy might think these elephants are big dogs the first time he sees them, but he will soon learn they are a new type of animal.

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Like Freud and Erikson, Piaget believed children change in qualitative ways from one age period to the next. The stages he described were based on the way he believed children thought about and understood the world at each age level. Piaget believed children are not just less knowledgeable than adults; rather, they think in qualitatively different ways at each developmental stage. He described four stages of cognitive development: sensorimotor, preoperational, concrete operations, and formal operations. We will describe these stages in detail in the chapters that describe cognitive development for each age group later in this book.

Modern Applications of Piaget's Theory

Piaget has been criticized for the methodology he used and on his conclusions about when children enter each of the stages in his theory, but his greatest contribution may be his concept of **constructivism** (Newcombe, 2011). Remember that in Chapter 1 we talked about the issue of whether children are passive recipients of environmental influences or actively participate in their own development. Piaget believed that children are active learners, always working to *construct* their understanding of the world.

Constructivist theory has been used as the basis of problem-based learning in the classroom. Using this approach, students are given a problem to solve, and the classroom teacher acts as a facilitator or guide as the students work together in a group of peers to solve it. In one study, students were given the task of constructing an aquarium habitat for their classroom. *One group of students listened to information presented by their teacher using PowerPoint slides, worksheets, and videos, while another group assessed what they knew about the problem and what they needed to know to solve it and then devised a plan to get that information using classroom and web-based resources. Students in the second group (the problem-based learning group) learned more factual information about aquatic habitats and improved their critical thinking skills more than the traditional learning group* (T/F Q4) (Rehmat & Hartley, 2020).

Piaget also emphasized that physical, bodily activities during infancy were the basis for development of thought. This idea has appeared in more recent years as part of the concept of **embodied cognition** (Kontra et al., 2012). In embodied cognition, thought and behavior are the outcome of a conversation among multiple “speakers,” including the brain, activity of the body, and environmental stimuli and effects (Marshall, 2016). If you think of a conversation you have had with a group of friends, generally there is not one person who controls the conversation. Instead, everyone in the group shapes the topics, direction, and flow of the interaction. In similar fashion, embodied cognition models a complex interaction of many factors that all contribute to the flow and development of human thought and behavior.

Lev Vygotsky's Sociocultural Theory

Lev Vygotsky (1896–1934), a Russian psychologist, had somewhat different ideas about cognitive development, emphasizing the importance of the social world and of culture in promoting cognitive growth. According to Vygotsky (1934/1986), learning first takes place in the interaction between people; then the individual internalizes that learning, and it becomes a part of their own independent thinking.

Vygotsky was more interested in what children could become than in how they currently functioned. He believed that looking at what children are capable of learning in interaction with a skilled helper is a better indicator of their level of cognitive development than just testing what they already know. He developed the concept of the **zone of proximal development**, defined as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86).

Proximal refers to being near or close. A good teacher must first determine what children already know and then challenge them to learn something near enough to what they already know so that they will be able to make sense of it, a process called **scaffolding**. A scaffold is a structure put around a building to allow people to work on it. In Vygotsky's concept, adults help the “construction” of the child's understanding by providing guidance and support (the scaffolding). Just as the scaffold comes down when a building is completed, so too the adult can step back when children fully understand. For

example, 2-year-olds may need you to hold their hand on the handle of a jack-in-the-box, but by age 3 children are likely able to do it on their own. Your input is no longer needed, and your “scaffolding” can come down. You will learn more about these concepts in Chapter 9.

Modern Applications of Vygotsky’s Theory

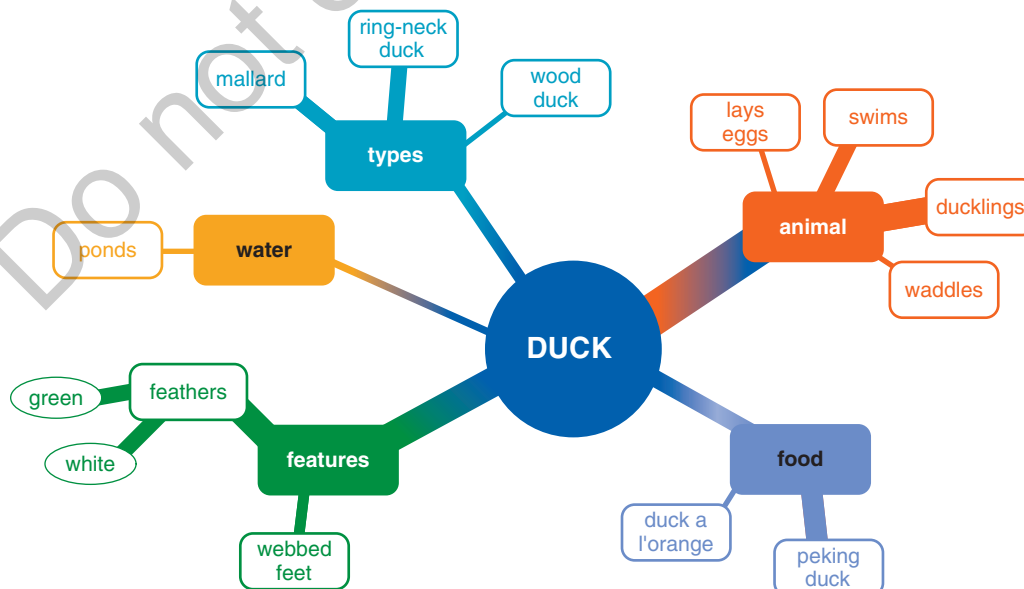
Like Piaget’s theory, Vygotsky’s ideas have had a powerful influence in the field of education. One specific educational practice that developed out of Vygotsky’s ideas is known as **dynamic assessment**. In this approach, instead of testing what a child knows or can do at one particular time, the instructor asks a question to assess the child’s understanding of a concept. If the child answers the question incorrectly, the instructor starts with the most indirect help, such as a suggestion to think about whether they have seen a problem like this before. If this help is not enough, the adult will increase the level of direction, potentially ending by giving and explaining the correct answer. Some children will only need the small suggestion, while others need a more direct approach (see Alavi & Taghizadeh, 2014; Petersen et al., 2017). You will read about dynamic assessment as an alternative to standardized testing in Chapter 12.

Information Processing

Whereas Piaget and Vygotsky provide more global concepts about cognition and its development, information processing theory breaks down the way we understand and use information into its component parts, such as attention and memory. The earliest approach to information processing described cognition as a series of steps. First we pay attention to something, then we process or think about it, then we store it in memory where we can later retrieve and use it. This has been referred to as the **stores model** and is based on a view of the mind as operating like a computer. However, the more we learn about cognition, the more complex it appears to be. In particular, the assumption that cognition is a linear, sequential process has been questioned.

A more current model is called the **connectionist or neural network model**. This way of thinking about information processing more closely reflects our current understanding that brain function consists of neurons, or nerve cells, operating through multiple simultaneous connections with other neurons. Instead of a sequential, step-by-step process, the connectionist approach models cognition as multiple, parallel processes occurring at the same time. As shown in Figure 2.5, when we see a white

FIGURE 2.5 ■ Neural network model of memory. In the neural network approach to information processing, concepts are made up of information (or nodes) and the links that connect that information to represent a concept. The width of the links in this figure represents the strength of each connection.



duck, different concept nodes may be activated. One node can represent a specific concept (*white*), one can represent a higher-order concept (*duck*), and one can represent a superordinate concept (*bird*) depending on how the neurons are activated (Robinson-Riegler & Robinson-Riegler, 2008). The concept nodes are analogous to neurons in the brain, and the links are connections between individual neurons. When information is stored in memory, it becomes a new node that is connected to other nodes in the network.

Although each node is connected in some way to other pieces of information in our memory, the strength of these connections can vary, and learning involves modifying the strength of the connections. When input comes into the system (for example, the sight of a bird in flight), certain nodes are activated. If the links between those nodes are strong enough, the output is a concept (in this case, *bird*).

Unlike Piaget who saw qualitative changes occurring in the way children think as they move from one stage to another, information processing looks at the gradual development of cognitive processes. You will find detailed discussion of the development of attention, memory, and other cognitive processes in the chapters that describe cognitive development for each age group later in the book.

Modern Applications of Information Processing

Information processing theory has led to an enormous amount of research on growth and changes in cognitive processes during childhood and adolescence. One new approach is the use of technologies that allow researchers to link specific cognitive processes with changes in both the structure and the function of the brain and nervous system. This area of study, known as **developmental cognitive neuroscience**, allows us to understand how the developing brain both promotes and limits certain cognitive abilities. For example, the ability to think in an abstract way rather than dealing only with concrete concepts develops throughout adolescence. Brain imaging studies have shown changes during adolescence in the activation of parts of the brain that deal with aspects of abstract thought (Dumontheil, 2014). Such studies support the idea that the immaturity of the adolescent brain limits cognitive abilities. Therefore, teachers, judges, and others should not expect teens to operate at the same level as adults. Brain development influences children's development at all ages, as you will learn throughout this book.

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. How are Piaget's theory and Vygotsky's theory different, and how are they similar?
2. What is constructivism?
3. How does the stores model differ from the connectionist or neural network model of information processing?
4. What is developmental cognitive neuroscience?

Critical Thinking

How does the concept of embodied cognition add to our understanding of the link between brain function and cognitive development?

THEORIES OF ETHOLOGY, ECOLOGICAL SYSTEMS, AND DYNAMIC SYSTEMS

Evolutionary Theory: Ethology

Charles Darwin's theory of evolution is based on the idea that living things that best adapt to their environment, not necessarily the ones that are biggest or strongest, are more likely to pass on their genes to the next generation. His focus was largely on physical characteristics, but the basic idea that human behavior that has adaptive value will persist is central to the field called ethology. Konrad

Lorenz (1903–1989) is considered the father of modern **ethology**, the study of the adaptive value of animal and human behavior in the natural environment. As a zoologist studying animal behavior in Munich, Germany, Lorenz found that ducks and geese would *immediately* follow their mothers after they were born. This automatic behavior, called **imprinting**, is adaptive because the mother provides her offspring with food and protection from predators. Lorenz showed that this behavior was innate and not learned. As you can see in Figure 2.6, when he removed the mother goose so that he was the first figure the newly hatched ducklings saw, they responded to him in the same way they would have responded to the mother goose: by following him.

Modern Applications of Evolutionary Theory

In the past, some researchers tried to apply the idea of imprinting to human behavior. Because ducklings will imprint on whomever they first see, *researchers examined the idea that infants must have skin-to-skin contact with their mother within the first few hours after birth for bonding, or love, to develop. Like many attempts to apply animal behavior to humans, this has turned out not to be the case (Streep, 2015) because the direct application of animal behavior to human behavior is usually too simplistic (T/E Q5).* However, ethological principles have contributed to our understanding of the slower, less automatic development of attachment between infant and mother during the first year of life. You will learn more about attachment in Chapter 7.

A more successful modern approach called *evolutionary developmental psychology* applies the principles and ideas of evolutionary theory specifically to questions of how and why children develop as they do (Frankenhuis et al., 2016). Children’s behaviors such as aggression, altruism, and attachment are seen as adaptations to the environment in two ways: (1) They help prepare children for adult life, and (2) they are adaptive at the children’s own stage of development and in their specific life circumstances.

One example of research based on an evolutionary developmental approach has focused on the onset of puberty in girls, which is affected by many factors but is largely controlled by genes. Research has shown that girls enter puberty at earlier ages when their parents have a high level of conflict with little support or satisfaction in their marriage, when their father is absent or severely dysfunctional, or when they have an insecure relationship with their mother at age 15 months (Belsky et al., 2010; Webster et al., 2014). Evolutionary developmental psychologists point to the fact that a girl with a dysfunctional childhood may not be able to count on reaching adulthood successfully; therefore, an early puberty may be adaptive because it helps ensure that she will be able to pass on her genes by enabling her to get pregnant earlier in life.

Ecological Systems Theory

We tend to think of the study of ecology as focusing on plants and animals and their relationships to the environment, but in the 1970s, Urie Bronfenbrenner (1917–2005) applied the idea of how

FIGURE 2.6 ■ Konrad Lorenz and imprinting. Konrad Lorenz observed the behavior of geese (left) and demonstrated the presence of imprinting by removing the mother goose and substituting himself. The goslings then treated him as if he were their mother (right).

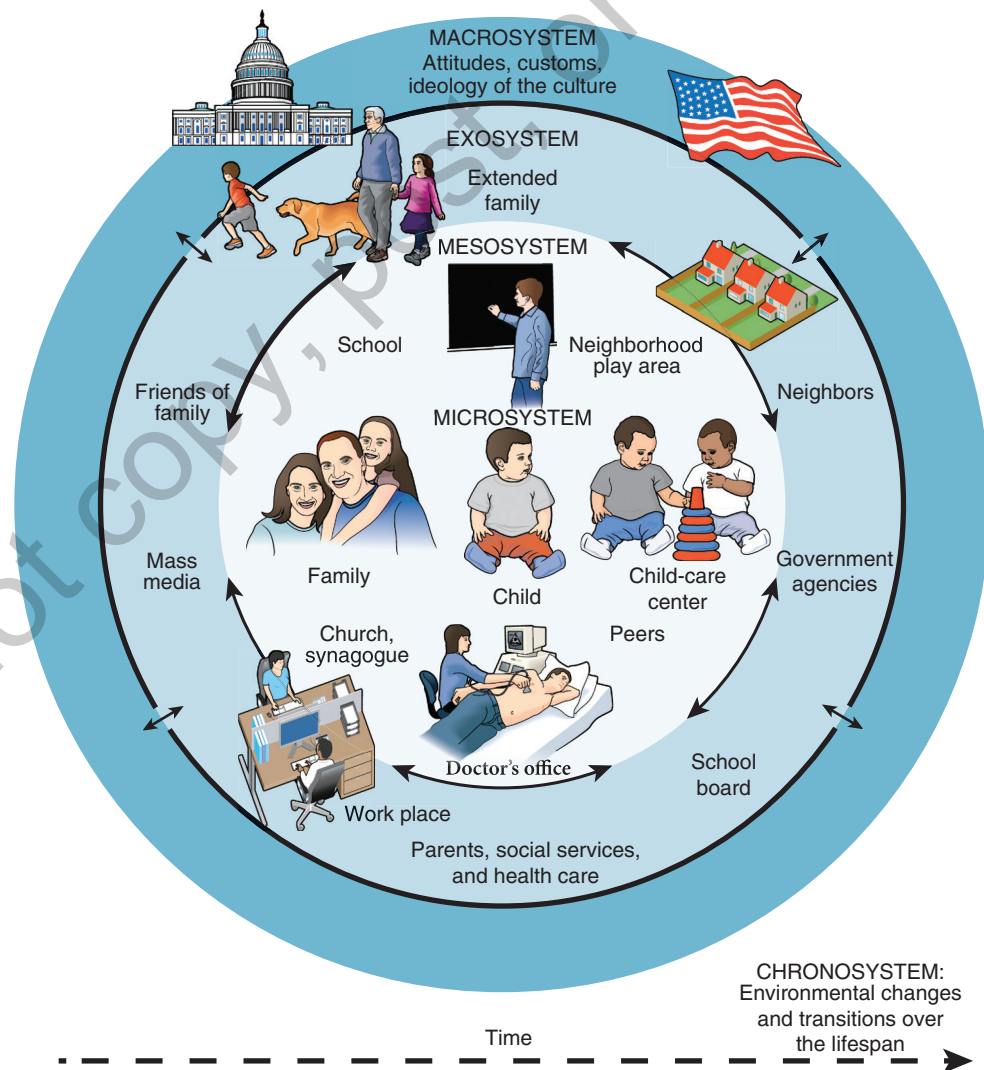


istock/ Cynthia Lempitsky; Nina Leon/ Contributor via Getty Images

organisms interact with their environment to the field of developmental psychology to create a human **ecological systems theory**. Using this framework, he defined development as the “interaction between the developing organism and the enduring environments or contexts in which it lives out its life” (Bronfenbrenner, 1975, p. 439). Bronfenbrenner believed we cannot understand children’s development without understanding how they interact with all the different facets of their environment. He also believed this interaction is a dynamic and reciprocal process. All aspects of the environment affect individuals, and individuals affect all aspects of their environment.

Bronfenbrenner (1977, 1986) proposed that development occurs within a nested set of influences that he divided into five systems—the microsystem, mesosystem, exosystem, macrosystem, and chronosystem—as shown in Figure 2.7. These systems are embedded one within the other, each influencing the other in a back-and-forth fashion. Bronfenbrenner emphasized the importance of understanding people, not on their own or with one or two other people, but rather within all these contexts. His theory is, in part, a criticism of some of the techniques of experimental psychology, in which children are tested in the laboratory and the results are then assumed to be true in the child’s natural setting (Bronfenbrenner, 1977).

FIGURE 2.7 ■ Bronfenbrenner’s ecological systems model. Think of the various systems in the ecological systems model as a set of nested environments, but with interactions both within a level and across levels. All of these interconnected systems change as a function of time, as represented by the arrow showing the chronosystem.



Adapted from Bronfenbrenner and Morris (2006), as cited in Kuther (2017).

The **microsystem** includes the face-to-face interactions children have in their immediate settings, such as home, school, or friendship groups. The interaction between a mother and a child forms a microsystem, as does the interaction between a child and a peer, or between a pair of siblings. The **mesosystem** brings together two settings that each contain the child. For example, when parents meet and talk to a child's teacher, the home setting interacts with the school setting, and this interaction influences the child's progress at school. The **exosystem** consists of settings the child never enters—that is, that are *external* to the child—but that affect the child's development nevertheless (Bronfenbrenner, 1986). For example, even if children never go to their parents' workplace, what happens in that setting can have an effect on them. A job that is so demanding that it leaves parents exhausted at the end of the day affects the way parents will interact with their children when they come home. The **macrosystem** consists of cultural norms that underlie the institutions and activities that make up someone's everyday life. For example, the macrosystem in the United States includes the ideology of democracy, as well as the value placed on individual achievement. The **chronosystem** consists of the events that take place at different times in a child's life, as well as the time in history in which the child lives. For example, parental divorce affects a 2-year-old child much differently than a teenager. Also, the current experience of divorce, when it has become more common, is different than it would have been in 1940 when it was relatively rare (Bronfenbrenner, 1986).

It will be easier for you to remember the various systems that make up ecological systems theory if you are able to recognize examples of each of them. **Active Learning: Examples of Ecological Systems** gives you a chance to do this.

Active Learning: Examples of Ecological Systems

Name the correct level of the ecological system for each of the descriptions that follow. The levels are the microsystem, mesosystem, macrosystem, exosystem, and chronosystem.

1. The number of mothers with children under the age of 5 who were employed outside the home doubled between 1970 and 1990.
2. A child's parents go to school for a parent-teacher conference so they can find out how their child is doing.
3. Navajo children compete in rodeos, baby contests, and other events at the annual Navajo Nation Fair.
4. A preschool teacher shows a child how to stack two blocks on each other.
5. New mothers in Spain are entitled to 16 weeks of paid leave after the birth of their baby.
6. A parent gets a promotion and a big raise, but that also means working longer hours.
7. Parents invite a teen's group of friends to their house to watch some movies.
8. Fathers today take a more active role in parenting than fathers in the past did.
9. Teens make plans for how they will spend time together on the weekend.
10. A new mother spends some time with her friends, who tell her she is too worried about caring for her baby and should just relax and enjoy being a mother.

Answers: (1) chronosystem, (2) mesosystem, (3) macrosystem, (4) microsystem, (5) macrosystem, (6) exosystem, (7) mesosystem, (8) chronosystem, (9) microsystem, (10) exosystem

Modern Applications of Ecological Systems Theory

Ecological systems theory has expanded the range and number of **variables** (characteristics that can be measured and that can have different values) that researchers include in their research to more fully understand a child's development within multiple contexts. For example, this theory helped researchers understand the full context in which immigrant children in the United States develop by examining



Social policy in action. The development of the Head Start program was strongly influenced by Bronfenbrenner's ecological systems theory. In addition to a quality preschool program, Head Start provides parenting counseling sessions. After these sessions, parents such as this father spend time reading and writing with their children.

Bob Daemrich / Alamy Stock Photo

the influences from family and peers (microsystem); the interaction of family, peers, and school (mesosystem); neighborhoods (exosystem); and immigrant cultural values (macrosystem) as they apply to the transition from adolescence to adulthood (chronosystem; Paat, 2013).

Another contribution of ecological systems theory is its application to social policy. A human ecologist believes all levels of society affect human development. The logical extension of this belief is understanding the importance of social policy, including legislation and programs at all levels of government. Bronfenbrenner himself was active in the creation of Head Start, a program designed to help children from socioeconomically disadvantaged backgrounds by providing interventions at several different levels. Head Start not only provides an excellent educational program for children but also helps their families by assisting with financial, social, educational, and psychological difficulties they might be experiencing. It also creates links between the classroom setting and the child's home. You will read more about Head Start and the impact it has had on children's lives in Chapter 9.

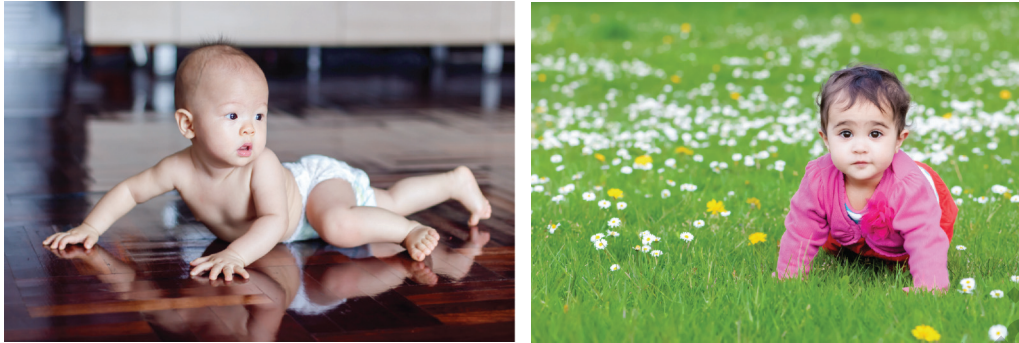
DYNAMIC SYSTEMS THEORY

As the study of children has become increasingly sophisticated, researchers have realized that development is a complex process that is based on characteristics of the whole child (including the nervous system, the musculoskeletal system, and the child's motivation or readiness) in the context of the environment, together with the nature of the task itself (Darrah et al., 2011; Sauve & Bartlett, 2010). **Dynamic systems theory** proposes that all these different aspects of development interact and affect each other over time. From this perspective, development is more like a jazz improvisation than a written piece of music (Spencer et al., 2011). Each part adjusts to every other part as children seek solutions for developmental problems that arise, and each child creates a unique pattern of behavior as a result.

To illustrate how this process works, we can look at how Esther Thelen (1941–2004) applied the theory of dynamic systems to the development of motor skills. Thelen (1989) found that the nature of physical development was flexible, not absolute. For example, newborn babies have a stepping reflex in which they appear to be walking when held upright with their feet touching a solid surface. This reflex typically disappears at about 2 to 3 months of age, and the disappearance was initially thought to be a product of brain maturation. However, Thelen found these babies will begin stepping again if placed up to their chests in water so that their legs are not so heavy, which means the disappearance of this reflex is not driven solely by brain development. Infants stop stepping reflexively when their legs become too heavy for them to lift.

Based on these observations, Thelen posited that the development of real walking is not just a matter of biological maturation but a coming together of many different experiences, bodily growth, and motivation. She showed that each infant explores and develops these abilities in different ways, depending on such individual characteristics as weight and activity level. Each child experiments with how to do things, and each action the child takes influences what the next action will be, creating a pattern of development that is unique to that person. Think of all the different ways that babies: on all fours, scooting on their tummies, or pulling with one leg while in a sitting position. Each has solved the

FIGURE 2.8 ■ Crawling takes many forms. There is no one right way to crawl. Babies figure out how to get where they want to go based on their abilities and their environment. Crawling on slippery wooden floors presents different challenges than crawling in the grass.



istock/yaoinlove; istock/Altinosmanaj

problem of how to get from here to there in their own unique way, developed from their own abilities and their environment. A baby who learns on a smooth, slippery floor may develop a different way to crawl than one who learns on a deep carpet or on grass, as shown in Figure 2.8.

Modern Applications of Dynamic Systems Theory

Although the earliest work based on dynamic systems theory focused on motor development, in recent years the theory has been used to understand many different aspects of child development, including cognitive and language development (Parladé & Iverson, 2011; Samuelson et al., 2015). For example, researchers have found that infant communication consists of a dynamic system that combines language, gesture, and emotion. When infants want a toy, they may point, look eager, and say the name of the toy. However, when one part of this system changes rapidly, coordination with the other parts may be disrupted. Sometime during the second year of life, many (but not all) toddlers go through what is known as a *vocabulary spurt*, in which they suddenly begin to pick up new words much more quickly. Researchers have found that when this happens, language becomes decoupled from emotion and gesture. That is, the system is thrown out of equilibrium (Parladé & Iverson, 2011). Seeing language as part of a dynamic system gives us a deeper understanding of how to promote and support its development.

CHECK YOUR UNDERSTANDING

1. How do the processes of animal imprinting and human attachment differ?
2. Why is it important to understand children within the context of the world around them?
3. What are the five systems that make up ecological systems theory?
4. Why do we say that dynamic systems theory describes human development in a way similar to a jazz improvisation?

Critical Thinking

A 7-year-old child is overly aggressive in school. Beginning with the child's own characteristics, what kinds of influence at each level of the ecological system might contribute to the child's difficulty?

DEVELOPMENTAL THEORY IN CULTURAL CONTEXT

Although some of the theories we have described take cultural differences into account, all were developed by European or American theorists, and most are based on research with Western, middle-class



Developmental theories reflect cultural values. Sub-Saharan African theories of child development emphasize children's connection to their community rather than the more individualistic approach of most Western theories.

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families (Kärtner, 2015). As we said in Chapter 1, *if we assume all societies must conform to Western values, we forget that different ideas and behaviors may be more adaptive for children growing up in different contexts and environments* (T/F Q6). To understand the diversity of development, we must examine the indigenous theories, or *ethnotheories*, of child development that guide the way children are raised in a variety of cultures. In Chapter 1, you were given examples of how cultural values affect specific parenting practices. In this chapter, we focus on how cultural values shape theories of child development.

We saw that Erikson's theory focused on the development of autonomy and identity of the individual. However, developmental theory in some cultures focuses more on the integration of the individual into the social group. For example, Nsamenang and Lo-oh (2010) explain that in sub-Saharan Africa, the overarching theory of development "positions the child not in his or her sovereignty but as socially integrated in a human community" (p. 386). This means that children are seen primarily as participants in their cultural communities rather than as autonomous individuals. To illustrate this cultural difference, compare Erikson's stages described earlier in this chapter to the stages of development described by Nsamenang (2015) for African culture as shown in Table 2.2.

Even within Western cultures, parental goals can differ. In a study of seven Western countries, parents from all the countries included "sociable," "loving," "active," and "strong-willed" in their description of their child. However, U.S. parents also included "intelligent" and "independent," while Italian parents were more likely to describe their child as "even-tempered" and "simpatico," indicating greater social and emotional competence (Harkness et al., 2015). For these reasons, it is important to remember that theories are shaped by the culture in which those writing the theories live. You will continue to learn more about these cultural comparisons throughout the book.

TABLE 2.2 ■ Comparing Erikson's stages with those described by Nsamenang. Erikson's theory focuses on the development of the individual, and Nsamenang's theory focuses on social connection throughout development.

Erikson's Stages	Nsamenang's Stages	Description of Nsamenang's Stages
Trust versus Mistrust	The neonatal period	Happiness for the safe delivery of the infant and projection of the kind of person the infant should become through socialization
Autonomy versus shame and doubt	Social priming	Increased communication, sharing, and exchange between infant and caregivers
Initiative versus guilt	Social apprenticeship	Rehearsal of social roles needed in different aspects of life
Industry versus inferiority	Social entree	Initiation rites associated with puberty
Identity versus role confusion	Social internment	Education for movement into adult roles and responsibilities
Intimacy versus isolation	Adulthood	Marriage and parenthood
Generativity versus stagnation	Old age/death	Maximum social competence, wisdom
Ego integrity versus despair	Ancestral and spiritual selfhoods	Importance of grandchildren
		Status of the "loving dead" or the "dreaded evil dead"

Adapted from Erikson (1963); Nsamenang & Tchombe (2011).

Comparison of Developmental Theories

When we began this section on developmental theories, we asked you to keep in mind these important questions:

1. How does the theory describe development? Does change occur quantitatively, in small steps, or qualitatively, in distinct stages?
2. What drives development? Is it the product of internal processes such as biological and cognitive growth, the result of environmental influences, or a combination of these factors?

You can now use Table 2.3 to review the theories presented in this chapter and to see whether your answers to these questions about them were correct. In addition, the table provides a very brief statement of some major contributions each theory has made to the study of child development and some of the recent applications of each theory.

As you learn about developmental theories, you might be tempted to say “I agree” or “I don’t agree” with any particular theory, but your opinion should ultimately depend on reasoned, testable evidence that supports or refutes each one. In the next section, we examine how psychologists carry out research that advances our theoretical understanding of human development.

TABLE 2.3 ■ Comparison of developmental theories.

Theory (Theorists)	Quantitative or Qualitative Change	Internal Processes and/or Environmental Influences	Contribution to the Study of Child Development	Recent Approaches/ Applications Based on Each Theory
Psychoanalytic theory (Freud and Erikson)	Qualitative: Freud has five stages. Erikson has eight stages.	Biology drives development and is affected by environmental experiences.	Children’s unconscious thoughts and motivations help explain their behavior. Erikson’s stages describe typical developmental issues from infancy through adolescence.	Psychotherapeutic approaches to treatment of psychological and emotional problems Resolution of developmental crises to build resilience
Behaviorism and social cognitive theory (Watson, Skinner, and Bandura)	Quantitative	Environment	Reinforcement is used to change children’s problem behaviors. Imitation is central to children’s learning.	Virtual and augmented reality treatment of phobias Applied behavior analysis Development of self-efficacy
Piaget’s cognitive theory	Qualitative: Piaget has four stages.	Biology drives development of cognitive processes, and the environment shapes it.	Understanding children’s active construction of knowledge shapes teaching approaches.	Activity-based learning Embodied cognition
Vygotsky’s cognitive theory	Quantitative	Environment, in the form of culture and social influence, drives development of cognitive processes.	Scaffolding and the zone of proximal development form the basis for teaching approaches.	Dynamic assessment
Information processing	Quantitative	Biology and environment interact to influence cognitive processes.	Basic processes of cognitive development are central to understanding the process by which children learn.	Developmental cognitive neuroscience

(Continued)

TABLE 2.3 ■ Comparison of developmental theories. (*Continued*)

Theory (Theorists)	Quantitative or Qualitative Change	Internal Processes and/or Environmental Influences	Contribution to the Study of Child Development	Recent Approaches/ Applications Based on Each Theory
Evolutionary theory/ ethology (Lorenz)	N/A	Biology underlies adaptation to the environment.	Children's behaviors are explained as a result of adaptation to the environment.	Evolutionary developmental psychology
Ecological systems theory (Bronfenbrenner)	Quantitative	A nesting of environmental influences is also affected by a child's characteristics.	Children interact with and are influenced by numerous levels of social influence.	Social policy applications such as the Head Start program
Dynamic systems theory (Thelen)	Quantitative	Biological growth interacts with cognitive processes and environmental experiences.	Children's behavior results from a complex interaction of biological, environmental, cognitive, and social-emotional factors.	Ongoing research on aspects of cognitive development

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. How are the cultural perspectives different between Erikson and Nsamenang, and how are they the same?
2. How do a culture's values shape the way people conceptualize the stages children go through?

Critical Thinking

Describe your own cultural background. Now think about what goals you would have if you were (or are) raising a child. How do you think your goals are related to your cultural background?

RESEARCH METHODS

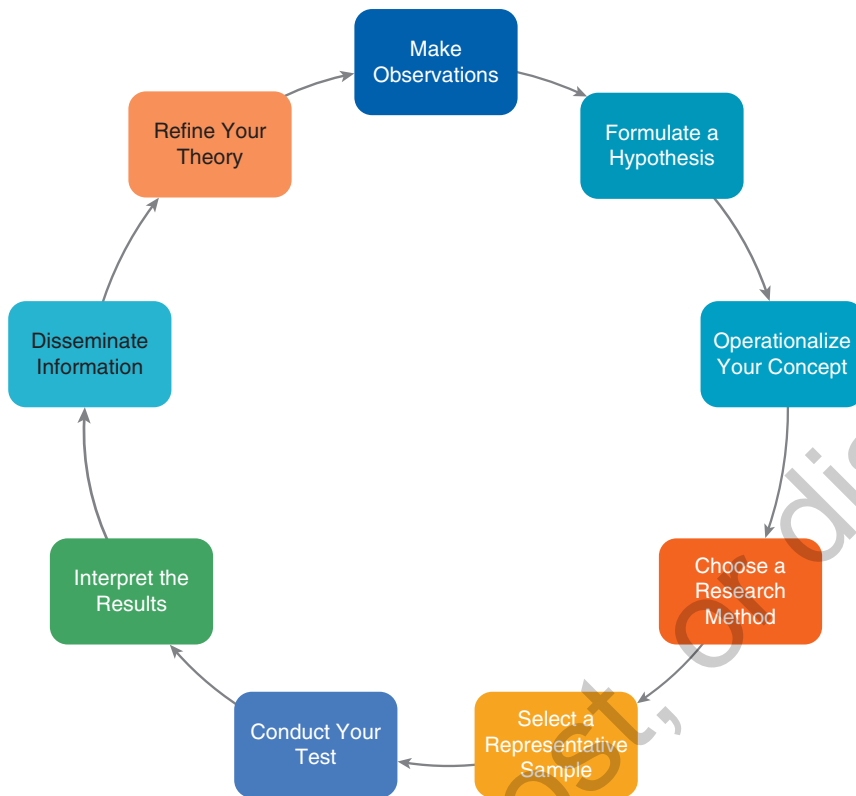
As we said at the beginning of this chapter, theories must be subjected to rigorous testing before we are willing to accept them as reliable and valid. In this section, we look at how researchers study children and adolescents. Because each research method has its own advantages and disadvantages, there isn't one best way to study development. Rather, we look for the most appropriate method to investigate the particular topic we want to examine. After describing a number of research methods used to study children and adolescents, we consider the ethical issues that come along with conducting research with this population.

The Scientific Method

Child development is one of many disciplines that use the **scientific method** to add to the body of knowledge. Researchers begin by asking a question (often based on a theory), next they identify the factors or elements that need to be examined to answer that question, and then they put their question to the test. Based on what they find, they can accept or reject the premise on which the original question was based. Most often their results lead to further questions to be tested. Each of these steps is described in more detail in the remainder of this chapter, but Figure 2.9 gives you a schematic outline of the process.

Research often begins with observing a behavior we are interested in understanding. In trying to make sense of what we see, we draw on theories to formulate a testable prediction, called a **hypothesis**,

FIGURE 2.9 ■ The scientific method. This figure shows each of the steps of the scientific method. Using this method, we refine our current theories and point to the questions that will guide our future research.



about the nature and causes of the behavior. Before we can test our ideas, however, we need to decide how to measure the behavior we want to study. If, for example, we are interested in studying aggression, we need to decide which observable behaviors will fit the way we conceptualize “aggression.” We can include physical aggression, such as hitting or biting, but we also may want to include verbal aggression, such as name-calling, or relational aggression, such as excluding someone from a group activity. Deciding what to include and what to exclude is called **operationalizing a concept**. Once we have done this, we can decide how to measure the concept.

Two essential characteristics of any measure used in scientific research are **reliability** and **validity**. A measure is reliable when it produces the same or similar results each time it is used. A measure is valid if it measures what it says it is going to measure. It is important to note how reliability and validity relate to each other. Just because a test is reliable does not necessarily mean it is also valid. Suppose we told you we had developed a new way to measure intelligence based on your shoe size. This likely would be a very reliable measure because each time we measured your feet we would get the same value. However, do you think this would be a valid way to measure intelligence? Certainly not, because there is no reason to think that foot size is related in any meaningful way to intelligence. Measures used in scientific research need to be both reliable and valid.

Another important decision involves choosing a sample of participants for our research. We try to make samples representative of the population we are interested in because we want our research to do more than say something about the particular group of children or adolescents who take part in our research. We want to be able to generalize our results from a particular sample to a larger population, but we must be careful how we take this step. For example, if we conduct research in kindergartens in suburban schools, we need to be careful not to assume that our findings will apply equally to children from urban or rural schools.

Finally, our confidence that the conclusions we draw are valid is strengthened if results are replicated or repeated in subsequent research. We can do this by repeating the research using other groups

that are the same as or similar to the group we originally studied, or by extending the research to new groups to see whether the conclusions can be generalized to them. We also expect that other researchers will be able to conduct their own independent research and come to the same or similar conclusions (Diener & Biswas-Diener, 2019). When there are a number of studies on the same topic, a statistical procedure called **meta-analysis** can be used to combine the data and determine whether there is a consistent pattern of findings across them.

Methods and Measures

Once researchers have developed their hypothesis, operationalized the concepts within it, and chosen their sample, they must decide how they will gather the data for their study. Because there isn't a single "right" or "best" method, we describe here seven frequently used ways of studying children and adolescents: observations, self-report measures, standardized tests, physiological measures, archival records, case studies, and ethnography.

Observations

We can learn a great deal about anything we are interested in, including development, by making careful observations. Scientific observations differ from our casual, everyday observations of the world because they need to be both systematic and objective and must be carefully planned and executed if they are to be valid.

Making observations in naturally occurring settings allows us to see children as they behave in real-life situations. It also gives the researchers a chance to see behaviors they didn't anticipate, so it can be a good source of new hypotheses for future research (Cherry, 2022). However, recording everything that happens even in a fairly short period of time produces a tremendous amount of raw data that must be analyzed and reduced before useful information emerges, so researchers sometimes use **checklists** to collect observational data. While observing the child, they simply mark the presence or absence of each item on the checklist or count how many times each behavior occurs. This is a quick way to compare a child's development to the development of other children or to keep track of children's progress over time, so checklists are often used in educational, medical, and other settings that require quick, efficient assessment of a child's level of functioning.

Although naturalistic observations are very useful sources of information about behavior, they have some limitations. If researchers are testing their own hypotheses, there is a risk that they might pay more attention

to observations that tend to support those hypotheses and overlook those that don't, a tendency called **observer bias**. *This threat to the validity of the observations can be reduced by having more than one observer code or score the observations or by using observers who don't know the specific hypothesis being tested (that is, observers who are "blind" to the hypothesis) so that this knowledge cannot affect their perception of the events they are observing (T/F Q7).*

Also, the mere presence of an observer might change the way people behave. Although children usually adapt to the presence of an observer without too much difficulty, video cameras can be used so that the child does not see the observer. A limitation of naturalistic observational research is that it doesn't tell us directly about the causes of behavior. To examine causes of behavior, researchers must be able to control the



Scientific observation. Carefully conducted observations, either in natural settings or in a laboratory, can give us insight into behavior as it naturally occurs.

Billy Hustace/ Getty Images

conditions of the children they are studying. You will learn more about what allows a researcher to conclude that one variable is the cause of certain outcomes when you read about research designs later in this chapter.

Self-Report Measures

Another way to gather information relatively quickly and efficiently is to use self-report measures such as **surveys**, **questionnaires**, and **interviews**. However, the usefulness of the data from self-report measures largely depends on the accuracy and validity of the responses received, so having questions that are precise, well written, and understandable is essential.

Usually interviewers ask everyone in the sample the same set of questions, but sometimes they want to ask additional follow-up questions or ask the respondent to expand on the original answers or provide examples. In this case, researchers can use a **clinical interview**, which allows this greater flexibility. As described earlier, much of Piaget's research was based on clinical interviews.

Because infants and children may be too young to respond to an interviewer's questions, we may need to rely on information provided by a second party, such as parents, child care providers, and teachers. The more time these people have spent with the child and the more familiar they are with the child's behavior, the more likely they will be able to provide high-quality information. Parents have been asked to describe children's eating behaviors (Fernandez et al., 2018), motor coordination (Bremer & Cairney, 2018), and problem behaviors following a parental divorce (Tein et al., 2013), and teachers have been asked to identify attentional difficulties in their students (Edwards & Sigel, 2015) and anti-social and risk-taking behaviors (Tieskens et al., 2018).

One problem with self-report measures is that the person answering the questions may be unwilling or unable to give complete or accurate responses. And sometimes respondents give the answer they think the researcher is looking for, or one they think makes them look good in the researcher's eyes, a problem called **social desirability**. You can understand how social desirability becomes a challenge for researchers investigating sensitive topics such as sexuality, drugs, or prejudice.

Even young children are able to accurately recall events and can give reliable eyewitness testimony (Otgaar et al., 2018), but when questions are misleading, children are subjected to repeated questioning, or the interviewer makes overt suggestions about what has happened, we cannot trust their answers (Brainerd & Reyna, 2012). **Journey of Research: Children's Eyewitness Testimony** illustrates the powerful influence the wording of questions can have on the data we obtain from children during an interview.

Journey of Research: Children's Eyewitness Testimony

An illustration of the impact of how we ask questions on the answers we get comes from several high-profile cases of alleged child abuse in the 1990s. In the notorious McMartin Preschool case, seven teachers were accused of sexually abusing several hundred young children based on interviews such as this one:

Interviewer: Can you remember the naked pictures?

Child: (Shakes head "no")

Interviewer: Can't remember that part?

Child: (Shakes head "no")

Interviewer: Why don't you think about that for a while, okay? Your memory might come back to you. (Interview Number 111, as cited in Garven et al., 1998, p. 349)

It is clear from the way the interviewer kept repeating the question and refused to accept the child's denial that there had been naked pictures that this interviewer had a particular answer in mind and wanted the child to give that answer. Suggesting that a memory "might come back" implies that the event is something that happened but has been forgotten, rather than allowing for the possibility that it never happened at all. Based on testimony such as this, several defendants initially received jail sentences, but in all these cases the charges were later dismissed or the plaintiffs were released from prison.

because of the improper way evidence had been gathered. Because children are limited in their ability to understand and interpret language, we need to be particularly careful about the wording of questions when designing surveys, questionnaires, and interviews for them.

Standardized Tests

You are probably familiar with **standardized tests** such as IQ tests and achievement tests. We standardize a test by administering it to large groups of children to establish norms. A **norm** is the typical range of performance of a large group of children of a given age on the test. Once we have established the norms for a test, we can compare an individual child's performance to the appropriate age norms to determine whether that child is performing at, above, or below the level of the average child of the same age. Standardized tests are also useful for assessing the effectiveness of programs and interventions. For example, the effectiveness of a prekindergarten program that provided a coaching system for literacy, language, and math skills was assessed using standardized tests of vocabulary, prereading skills, and early math skills (Weiland & Yoshikawa, 2013).

Standardized testing has sometimes been controversial because of concerns about the validity of these tests—that is, whether they actually measure what they say they are measuring. For example, critics have claimed that college entrance tests such as the SAT and the ACT are biased in a way that discriminates against certain groups of students. On average, men score higher than women; Asian Americans, whites, and students of more than one race score higher than Hispanics/Latinos, Native Hawaiians/Other Pacific Islanders, American Indians/Alaska Natives, and Blacks/African Americans; and students from families with higher levels of parental education score higher than students from families with lower levels of parental education (College Board, 2021). *In response to concerns about possible bias, over 1,600 colleges have recently stopped using the SAT or ACT in admissions decisions or have made them optional* (T/F Q8) (FairTest, 2021). The American Psychological Association and the American Educational Research Association recommend that important educational decisions never depend on a single test score.

Physiological Measures

It is not always easy to gather the types of data we need to answer important questions about development, but today a number of physiological measures are helping us get some of those answers. Table 2.4 summarizes some of the measures and what they indicate.

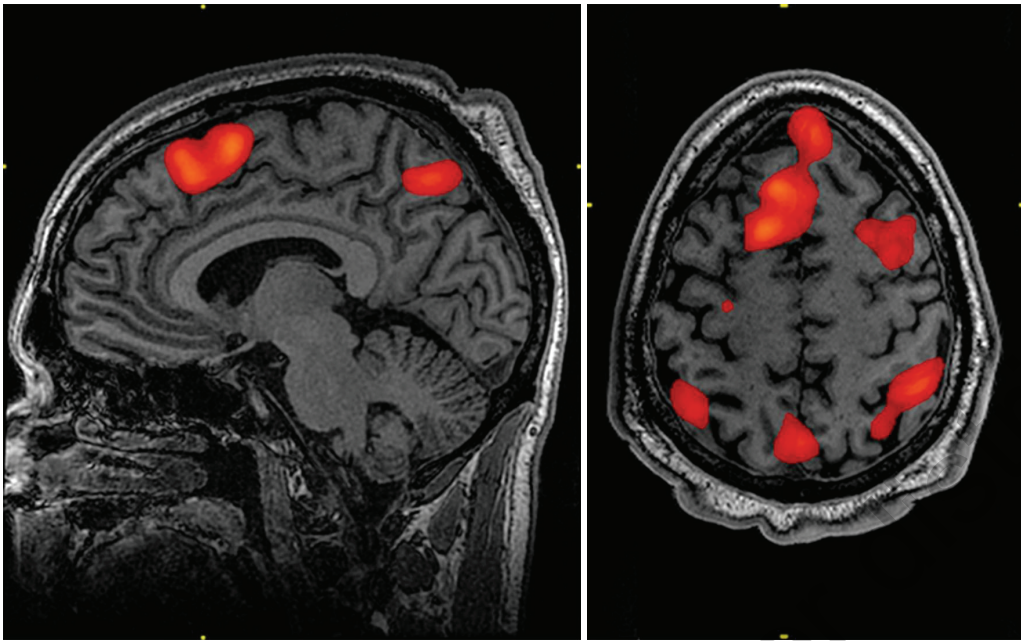
By using physiological measures, researchers have been able to understand more about the processes that underlie certain behaviors. An MRI shows images of the brain and can illustrate how the structure of the brain changes with age. An fMRI shows how the brain functions and has been used to

TABLE 2.4 ■ Physiological measures.

	Physiological Measure	What It Measures
Measurements of brain functions	Electroencephalograms (EEGs)	Electrical activity in the brain
	Magnetic resonance imaging (MRI)	Structures of the brain
	functional magnetic resonance imaging (fMRI)	Blood flow showing which parts of the brain are active
	Event-related potentials (ERPs)	The brain's electrical responses to meaningful sensory stimuli
Other measures of body function	Sweat	Arousal
	Eye dilation	Interest
	Heart rate	Information processing demands
	Breathing patterns	Anxiety, stress

Dupler (2014), Sowden & Barrett (2006), UC San Diego Center for Functional MRI (n.d.).

FIGURE 2.10 ■ fMRI. This fMRI image shows where the blood is flowing through the brain when the person thinks about an activity, in this case a memory task.



Signal Photos / Alamy Stock Photo

examine normal developmental changes in its functions (Long et al., 2017). Figure 2.10 illustrates the information we get from an fMRI. These findings will help us understand what happens when brain development results in conditions such as attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). For instance, using fMRIs to scan the brains of children diagnosed with ASD, researchers have found that the part of the brain that controls face recognition is underactive in these children (Lynn et al., 2016). Having less ability to recognize familiar faces may relate to behaviors often seen in children with ASD, such as a lack of eye contact with others and little or no interest in social relationships. You will learn more about how ASD can be diagnosed in infants and how it is expressed in young children in Chapters 5 and 8.

Because physiological measures enable us to measure what is going on inside an individual without relying on verbal communication, they have been particularly important in research involving infants and young children who can't understand or answer questions because they are not yet verbal or their language ability is limited. Another advantage is that physiological responses are not under the conscious control of the individual, so they cannot easily be faked or presented in a way intended to make them socially desirable (Blascovich et al., 2011). Because most of these measures are noninvasive, nothing needs to be placed inside the body to collect the data. For instance, a type of cap with electrodes embedded in it can be used to record electrical brain activity with no discomfort to an infant who is wearing it.



Cortical measurement. This infant's brain activity is being measured by means of a specially designed "electrode hat." This noninvasive method of studying the brain has given us new insights into its functioning.

Oli Scarff/ Getty Images

Archival Records

Researchers don't always collect their own data. They may use **archival records**, or data that were collected by others. For instance, a researcher might use historical diaries, letters, or photographs to gain insight into what childhood was like in the past. Data routinely collected by the U.S. government provide a historical snapshot of many topics relevant for a developmental researcher. In this book, you will read about research based on government reports on child abuse, adolescent pregnancy, and many health conditions affecting children and adolescents. Medical records and school records are other sources of archival data that are relevant to understanding a child's development.

One of the most ambitious sources of archival data related to child development is the Panel Study of Income Dynamics (PSID). Data on family, school, and neighborhood characteristics that are linked to the physical health, emotional well-being, cognitive development, and social relationships of the children have been collected from a nationally representative sample of over 18,000 individuals every year since 1968 (PSID, n.d.). Because data collection of this scope requires a great deal of time, money, and effort, it is more cost-effective to make these archival data available to other researchers than to have them collect their own data. More than 6,000 peer-reviewed publications are based on the data in this archive (PSID, n.d.). However, a limitation of using archival data is that the researcher has no control over the variables that are available for analysis or the characteristics of the sample. However, researchers can sometimes select a portion of the original sample to create a subsample that is more relevant to their specific research interests.

Case Studies

A **case study** takes a comprehensive and intensive look at a single individual or a small group. Case studies have been used to investigate research questions as diverse as the psychological challenges faced by a child with the severe mental disorder called psychosis (Green et al., 2015), the problems encountered by a blended family (Zelevnikow & Zelevnikow, 2015), and the development of the delusions of a terrorist (Cotti & Meloy, 2019).

Because of the close relationship that can develop over time between the researcher and the subject of a case study, the researcher must strive to remain objective when making observations and interpreting data. Despite this challenge, case studies offer a rich and deep picture of development because they can bring together information from multiple sources using multiple methods, including interviews, observations, tests, and documents. *Although we may not be able to generalize the findings to a broad cross section of the population, case studies can be a rich source of new hypotheses that researchers can explore in the future with other more representative groups of individuals* (T/F Q9).

Ethnography

Ethnography is a research technique adapted from the field of anthropology in which a researcher lives with a group of people as a participant observer, taking part in the group's everyday life while also observing and interviewing the people in the group. The primary goal of this approach is to use observations to understand how people make sense of their world and their experiences in it (Merriam, 2009). It is especially helpful when studying children in different cultures because it allows the researcher to see the whole context of the children's development. For example, Samantha Punch (2012) moved to an area of Bolivia to study children's development in a poor, rural community, and when Sudhir Venkatesh (2008) wanted to administer questionnaires to gang members in inner-city Chicago, he ended up living among them for almost 10 years. This resulted in a rich account of their lives in a book titled *Gang Leader for a Day: A Rogue Sociologist Takes to the Streets*.

Although ethnographies give us an in-depth look at a cultural group from someone embedded in that group for an extended period of time, researchers must recognize that their presence may change the behavior of the group they are observing and their own biases may affect how they interpret what they see. A researcher's personal safety could be placed in jeopardy in some research settings, and a considerable amount of time is needed to carry out this type of study.

Table 2.5 gives a brief summary of the different types of methodology used in research with children.



Ethnography. This ethnographic researcher entered into the everyday life of the Matis people who live in the Amazon rain forest of Brazil to gain a rich picture of all aspects of their lives.

Scott Wallace / Contributor/ Getty Images

TABLE 2.5 ■ A comparison of research methods. Each type of research method has some advantages and some disadvantages. Think about why you might choose each of these methods.

Method	Advantages	Disadvantages
Observation	<ul style="list-style-type: none"> Rich source of information Can observe behavior as it naturally occurs Can lead to new hypotheses Can be conducted in a laboratory to gain control of the situation 	<ul style="list-style-type: none"> Potential observer bias Can produce large amounts of raw data that must be coded and analyzed Presence of an observer may change the behavior being observed
Survey, questionnaire	<ul style="list-style-type: none"> Gathers information quickly and efficiently Can gather information on many different topics 	<ul style="list-style-type: none"> Questions must be precisely worded Can include misleading or biased questions Respondents may not answer honestly Respondents may not be able to accurately recall or report on behavior Respondents may provide a socially desirable answer rather than a truthful one
Interview (structured and clinical)	<ul style="list-style-type: none"> Can be a first-person or third-person account Can gather in-depth information 	<ul style="list-style-type: none"> Respondent must have the verbal skills necessary to understand and answer questions
Standardized test	<ul style="list-style-type: none"> Allows an individual to be placed within the range of performance of a group 	<ul style="list-style-type: none"> Must periodically update norms May be biased against certain groups

(Continued)

TABLE 2.5 ■ A comparison of research methods. Each type of research method has some advantages and some disadvantages. Think about why you might choose each of these methods. (*Continued*)

Method	Advantages	Disadvantages
Physiological measures	Can gather data that don't require language or an active response from participants Responses are difficult to fake	Requires expensive equipment that can be difficult to maintain Interpretation of data is not always clear
Archival data	Large amounts of data may be available Economical regarding time and money	No control over the variables collected or the sample characteristics
Case study	Source of rich information and hypotheses Can utilize multiple methods	Information may not generalize to a larger population Time intensive Possible observer bias
Ethnography	Can provide a detailed look at cultural groups	Presence of an observer may change the behavior of group members Time intensive Possible observer bias

CHECK YOUR UNDERSTANDING

Learning Questions

1. What does it mean to say that a measure is reliable and valid?
2. Why is it important to have a representative sample in research?
3. What are the advantages and disadvantages of using observations, standardized tests, and case studies to collect data?

Critical Thinking

Identify a question related to child development that interests you. Describe the method or methods you would use to try to answer this question, and explain why this approach would be the most appropriate one to use.

HOW RESEARCH IS DESIGNED

Researchers use one of two ways to test a hypothesis: experimental or correlational research designs. In this section, we discuss the differences between these approaches and the strengths and limitations of each. We then look at the different ways researchers design research to examine developmental changes with age.

Experimental Designs

As useful as other methods are for collecting data, conducting experiments occupies a central place in our repertoire of research methods. One reason is that experiments allow us to do something other methods can't—they can *identify the causes* of behavior. With other methods, we can speculate about the causes, but we do not have enough control over the situation to make a firm determination. However, when a researcher designs an experiment, the goal is to control as many aspects of the experimental situation as possible to draw conclusions about the causes of the behavior being studied.

The following are the essential features you will find in an **experimental research design**:

- The **experimental group** is the group that receives the special treatment of interest to the researcher.
- The **control group** does not receive the special treatment and is the baseline against which the experimental group can be compared.
- The participants are randomly assigned to either the experimental or the control group. Because this assignment is made by chance, the two groups will likely start out being very similar to each other, without any systematic differences that could affect the outcome of the experiment. Researchers sometimes assess the participants on the outcome variable before the experiment begins to make sure that the two groups are the same at the start of the experiment.
- The **independent variable** is the treatment the researcher hypothesizes will make a difference between the groups after the experiment. The assumption is that the independent variable is the cause of any change observed following the experiment.
- The **dependent variable** is the outcome of interest to the researcher, measured at the end of the experiment to see whether manipulating the independent variable has produced the expected effect.

If we look at an example of experimental research, illustrated in Figure 2.11, this terminology will have more meaning for you. Researchers examined the impact of attending Head Start on cognitive and behavioral development (Zhai et al., 2014). A group of children were eligible to enroll in Head Start, but there were not enough spaces for all of them, so the children who were randomly chosen to participate in the Head Start program became the experimental group and the children who could not be enrolled became the control group. In this study, the outcome measure, or dependent variable, was the children’s cognitive and social-behavioral development. By the end of first grade, the researchers found that the children who had attended Head Start had better cognitive scores and parent-reported behavioral development than the children who did not attend Head Start. Because the two groups of children were similar at the start of the experiment, and because the only relevant difference between the groups during the intervention was whether the children attended Head Start, the researchers could conclude that participating in Head Start was the cause of the difference they observed at the end of the experiment.

FIGURE 2.11 ■ The experimental process. This table shows how an experimental design (in this case an experiment to study the effect of attending Head Start) is carried out, starting with a sample of the population of interest to the researcher and ending with results that can be interpreted.

STEP 1: SELECT A SAMPLE	STEP 2: RANDOM ASSIGNMENT	STEP 3: PRETEST	STEP 4: TREATMENT	STEP 5: POSTTEST	STEP 6: COMPARE RESULTS
A representative group of children is chosen for the study.	Children are randomly assigned to groups.	Pretest establishes groups are the same.	Independent variable is administered to the experimental group.	Dependent variable is measured for both groups.	Researcher determines whether results support hypothesis.
Sample	Experimental Group	Cognitive and social-behavioral development test scores	Attend Head Start	Cognitive and social-behavioral development test scores	Experimental group scores > control group scores
	Control Group	Cognitive and social-behavioral development test scores	Do not attend Head Start	Cognitive and social-behavioral development test scores	

Active Learning: Experimental Research Design gives you an opportunity to review the terminology used in experiments and to check that you can recognize each element when you see it in the description of an experiment.

Active Learning: Experimental Research Design

You can test your understanding of experimental research design by identifying the components of an experiment in this example taken from a study conducted in Germany. This study assessed a program designed to build skills children could use to reduce the risk they would become victims of childhood sexual abuse (Czerwinski et al., 2018).

A total of 219 third graders participated in the study. Children from eight schools took part in seven sessions of the IGEL Program that focused on improving the children's knowledge of sexual abuse, as well as their skills in handling the misbehavior of others and asking an adult for help. Children in four other schools did not receive any sessions until after the program evaluation was complete.

After completing the sessions, the researchers assessed the knowledge of all the children about childhood sexual abuse and what actions to take in situations that were potentially dangerous. Those students who participated in the IGEL Program training sessions were more knowledgeable about childhood sexual abuse and how they could protect themselves.

From the description of this experiment, identify the following:

Experimental group

Control group

Independent variable

Dependent variable

Answers:

Experimental group: The group that received the IGEL Program training

Control group: The group that did not receive the IGEL Program training

Independent variable: Whether the group received the IGEL Program training or not

Dependent variable: The measure of knowledge about childhood sexual abuse and ways to protect oneself

Natural or "Quasi" Experiments

It may have occurred to you that, as appealing as the experimental method might be, it cannot answer many of the questions that are of great interest to us as developmentalists. There are many situations we could never ethically create as experiments. For example, if we want to study the effects of divorce on children, we cannot randomly assign half our sample of families to divorce while the other half stays married. To answer these types of questions, researchers can take advantage of situations that occur naturally to test a hypothesis using a **natural or "quasi" experiment**.

For example, in West Africa, administrators in private schools can decide which discipline techniques they will use in their schools. Some choose to use corporal punishment, such as slapping or pinching children when they misbehave, while other administrators choose to use nonphysical child management techniques (Talwar & Lee, 2011). Researchers were able to use this naturally occurring situation to examine the effect of these two different school environments on children's willingness to lie about their misbehavior.

Children from both types of schools were individually asked to play a game with the researcher in which they heard a sound and had to guess which toy made it while they had their back turned to the researcher. After making a sound with one of two toys, the researcher said she needed to leave the



What did you do? In a natural experiment, most children could not resist peeking at a toy when they were told not to, but those from schools that relied on physical punishment for discipline were more likely to lie about what they had done.

istock/ PeopleImages

room for a while and told the child not to turn around to look at the toy while she was gone. When she returned, she asked the child if they had looked at the toy in her absence. Although the majority of the children from both types of schools peeked, many more of the children from the schools that used physical punishment denied what they had done. In other words, they lied about the fact that they had peeked. The researchers concluded that the punitive school environment gave children the motivation to lie as a way to protect themselves from punishment.

Similar to experiments conducted in a laboratory, researchers in this study controlled as many variables as possible with the exception of the variable they were interested in studying. Both schools were located in the same city, enrolled students from similar socioeconomic backgrounds, and had students who scored at a similar level on standardized tests of cognitive ability. Although it is possible that there were some other ways in which the two types of schools differed, the most likely relevant variable was their different discipline practices, so this was the independent variable in this study. Whether the children would lie about their misbehavior was the dependent variable measured at the end of the experiment.

One drawback in a natural experiment is that it is more difficult to rule out other factors that may affect the results. In a true experiment, some teachers would be randomly assigned to use physical punishment, and a comparable group of teachers would be assigned to use nonphysical punishment, but this research could only be done as a natural experiment because no teacher would agree to hit a child when that teacher did not believe in using physical punishment in a classroom.

Correlational Designs

In a **correlational research design**, a researcher examines the relationship between two or more naturally occurring variables, such as self-esteem and children's academic achievement. When we look at correlations, we are interested in the *strength* of the relationship and the *direction* of the relationship. Figure 2.12 will help you visualize these aspects of correlations as we describe them. We talk first about the direction of the relationship. Correlations can be *positive* or *negative*. In a positive correlation, the value of one variable increases as the value of the second variable increases. For example, lifetime earnings are positively correlated with the number of years in school. As years completed in school go up, so do lifetime

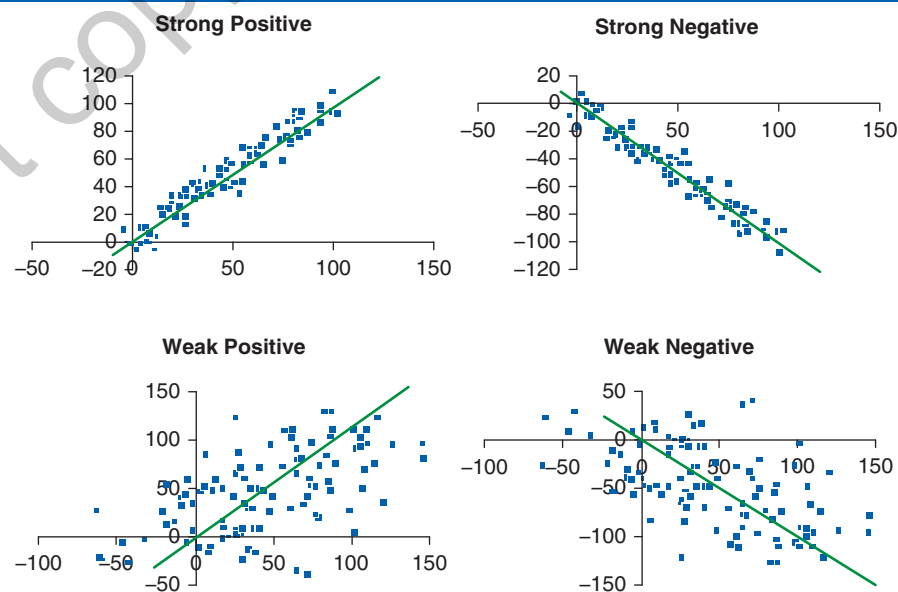
earnings. In a negative correlation, as the value of one variable increases, the value of the second variable decreases. For example, the more often people brush their teeth, the lower their rate of tooth decay.

The second characteristic of correlations is the strength of the relationship between the two variables. This can range from a correlation of $+1.0$ (a perfect positive correlation) to a correlation of -1.0 (a perfect negative correlation). At either of these extremes, a change of one unit of measurement in one of the variables is accompanied by a change of one unit of measurement in the second variable, so if we know someone's score on one variable, we can perfectly predict their score on the second variable.

Figure 2.12 illustrates the difference between a weak correlation and a strong one. As a correlation moves from $+1$ or -1 toward 0 , the relationship between the variables gets weaker and weaker, so an increase in the value of one of the variables is now associated with a *range* of values for the second variable. For example, the amount of coffee you drink is not correlated to how tall you are. Tall, short, and average-size people drink a lot of coffee, and tall, short, and average-size people drink no coffee at all (Johns Hopkins Medicine, n.d.). Based on your height, we could not predict how much coffee you drink, so the correlation would likely be 0 . Many correlations in developmental research are in the moderate range of $\pm.15$ to $\pm.40$.

How can you use information from correlational data? *If you read an article that said, "Study finds that mothers who talk to their children a great deal have children with high self-esteem," could you correctly conclude that frequent conversations with children will build their self-esteem? You could not (T/F Q10).* Because the researchers could not control how much mothers in this study talked to their children, this is clearly correlational research. Correlational research tells us that there is a relationship between two variables (in this case, mothers' conversations and children's self-esteem), but a third variable that wasn't even measured might be responsible for the relationship we observed. For instance, it may be that the mothers who talked a lot to their children were also ones who gave their children a lot of praise and positive feedback. In this case, it would be the nature of what they said rather than the amount of conversation that affected the children's self-esteem. For this reason, we must use caution when

FIGURE 2.12 ■ Examples of correlations. In these graphs, each dot represents one individual's scores on Variables 1 and 2. Lines that slope upward indicate a positive correlation, and ones that slope downward indicate a negative correlation. The closer the scatter of dots are to the line that indicates a perfect correlation, the stronger the correlation is.



Adapted from Columbia University (2015).

interpreting correlational findings because the fact that two things are associated with each other does not mean that one of them necessarily caused the other.

Developmental Designs

If we define development as “change with age,” there are several ways to examine the changes that occur as children grow and develop. As we look at these designs, we again will find that each has its own advantages and disadvantages, but each also has a place in answering the complex questions we have about development. Three basic developmental research designs are longitudinal, cross-sectional, and sequential. We will then describe a relatively new technique, the microgenetic design.

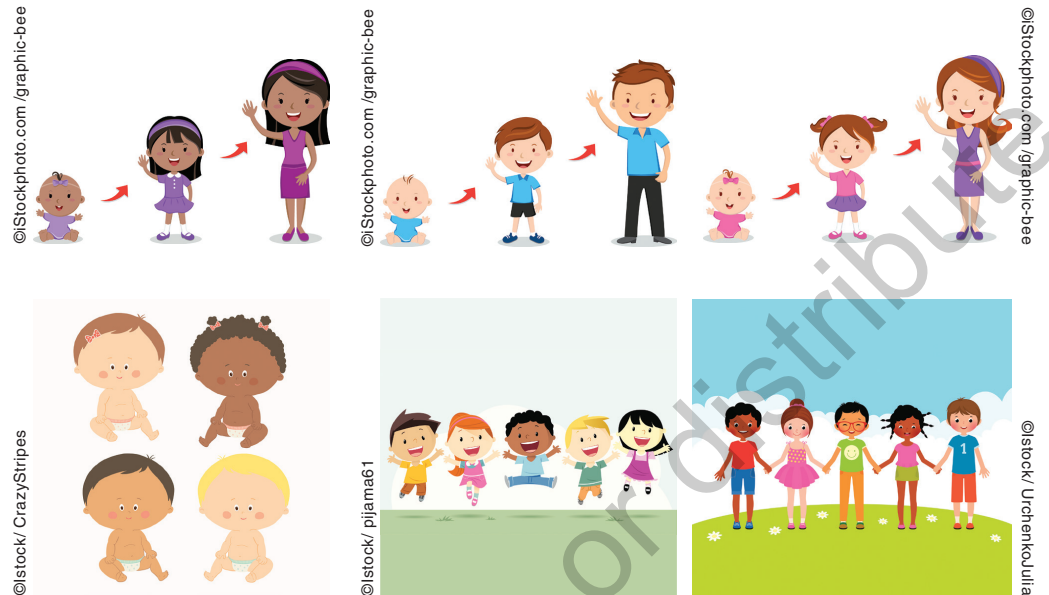
A **longitudinal design** follows one group of individuals across time and looks at the same or similar measures at each point of testing. The biggest advantage of a longitudinal design is that it gives us the clearest picture of how the variables we are interested in change as a function of age. However, it takes a good deal of time and money to conduct multiple waves of data collection for a large group of individuals. Many researchers do not have the resources necessary to conduct this type of research. Also, because participants need to be tested or measured repeatedly over the course of the study, it is inevitable that some will drop out, and that may compromise the representative nature of the original sample. For example, children from families with limited financial resources tend to change schools more frequently than children from families with more resources. If you are doing your research in a school, this means that more students in the first group will move away during the course of the study, so by the end of the study, those left in your sample may be more affluent than your original group. If this happens, you cannot be sure whether the changes you see are due to age or to differences in family income level.

Longitudinal studies also lock researchers into using one set of measures even if better alternatives come along. If they switch measures during the study and find changes in the level of the outcomes they are tracking, the researchers cannot be sure whether the changes are attributable to the fact that the participants are older or the new measure is actually measuring something slightly different than the original measure. Despite these concerns, however, longitudinal research provides a very powerful way to look at developmental change.

Using a **cross-sectional design**, researchers study multiple groups of participants who cover the age range of interest to the researcher. If you were interested in developmental changes between elementary and middle school, you could collect data from groups of participants who were 8 years old, 10 years old, and 12 years old. Then, by comparing the results from the groups, you could construct a picture of the changes that occur over that period of development. Because you collect all your data at the same time, you can do so in a relatively quick, cost-effective manner. Obviously, participant dropout is not an issue because there is only a single data collection. Based on cross-sectional research, you will know that children of different ages show differences on the outcome you measured, but you won't know *why*. We presume age changes are responsible, but we need to be careful when making these assumptions. Figure 2.13 illustrates the difference between longitudinal and cross-sectional designs.

One of the big challenges in cross-sectional research is that the different age groups in the study must be as similar as possible on any variable that might affect the study's outcome. To make this point clear, here is an extreme example. Imagine you are interested in how self-esteem changes during the transition from elementary to middle school. To examine these changes, you use a group of 8-year-old students who attend a public elementary school in a city, a group of 10-year-old students from a private school with a religious affiliation, and a group of 12-year-old students from a suburban public school. Even if you found differences in self-esteem between the groups, could you correctly interpret them as age-related changes associated with school transitions? Clearly, you could not. Because the groups came from such widely different school settings (and, therefore, it is likely that they differ from each other in a variety of other ways), you could not make any valid interpretation of these data. Differences between groups in actual cross-sectional research are much subtler than those in this example, but any difference that is not recognized and accounted for by the researchers can be a threat to the validity of the conclusions drawn from this type of research.

FIGURE 2.13 ■ Longitudinal and cross-sectional research designs. In a longitudinal research design, the same group of participants is followed and tested at several different points in the course of the study (top line). In a cross-sectional research design, the researcher constructs groups of different ages that are comparable to each other in as many ways as possible and tests all groups at the same point in time (bottom line).



Another difficulty with cross-sectional research is that different age groups or cohorts have lived during different times in history. These differences create what is called a **cohort effect**. For example, people in their 70s are likely to be less skilled with computers than those in their 20s. This does not mean computer skills decline with age; rather, it reflects the different life experiences of the two groups. People now in their 70s were already more than 30 years old when home computers were first introduced, while those in their 20s have had experience with computers practically since they were born.

Sequential designs bring together elements of cross-sectional and longitudinal research designs. A sequential design uses several groups of people of different ages who begin their participation in the study at the same time, just as cross-sectional research does, and follows them over a period of time, just as longitudinal research does. What makes this method different is the overlap of the groups' ages. For example, if we were looking at children's health over the age range from birth to 20 years, we could begin by assessing four different groups: infants, 5-year-olds, 10-year-olds, and 15-year-olds. When we repeat our assessment 5 years later (when the infants are 5 years old, the 5-year-olds are 10, and so on), we will have two different groups that were assessed at age 5, two assessed at 10, and two assessed at 15. Because we needed to follow the groups for only 5 years to cover our age span of interest, the risk of participants dropping out of the research study is lower than it would have been in a 20-year study, and this reduces sample bias. We also reduce the time, money, and labor needed to conduct the study compared to a 20-year-long study of children's health. Finally, if there were any cohort differences between the groups, those effects would become apparent when we compare the results of the overlapping groups who are the same age in different years.

Even though sequential research offers advantages, the cohort groups still need to be as much alike as possible at the start of the study, and you still need to be able to track and reassess the groups at regular intervals, so sample attrition can still be a potential problem.

Test your understanding of these three different developmental research designs by trying **Active Learning: Developmental Research Designs**.



Cohort effect. This teen may know more about computers than his grandfather, but it is because he has had more experience using them, not because people forget how to use computers as they get older.

istock/iamotos

Active Learning: Developmental Research Designs

Look at the table provided and answer the following questions:

1. If only Group A was tested in 2021 and 2026, what type of developmental research design would this be?
2. If all groups were only tested in Testing Year 2021, what type of developmental research design would this be?
3. If all groups were tested in years 2021 and 2026, what type of developmental research design would this be?

	Testing Year 2021	Testing Year 2026
Group A	age 15	age 20
Group B	age 10	age 15
Group C	age 5	age 10

Answers:

1. Longitudinal research design, because the same group of participants is followed and retested after 5 years.
2. Cross-sectional research design, because different age groups are tested and compared at the same time.
3. Sequential research design, because different age groups are compared and the groups also are followed and retested after 5 years.

A fourth type of developmental research design is a **microgenetic design**. In this case, the term *genetic* refers to the *genesis* or beginning of a behavior, not to the action of our genes. *Micro* refers to the fact that this approach looks at small, moment-to-moment changes that eventually lead to larger developmental change.

In microgenetic research, an individual or small group of individuals is observed frequently during the time that a change is expected to happen. Because the observations are frequent, they allow researchers to see changes that otherwise would be missed by designs that make less frequent observations. The primary advantage of this design is that while other developmental research designs give us a snapshot of what is happening at different points in development, the microgenetic approach describes not only what happens and when it happens, but also the process by which the change occurs (Fogel, 2011).

Although conducting frequent repeated observations requires a strong commitment on the part of the participants, it also means that parents and children are true collaborators in the research process. With regard to disadvantages, we need to recognize that because the design requires repeated testing, some of the change we observe may be due to a practice effect. The intensive nature of the observations also makes this a time-consuming and expensive approach. And, while it produces a great deal of data that are rich and informative (Flynn et al., 2006), these data must be analyzed and reduced before they can yield an understandable set of conclusions. This can be a daunting task.

Interpreting and Using the Results of a Study

After conducting research, we must still interpret the results, but two people could look at the same data and interpret them differently. In reaching conclusions, we must be careful not to generalize beyond the characteristics of the sample that took part in the research. We also need to remember that conclusions drawn from research are generalizations that apply to groups of individuals. As you learned in Chapter 1, there is a great deal of diversity among individuals within any group, so our conclusions will not apply to every single child but the fact that some children do not fit the general pattern of the results does not invalidate the conclusion.

To help interpret research results correctly, data are tested using various statistical methods. There are tests of *statistical significance* that let us determine how likely it is that the results we got were just a chance finding and don't reflect real differences between groups. However, even if the results did not happen by chance, we can also ask whether they make any difference in the real world, or what is called *practical significance*. As an example, consider research on the relationship between birth order and intelligence (Rohrer et al., 2015). An analysis of IQ test scores of over 17,000 participants in three international studies found that the scores of firstborns in the sample were higher than the scores of second-borns at a statistically significant level of .0001 (meaning that there is only 1 chance in 10,000 that this difference is an accidental or chance finding). But before any firstborn readers of this text begin celebrating their intellectual superiority over their siblings, note that the difference in test scores between the two groups was only 1.5 points. Such a small average difference is unlikely to have any practical significance in real life. Increasingly, researchers are also reporting **effect sizes**, which are a statistical measure of how large the difference is between groups that are being compared. While the significance level tells us that there is a difference, the effect size tells us how big that difference is (Sullivan & Feinn, 2012).

After researchers have confidence in the conclusions drawn from their research, they share that information with others. In Chapter 1, we described the peer review process that research articles go through before they are published in journals. There is a similar process for research information presented at professional meetings. In both cases, people who are knowledgeable about the topic have the opportunity to critique the way the research was conducted and identify any possible flaws in the logic or problems with the methodology, analysis, or interpretation of the findings before those findings are shared with others. Researchers then make their information available to the public, government agencies, private organizations, and policymakers who can use it in ways that benefit children and families.

CHECK YOUR UNDERSTANDING

Learning Questions

1. Why can an experimental design identify the causes of behavior while a correlational design cannot?
2. What are the advantages and disadvantages of using a longitudinal versus a cross-sectional research design?
3. Why must we be careful when we generalize the results from any one study?
4. What is the difference between statistical significance and effect size?

Critical Thinking

Identify a topic you think can best be investigated using a longitudinal research design and explain why the time and expense required to use this design would be justified.

ETHICS IN RESEARCH WITH CHILDREN AND ADOLESCENTS

To ensure the safety and well-being of human participants in research, U.S. Department of Health and Human Services (2021) regulations provide specific protections for them. They may be exposed to only minimal risks during their participation, and any potential risk must be weighed against the anticipated benefits from the research. They must be informed of the purpose of the research and its risks and benefits and must freely agree—without coercion—to participate; they have the right to withdraw from participation at any point. Finally, the privacy of participants must be protected, and the data collected must be treated as confidential.

Because of their particular vulnerability, children are given additional protections when they participate in research. The Society for Research in Child Development (SRCD, 2021) developed specific guidelines that include:

- The expectation that no physical or psychological harm will be done to children who participate in research.
- The expectation that the researcher will use the least-stressful research procedures possible.
- The necessity to obtain consent from both the children and their parents for the child's participation. If children are not old enough to give consent because they do not necessarily understand the full significance of the research, they still must assent if they are old enough to do that.
- The right of children and families to freely choose to participate in the research and to be able to terminate participation at any point if they want to.
- The responsibility of the researcher to inform parents of any threats to the child's well-being that they become aware of during the research and to arrange for assistance for the child.

Children and families are truly participants in the research process. It is only with their help and cooperation that researchers can continue to build the body of knowledge necessary for the scientific study of how children develop.

CHECK YOUR UNDERSTANDING

Knowledge Questions

1. What does the U.S. Department of Health and Human Services require as ethical guidelines for research with human participants?
2. What additional considerations come from the Society for Research in Child Development regarding research involving children?

Critical Thinking

Why must researchers take extra precautions when studying children? What characteristics do children have that could make them more vulnerable to unethical treatment?

CONCLUSION

In this chapter, you have been introduced to the basic theories that organize information about child development and guide ongoing research in the field. You will find more theories related to specific topics as you read through the rest of this book. You also were introduced to a number of methods that are used as a part of the scientific process to test these theoretical ideas. As you continue to read about theories and methods throughout this text, remember that our body of knowledge is dynamic. It grows and changes as our understanding grows and changes. You will be able to apply your knowledge of theories and research methods not only to examples in this text, but also to information on child development that you encounter beyond this course.

CHAPTER SUMMARY

2.1 How do developmental theories help us understand children's growth and development?

Theories of development give us models that help us understand children and allow us to predict how they will behave. Some theories propose that development occurs in stages, while others see development as a continuous process. Theories also differ in their emphasis on biological, cognitive, and environmental influences that bring about growth and development.

2.2 How do Freud and Erikson describe the stages of child development?

Freud's **psychoanalytic theory** states that sexual energy shifts from one area of the body to another as the child develops, forming the basis for five **psychosexual stages**. Erikson believed the social world and the development of identity were driving forces for development through **psychosocial stages**.

2.3 What are the basic principles of behaviorism and social cognitive theory?

In the theory of **behaviorism**, **classical conditioning** pairs an unconditioned stimulus with a neutral stimulus. After repeated pairings, the neutral stimulus elicits a conditioned response. In **operant conditioning** something that follows a behavior affects the likelihood of that behavior happening again. **Reinforcement** increases the behavior, while punishment and extinction decrease it. Bandura's **social cognitive theory** emphasizes the importance of imitation as a learning process.

2.4 How do the theories of Piaget, Vygotsky, and information processing describe cognitive development?

Piaget's theory of cognitive development states that we organize the world into **schemas** and either **assimilate** new information that fits into them or **accommodate** it by changing our schemas.

Vygotsky emphasized the role of social interaction and believed adults or more skilled peers help children learn through **scaffolding**. Learning occurs in the child's **zone of proximal development**.

Information processing initially likened the functioning of the mind to the way that computers work in what is called the **stores model**. The more recent **connectionist or neural network model** describes mental processing as a neural network of concept nodes that are interconnected by links. **Developmental cognitive neuroscience** links brain development with cognitive changes.

2.5 How do the theories of ethology, ecological systems, and dynamic systems apply to the study of child development?

Ethology is the study of animal and human behavior in relation to their adaptation to the natural environment. *Evolutionary developmental psychology* applies the principles and ideas of evolutionary theory to questions of how and why children develop as they do.

Bronfenbrenner's **ecological systems theory** proposes that individuals grow and develop within a nested set of influences that he divides into five systems: **microsystem**, **mesosystem**, **exosystem**, **macrosystem**, and **chronosystem**.

Dynamic systems theory examines the way all aspects of development—biological, cognitive, and social-emotional—influence one another as children work out unique responses to developmental challenges.

2.6 How are developmental theories influenced by culture?

All theories are influenced by the culture in which they are developed. A theory developed by someone living in sub-Saharan Africa is likely to look quite different from one developed by someone living in a Western country.

2.7 What methods and measures are used to study children's development?

The **scientific method** begins with observations, which generate **hypotheses**. After we **operationalize** the concepts in our hypotheses, we select a representative sample for research. Any measures we use must be **reliable** and **valid**.

Research can draw on observations, **checklists** of behaviors, or self-report measures that include **surveys**, **questionnaires**, and **interviews**. We also gather data via **standardized tests**, physiological measures, **archival records**, **case studies**, and **ethnography**.

2.8 What are the advantages and disadvantages of the different research designs used to study development?

Experimental research design randomly assigns participants to an **experimental** or to a **control group**. The **independent variable** is the treatment given to the experimental group, after which we measure the **dependent variable** for both groups. If there is a difference, we can conclude the independent variable caused it. **Correlational research** examines the relationship between naturally occurring variables. Results are examined for the direction and the strength of the relationship, but a correlation does not mean that one of the variables caused the other.

A **longitudinal design** follows and assesses a single group of participants over a period of time. **Cross-sectional designs** assess comparable groups of participants of different ages at the same time. In a **sequential design**, several groups are followed for a period of time, with an overlap in the age at which one group begins the study and another group finishes it. In a **microgenetic design**, the researcher makes frequent, detailed observations of the participants around the time a developmental transition is expected to occur, looking at small, moment-to-moment changes that eventually lead to larger developmental change.

In interpreting study results, we must not generalize beyond the characteristics of our sample, and we expect to find individual exceptions to the results. Researchers must look at both the statistical significance of the data and the **effect size** to determine how important the results are.

2.9 What ethical considerations apply to research with children and adolescents?

All research must protect the physical and psychological safety and well-being of all participants and children in particular. Researchers must minimize any risk and protect their confidentiality. If children are old enough to understand the nature of the research, they are asked to provide informed consent that is freely given. Children (and their parents) have the right to withdraw from participation at any point. Researchers are obligated to rectify any threats to the children's well-being that they detect.

KEY TERMS

- | | |
|---|---------------------------------------|
| Accommodation (p. 39) | Latency stage (p. 31) |
| Anal stage (p. 31) | Longitudinal design (p. 62) |
| Applied behavior analysis (ABA) (p. 37) | Macrosystem (p. 45) |
| Archival records (p. 56) | Mesosystem (p. 45) |
| Assimilation (p. 39) | Meta-analysis (p. 52) |
| Behaviorism (p. 33) | Microgenetic design (p. 65) |
| Case study (p. 56) | Microsystem (p. 45) |
| Checklist (p. 52) | Natural or "quasi" experiment (p. 60) |
| Chronosystem (p. 45) | Negative reinforcement (p. 35) |
| Classical conditioning (p. 33) | Norm (p. 54) |
| Clinical interview (p. 53) | Observer bias (p. 52) |
| Cohort effect (p. 64) | Operant conditioning (p. 35) |
| Connectionist or neural network model (p. 41) | Operationalizing a concept (p. 51) |
| Constructivism (p. 40) | Oral stage (p. 31) |
| Control group (p. 59) | Phallic stage (p. 31) |
| Correlational research design (p. 61) | Phobia (p. 34) |
| Cross-sectional design (p. 63) | Positive reinforcement (p. 35) |
| Dependent variable (p. 59) | Psychoanalytic theory (p. 30) |
| Developmental cognitive neuroscience (p. 42) | Psychosexual stages (p. 30) |
| Developmental theory (p. 28) | Psychosocial stages (p. 31) |
| Dynamic assessment (p. 41) | Punishment (p. 36) |
| Dynamic systems theory (p. 46) | Questionnaires (p. 53) |
| Ecological systems theory (p. 44) | Reinforcement (p. 35) |
| Effect size (p. 66) | Reliability (p. 51) |
| Ego (p. 30) | Scaffolding (p. 40) |
| Embodied cognition (p. 40) | Schema (p. 39) |
| Equilibration (p. 39) | Scientific method (p. 50) |
| Ethnography (p. 56) | Self-efficacy (p. 38) |
| Ethology (p. 43) | Sequential design (p. 64) |
| Exosystem (p. 45) | Shaping behavior (p. 35) |
| Experimental group (p. 59) | Social cognitive theory (p. 38) |
| Experimental research design (p. 59) | Social desirability (p. 53) |
| Extinction (p. 36) | Standardized test (p. 54) |
| Genital stage (p. 31) | Stores model (p. 41) |
| Hypothesis (p. 50) | Superego (p. 30) |
| Id (p. 30) | Survey (p. 53) |
| Imprinting (p. 43) | Validity (p. 51) |
| Independent variable (p. 59) | Variable (p. 45) |
| Interview (p. 53) | Zone of proximal development (p. 40) |