

## Circle of Life

"Of all the joys that brighten suffering earth, what joy is welcomed like a newborn child?" —Caroline Norton (1808–1877).



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## The Beginnings of Life



### 12-1 How do humans grow from single cells into newborns?

If you are a young woman, you were born with all the egg cells you'll ever have, although they were immature when you were just a baby. Only about 1 of every 5000 egg cells will mature and be released from an ovary. If you are a young man, you did not begin producing sperm cells until you reached puberty, but you'll keep producing them until you die. Although the rate slows with age, males produce about 2 million sperm cells in the 30 minutes it takes to eat lunch, a rate of about 1000 per second.

### Prenatal Development

*Prenatal* literally means *before (pre-) birth (-natal)*. The prenatal stage of development starts at conception and ends at birth.

A newly fertilized egg is called a **zygote**. Less than half of all zygotes make it past the first 14 days after being fertilized.<sup>1,2</sup> Luckily, you and I survived that risky period. A lot happens during those 2 weeks. First, the single-cell zygote begins to divide into identical cells; one cell becomes two, and two cells become four. In the first week, after dividing about seven times, the cells start to *differentiate*, to specialize in function. For example, some cells start to develop into a brain, and others start to develop into lungs or a heart. **Genes**—the biochemical units of heredity—direct this process.

Around the tenth day, the zygote attaches to the mother's uterine wall, where it will stay for about 37 weeks. But when the developing human organism passes the 14-day milestone, it is no longer known as a *zygote*; it is now an **embryo**, the developing human organism from about 2 weeks after fertilization through the end of the eighth week (see **Figure 12.1**). The embryo has a noticeable heartbeat and red blood cells produced by its own liver. Most of the body's major organs will have formed by the end of the embryonic stage.

At 9 weeks, the developing organism enters the fetal period. A **fetus** is the developing human organism from 9 weeks after conception to birth. It is unmistakably human in form. Fetuses born prematurely at the end of 22 weeks have organs that are developed enough to provide a chance at survival.<sup>3</sup>

But let's not hurry things. While still in the mother's body, the fetus receives oxygen and nutrients from the *placenta*, a cushion of cells that also screens out some

**zygote** A fertilized egg.

**genes** The biochemical units of heredity that make up chromosomes.

**embryo** A developing human organism from about 2 weeks after fertilization through the end of the eighth week.

**fetus** A developing human organism from 9 weeks after conception to birth.

#### FIGURE 12.1

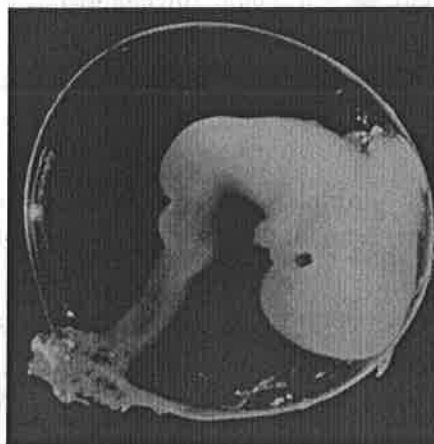
##### Nine Weeks After Conception

At 9 weeks, the developing organism becomes a fetus and is unmistakably human in form. Facial features, hands, and feet are visible at this time.



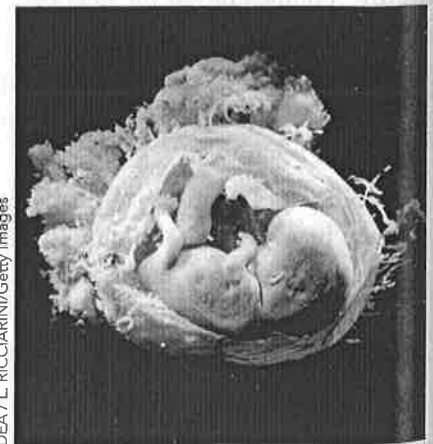
SciencPro/SPU/Science Source

3 weeks



BIOPHOTO ASSOC./Science Source

4 weeks



DEA / L. RICCIARINI/Getty Images

9 weeks

substances that could harm the fetus. Unfortunately, the placenta is not a perfect screen, and some viruses, toxins, and drugs do slip through. **Teratogens** are substances that cross the placental barrier and prevent the fetus from developing normally.

Teratogens take many forms. Radiation, toxic chemicals in the water or air, or viruses like Zika can harm a fetus, as can some prescription and over-the-counter drugs. Other teratogens include nicotine, alcohol, and the viruses associated with sexually transmitted infections (STIs). Women who smoke during pregnancy increase the risk of abnormal fetal heartbeat, premature birth and its related complications, and miscarriage.<sup>4</sup> The effects of alcohol on a fetus can be even more dramatic. There is no known safe quantity of alcohol to consume while pregnant, and even moderate drinking can damage a fetus's brain.<sup>5</sup> Children whose mother drinks heavily during pregnancy may be born with **fetal alcohol syndrome (FAS)**. The cognitive abnormalities that appear in children whose mother consumed large amounts of alcohol while pregnant can result in lifelong struggles. Physical symptoms of FAS may include a small, misproportioned head and unusual facial features. Mothers may also transmit STIs to their unborn children. Pregnant women with STIs are more likely than other women to have babies with mental disabilities and blindness.<sup>6</sup>

As frightening as teratogens are, most fetuses survive their 9 months in the womb and enter the world as healthy newborns.

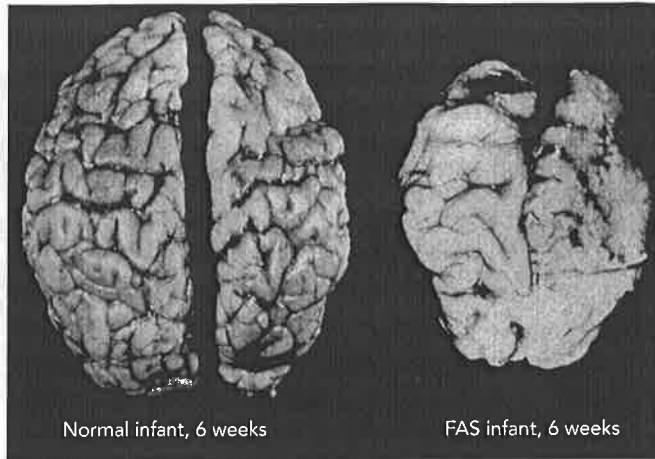
## The Newborn

If left to fend for themselves shortly after birth, infants would not survive. However, newborns are not passive little bundles who don't notice the world around them.

Within the first half hour of life, infants will turn their head to watch a picture or drawing of a human face, but they will not turn their head to view an indistinguishable jumble of images.<sup>7,8</sup> Newborns also turn their head toward human voices, and they have definite taste preferences. Sugar water and mother's milk? Yes, please! Milk with a spoiled taste or smell to it? No, thanks!

Nearly all full-term newborns don't have to learn sucking, swallowing, or grasping. These **reflexes** (automatic, unlearned responses) are survival behaviors, and nearly every baby comes equipped with them. To help find the breast or bottle that supplies nourishment, newborns have a **rooting reflex**, a baby's tendency, when touched on the cheek, to open the mouth and search for the nipple.

But newborns don't just roll off the assembly line, any one interchangeable with another. Even in the first few hours of life, a baby's **temperament**—characteristic emotional excitability—is evident. In the weeks following birth, an easy baby displays predictable sleeping and eating patterns, appears relaxed, and is cheerful. During these same weeks, a difficult baby is unpredictable, intense, and irritable. And the slow-to-warm-up baby will avoid new situations, have relatively low activity levels, and take more time to adapt to something new.<sup>9</sup> Temperament appears to be tied to our genetic makeup.<sup>10</sup> Studies showing how identical twins have more similar temperaments than fraternal



Normal infant, 6 weeks

FAS infant, 6 weeks

Dr. Sterling Clarren

### Fetal Alcohol Syndrome

Symptoms of fetal alcohol syndrome (FAS) include distinctive facial misproportions such as a short, upturned nose; a sunken nasal bridge; and small eyelid openings. If his mother had stayed free of alcohol during her pregnancy, this child would not have been born with FAS. (From MayoClinic.com, 2006.)

### LIFE MATTERS

We don't often think of medications as teratogens, but a few commonly used medications that should be avoided while pregnant are Accutane, ibuprofen, Motrin, cold and allergy decongestants, and Aleve.

**teratogens** Substances that cross the placental barrier and prevent the fetus from developing normally.

**fetal alcohol syndrome (FAS)** Physical and cognitive abnormalities that appear in children whose mothers consumed large amounts of alcohol while pregnant.

**rooting reflex** A baby's tendency, when touched on the cheek, to open the mouth and search for the nipple.

**temperament** A person's characteristic emotional excitability.

**Reflexes in Newborns**

Stroking this baby's cheek initiates the rooting reflex as the baby searches for something to suck (left). The grasping reflex allows this newborn (right) to support its own weight. This reflex disappears by the baby's first birthday.

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Petit Format/Science Source



twins suggest that our biologically based temperament sets the stage for our personality.<sup>11</sup>

Temperament is also a relatively stable personality aspect. The most intense preschoolers grow up to be intense young adults.<sup>12</sup> Inhibited, fearful 2-year-olds generally become shy second graders.<sup>13</sup>

**MAKE IT STICK!**

- What do we call a fertilized egg for the first 14 days of its existence?
  - A zygote
  - An embryo
  - A fetus
  - A placenta
- What do we call the issue regarding the interaction between heredity and environment?
  - Stability and change
  - Continuity and stages
  - Growth and birth
  - Nature and nurture
- What is the safe amount of alcohol a pregnant woman can drink without fear of harming her fetus?
  - One beer per day
  - None
  - Two beers per day
  - Three beers or glasses of wine per day
- A label on a medication says, Should not be taken by pregnant women. This warning indicates that the medication could be a \_\_\_\_\_.
  - was an intense baby and child.
  - did not respond to the rooting reflex.
  - had an excess of genes as a newborn.
  - was exposed to dangerous teratogen levels.

## Physical Development in Infancy and Childhood



**12-2** How do genes and early experiences affect infant and child development?

Infancy is the first year of a child's life. From about 1 year to 3 years of age, a child is a toddler. Childhood includes the years between toddler and teenager. From infancy through childhood, we develop at an amazing pace on many fronts—physically, cognitively, emotionally, and socially. Let's look first at physical development during this early part of life.

## The Developing Brain

During prenatal development, your body made nerve cells at the rate of 4000 per *second*. With your first breath of air, your brain cells were where they needed to be, but your nervous system was still immature. You could not walk, talk, or remember as you now do because your brain had not yet formed the neural networks that would let you perform these behaviors. In part, these neural networks, which continue developing even in adolescence, were a result of **maturation**—the biological growth processes that enable orderly changes in behavior. Experience has little effect on maturation. You rolled over, sat up, walked, and learned to run based largely on your genetic blueprint, and no amount of experience can change that. However, experience does affect *development*. Parents who talk and read to their children foster neural connections that help reading skills develop (see **Figure 12.2**). Those who abuse and neglect their children also deprive them of these complex neural connections and hinder development.

From ages 3 to 6, the most rapid neurological growth appears to be in the part of the brain responsible for thinking rationally. Indeed, preschoolers often show amazing growth in their ability to behave and pay attention to a leader.<sup>14</sup>

To see how maturation affects memory, try to remember anything about your first birthday party, or try to remember wearing diapers. Any luck? If you're like most of us, the answer is *no*. We can't remember much before about the age of 3, and we remember little that happened during ages 3 through 5 because we did not have the neural connections in our brains that allow us to remember. Elizabeth Loftus<sup>15</sup> uses a computer example to explain this. In a way, trying to remember things that happened before age 5 (over a decade for you) is like trying to open the assignment you just wrote using word-processing software from the 1990s. Good luck with that!

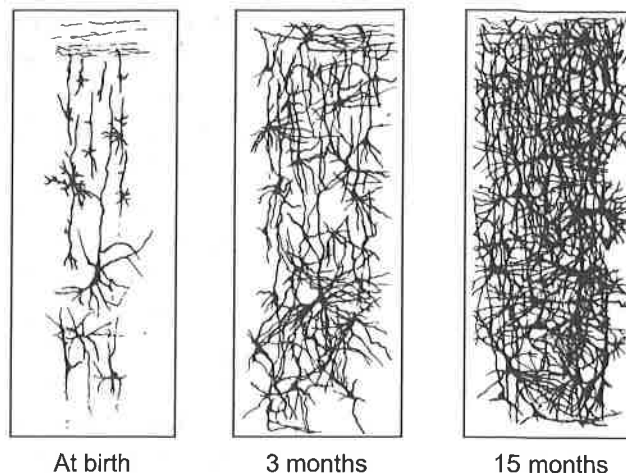
So, do our memories function when we are very young? Yes, but in different ways:

- Most 1-year-olds will imitate the making of a rattle (putting a button in a box) 3 months after observing this act.<sup>16</sup>
- Most 3-year-olds recognize an out-of-focus picture more quickly if they saw a clear version of the picture 3 months earlier.<sup>17</sup>
- Most 10-year-olds say they recognize only one in five of the classmates they have not seen since preschool. But their physiological responses (measured as skin perspiration) are greater to former classmates, even to those they claim they don't recognize. The nervous system remembers what the conscious mind does not.<sup>18</sup>

As you can see, your memory was working when you were an infant and a young child, but it was working differently than it does now. The parts of the brain dealing with memory continue to develop well into the teen years.<sup>19</sup>

## Motor Development

Physical skills and muscular coordination are products of the developing brain. The neural pathways and muscles necessary for crawling (or scooting on your bottom)



**FIGURE 12.2**

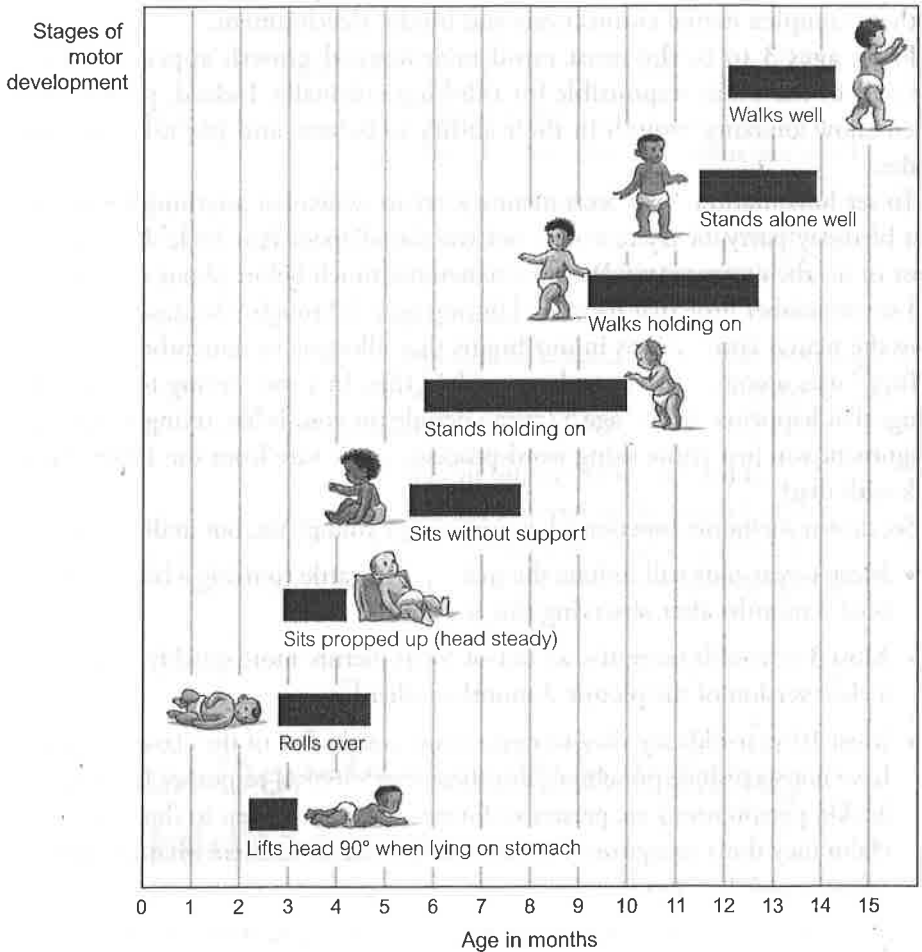
### Neural Development

These drawings show how the brain's neural networks grow increasingly more complex as a child matures. Complex activities such as problem solving and reasoning are among the last areas to mature.

**maturation** Biological growth processes that enable orderly changes in behavior.

mature before the pathways and muscles for walking. We all walk before we run because we are developmentally ready to walk before we are ready to run (see **Figure 12.3**).

Unfortunately, developmental charts that show “normal” ages for crawling, standing, and walking haunt some new parents. I’ve seen parents trying to force their child to crawl, ignoring the baby’s tearful protests, as a “deadline for normal behavior” approached. Here’s some good advice you can give if you see a parent prodding a child to catch up: Relax! Developmental charts provide age *ranges*. In this country, 25 percent of the babies walk at 11 months. Within a week of their first birthday, 50 percent are walking, and almost all of the remaining 50 percent will walk sometime shortly thereafter. The child’s brain creates the readiness for crawling or walking, not the parents’ prodding. The same holds true for all physical skills, including bladder and bowel control. Before a baby achieves the needed neural and muscular maturation, no amount of begging, bribing, or scolding will accomplish toilet training. Knowledge of this fact helped me potty-train my daughters (when they were ready, not when I was ready) in a few days instead of a prolonged period of several months.



**FIGURE 12.3**  
**Motor Development**

Some infants reach each milestone sooner or later than others, but the order of the stages is the same for all infants. The colored bars show developmental norms—the ages at which infants master the motor skill. The left end of the bar indicates the age by which 50 percent have mastered the movement. The right end of the bar indicates the age by which 90 percent have mastered the movement.



**MAKE IT STICK!**

- Which of the following is the best term for the biological growth processes that enable orderly changes in behavior?
  - Temperament
  - Nature
  - Nurture
  - Maturation
- Which statement is accurate about the relationship between brain development and memory?
  - Events occurring during infancy usually aren't remembered because of a lack of neural connections.
  - The brain develops most of its brain cells after birth, so memories of infancy are rare.
  - Brain development is finished at birth and does not have a dramatic effect on memory.
  - Some remember infancy because they were born with more brain neurons than others.
- Which of the following kinds of development will be affected *least* by early life experiences?
  - Attachment development
  - Cognitive development
  - Motor development
  - Social development
- Which is more important in determining when a child walks: its brain or the urging of its parents?

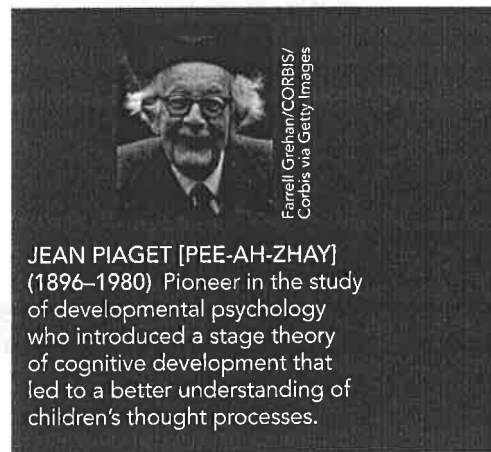
## Cognitive Development in Infancy and Childhood

### **12-3** How does Jean Piaget's theory of cognitive development describe how children think at specific cognitive stages?

Few people have had a greater impact on **developmental psychology** than Swiss psychologist **Jean Piaget** (pronounced pee-ah-ZHAY). In 1920, Piaget was working on intelligence tests to determine the age at which children were likely to answer questions correctly. However, Piaget became interested in the *incorrect* responses children gave, cleverly realizing there was a lot to learn from wrong answers. Children at a given age were making remarkably similar mistakes.

Over the next 50 years, Piaget<sup>20</sup> advanced the belief that the way children think and solve problems depends on their stage of cognitive development. **Cognition** refers to all mental activities associated with thinking, knowing, and remembering. Children know less than you and I know, but they also think *differently*. Trying to explain to a 3-year-old how you exchange pretend money for property will get you nowhere, but an 8-year-old can understand that Boardwalk costs \$400 when you're playing Monopoly. Given your more advanced reasoning skills, that same 8-year-old will not stand much of a chance against you if you're playing a game of strategy.

Piaget wrote that all people, even infants, regularly face and adapt to environmental challenges. We do so by developing **schemas** (sometimes called *schemes*), which are concepts or mental frameworks that organize and interpret information. As a toddler, for example, your schema for getting food may have been to pull on the pant leg of the nearest adult or to start crying. By now, you have countless schemas, from how to start the car to which remote you need to which buttons you push to switch from Netflix to the Food Network. How did you develop all of these helpful mental plans? Piaget's answer would be that you used two different experiences:



Farrell Grehan/CORBIS/Corbis via Getty Images

**JEAN PIAGET [PEE-AH-ZHAY]** (1896–1980) Pioneer in the study of developmental psychology who introduced a stage theory of cognitive development that led to a better understanding of children's thought processes.

#### **developmental psychology**

A subfield of psychology that studies physical, cognitive, and social change throughout the life span.

**cognition** All mental processes associated with thinking, knowing, and remembering.

**schemas** Concepts or mental frameworks that organize and interpret information.



Two-year-old Jocelyn has learned the schema for *dog* from her picture books.



Jocelyn sees a cat and calls it a "dog." She is trying to assimilate this new animal into an existing schema. Her mother tells her, "No, it's a cat."



Jocelyn accommodates her schema for four-legged animals and continues to modify that schema to include different kinds of dogs and cats in the neighborhood.

**FIGURE 12.4**

**Assimilation and Accommodation**

These experiences allow children to make sense of their worlds either by interpreting new information with existing schemas or by changing a current schema.

**assimilation** Interpreting new experience in terms of existing schemas.

**accommodation** Adapting current schemas to incorporate new information.

- **Assimilation**—Interpreting your new experiences in terms of your existing schemas
- **Accommodation**—Adapting your current schemas to incorporate new information

Children assimilate and accommodate all the time. Consider a 2-year-old, whose simple schema for *doggie* is *four-legged animal*. This concept works wonderfully for all the dogs in the neighborhood but not for cats. The toddler must accommodate or modify her schema to account for four-legged animals that are not doggies (see **Figure 12.4**).

In addition to explaining how we form plans to organize and interpret information, Piaget proposed that we all pass through four separate stages of cognitive development on our journey from childhood to adulthood. **Table 12.1** outlines Piaget's sensorimotor, preoperational, concrete operational, and formal operational stages.

**TABLE 12.1** Piaget's Stages of Cognitive Development

Typical Age Range	Description of Stage	Key Developmental Events
Birth to nearly 2 years	<b>Sensorimotor</b> Experiencing the world through senses and actions (looking, touching, mouthing, and grasping)	<ul style="list-style-type: none"> <li>• Object permanence</li> </ul>
About 2 to 6 or 7 years	<b>Preoperational</b> Representing things with words and images but lacking logical reasoning	<ul style="list-style-type: none"> <li>• Pretend play</li> <li>• Egocentrism</li> <li>• Language development</li> </ul>
About 6 or 7 to 11 years	<b>Concrete operational</b> Thinking logically about concrete events; grasping concrete analogies and performing arithmetical operations	<ul style="list-style-type: none"> <li>• Conservation</li> <li>• Mathematical transformations</li> </ul>
About 12 through adulthood	<b>Formal operational</b> Abstract reasoning	<ul style="list-style-type: none"> <li>• Abstract logic</li> <li>• Potential for mature moral reasoning</li> </ul>

## Sensorimotor Stage

According to Piaget, during the **sensorimotor stage** (from birth to about age 2), infants learn about the world through their sensory impressions and motor activities. Infants gain information by mouthing, grasping, looking, hearing, and touching—and this is how they develop their schemas.

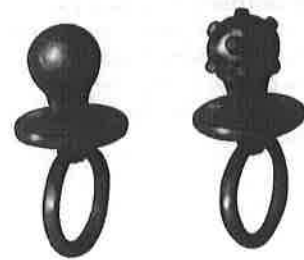
Infants focus on things they can perceive through their senses. At first, the things they couldn't see or hear did not exist. But eventually, infants develop **object permanence**, the awareness that things continue to exist even when you cannot see or hear them.

Piaget assumed object permanence was not possible until around 8 months of age, but research indicates that he underestimated a young child's abilities. Piaget did not think infants could think or deal with abstract ideas, but other researchers have produced evidence of very early logical thinking. Consider the following:

- One-month-old babies were allowed to suck on one of two differently shaped pacifiers without seeing either (see **Figure 12.5**). Later, when the infants were shown the two pacifiers, they looked almost exclusively at the one they had *felt* in their mouth, indicating the memory necessary for object permanence.<sup>21</sup> This study was replicated with babies just 12 hours old with similar results.<sup>22</sup>
- At 5 months of age, babies stare longer or do double takes at impossible situations.<sup>23,24</sup> The example in **Figure 12.6** shows how researchers observed this behavior. Infants also show surprise when a puppet that usually jumps three times jumps only twice.<sup>25</sup> Piaget would not have predicted that such young children could show either numerical thinking skills or awareness of change.

**sensorimotor stage** In Piaget's theory, the stage (from birth to about 2 years of age) during which infants learn about the world through their sensory impressions and motor activities.

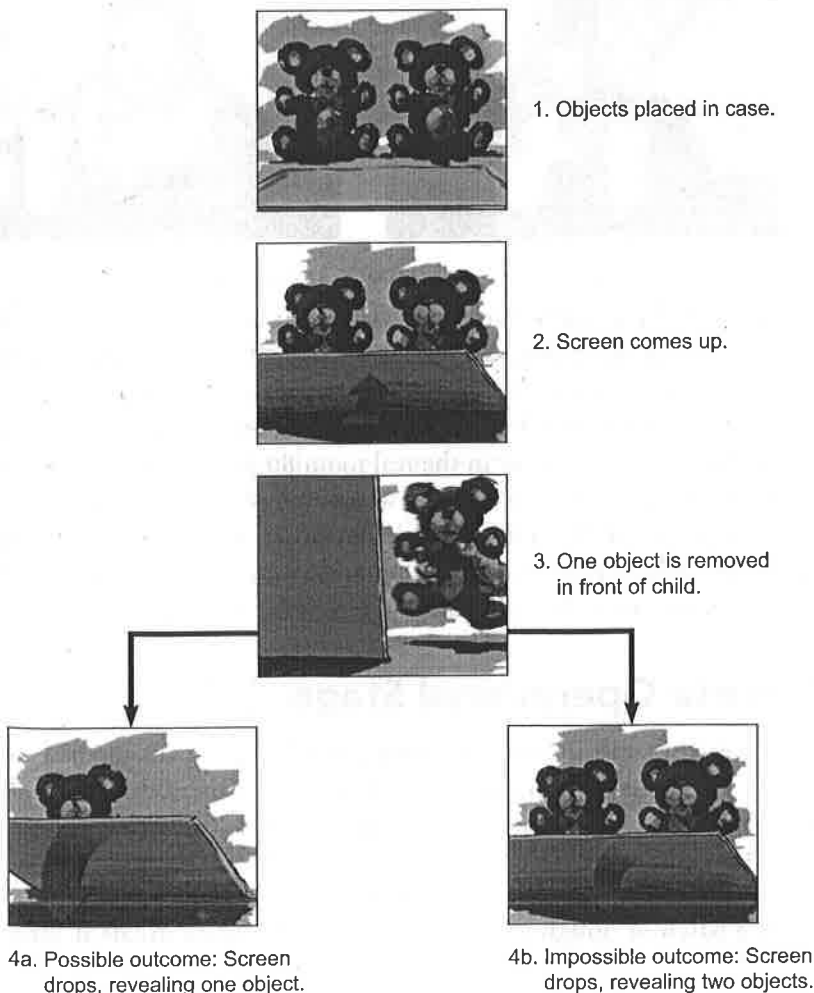
**object permanence** The awareness that things continue to exist even when you cannot see or hear them.



**FIGURE 12.5**

### Early Memories

After sucking on one of these two pacifiers, babies looked longer at the pacifier they had felt in their mouth. This is evidence of early logical thinking. (Research from Meltzoff & Borton, 1979.)



**FIGURE 12.6**

### Early Object Permanence

When shown a numerically impossible outcome (there still being two objects after watching one being taken away), 5-month-old infants stare longer at the two objects, a finding that supports the development of object permanence far earlier than Jean Piaget assumed. (Research from Wynn, 1992.)



**preoperational stage**

In Piaget's theory, the stage (from about 2 to 6 or 7 years of age) during which a child learns to use language but cannot yet think logically.

**conservation** The principle (which Piaget believed to be a part of concrete operational reasoning) that properties such as mass, volume, and number remain the same despite changes in the forms of objects.

**egocentrism** In Piaget's theory, the inability of the preoperational child to take another person's point of view or to understand that symbols can represent other objects.

## Preoperational Stage

Piaget defined the **preoperational stage** (from about age 2 to about age 6 or 7) as a time during which a child learns to use language but cannot yet think logically. If you show 5-year-olds two identical clear glass beakers, each with a cup of blue liquid in them, they'll know the beakers hold the same amount. However, if you then pour the contents of one beaker into a taller, narrower beaker, causing the water line to move up, the preoperational child will probably tell you the new beaker now holds more liquid. Although the different-sized beakers hold the same amount of liquid, 5-year-olds typically focus only on the height dimension. These children lack an understanding of **conservation**, the principle that properties such as mass, volume, and number remain the same even if the object's form changes. Without this understanding, 5-year-olds do not have the cognitive skills to mentally pour the tall beaker's contents back into the regular beaker (see **Figure 12.7**).

Preoperational children develop language skills, but their communication is often egocentric. **Egocentrism** is the inability to consider another's point of view. This means that preoperational children are likely to say whatever is on their mind without taking into account what others have said. Egocentrism shows up in the actions and statements of young children. For example, many years ago, my oldest daughter used to close her eyes when she didn't want anybody to see her. Ask a 4-year-old why the sun shines in the morning, and you might hear the answer, To wake me up.



Bianca Moscatelli/Worth Publishers

**FIGURE 12.7**

### Conservation Problem

Conservation is the principle that properties such as mass, volume, and number remain the same even if the object's form changes. The two beakers in the third panel clearly have the same amount of liquid, but a 5-year-old would probably not understand this conservation problem.

We've learned that taking another's viewpoint, a form of symbolic thinking, appears earlier in the preoperational mind than Piaget thought. In one study, 3-year-olds were able to use a scale model of a real room to locate a hidden stuffed animal. If little Snoopy was hidden under a pillow in the scale model, 3-year-olds knew to look under the pillow in the real room 80 percent of the time. However, only 30 percent of 2½-year-olds knew where to look for little Snoopy in the real room.<sup>26</sup> Piaget probably would have been surprised that symbolic thinking could be shown at such an early age and also that 6 months made such a difference in children's ability to use the scale model of a room as a symbol.

## Concrete Operational Stage

### concrete operational stage

In Piaget's theory, the stage of cognitive development (from about 6 or 7 to 11 years of age) during which children gain the mental skills that let them think logically about concrete events.

Piaget believed that in the **concrete operational stage** (from about age 6 or 7 to about age 11) children gain the mental skills that let them think logically about concrete events. Concrete operational children comprehend that mass and volume stay the same despite changes in the forms of objects (a sign of understanding *conservation*). They know that change in shape does not affect quantity. Whether you roll a batch of dough into one big loaf of bread or divide it into a dozen

rolls, a child at the concrete operational stage knows that you still have the same amount of dough.

In the concrete operational stage, Piaget said that children could also comprehend mathematical transformations. For example, they enjoy math-based jokes that used to be over their heads, like this one:

A king asked his baker to bring him a pie. When the baker brought a pie cut in six pieces, the king yelled at the baker, "Why didn't you bring me a pie cut in two pieces? I could never eat six!"

Obviously, that king can't conserve. Concrete operational children understand the joke (even if it's not that funny).

## Formal Operational Stage

Concrete reasoning requires actual experience. In the **formal operational stage** (age 12 and over), children begin to think logically about abstract concepts and form strategies about things they may not have experienced. The ability to create and use the strategies necessary to play chess is a sign of formal operational thought. Think of the abstract reasoning necessary to understand chemical equations and the laws of physics. Concrete thinkers would struggle in these classes. Young adolescents, said Piaget, become capable of solving hypothetical problems. They can figure out the answer to *If this, then what* questions, such as the following: Whenever Emily goes to school, Meredith also goes to school. Emily went to school. What can you say about Meredith?

Every formal operational thinker knows that Meredith also went to school—but so do most second-graders,<sup>27</sup> who do not fit Piaget's expected age range for this stage. Once again, recent research differs from Piaget's expectations; the mental skills that form the basis for Piaget's stages appear earlier than he predicted.

## Assessing Piaget

We've seen that Piaget's pioneering research underestimated children's abilities in virtually every stage of his theory. Further, most developmental psychologists now believe development is fairly *continuous*, rather than divided into the discrete stages Piaget proposed. And Piaget's work did not reflect the effects of culture on cognitive development. For example, if you were raised in a cultural environment that made minimal use of numbers (such as the Mundurucu and Pirahã of the Amazon rain forest), your language might have number words only up to 2, with all numbers or quantities after that might simply be called *many*. This type of language difference appears to delay the development of quantity conservation.<sup>28,29</sup>

Nevertheless, Piaget's identification of cognitive milestones broke new ground. Stimulated by his work, thousands of psychologists ran experiments on how the mind develops and wrote countless articles on the development of children. Piaget taught us that we learn best when the lesson builds on what we already know (schemas). He showed that new reasoning abilities require the stepping stones of previous abilities. Furthermore, he taught us that children simply cannot reason using adult logic and that it is unrealistic to expect a 3-year-old to reason like a 7-year-old. Piaget provided a wonderful base on which other psychologists could build our current understanding of cognitive development.

### formal operational stage

In Piaget's theory, the stage of cognitive development (beginning about age 12) during which people begin to think logically about abstract concepts and form strategies about things they may not have experienced.

### LIFE MATTERS

When watching a child interact with their parent in line at the grocery store, it's easy to perceive the child as ungrateful or entitled and in need of stricter discipline. How might Piaget's theory of cognitive development change your perspective of the child's behavior?

**MAKE IT STICK!**

- Which Piagetian stage is characterized by pretend play and egocentrism?
  - Preoperational
  - Sensorimotor
  - Concrete operational
  - Formal operational
- Which Piagetian stage is characterized by the belief that mass and volume stay the same despite changes in the form of objects?
  - Sensorimotor
  - Concrete operational
  - Formal operational
  - Preoperational
- What do we call adapting your current schemas to incorporate new information?
  - Assimilation
  - Accommodation
  - Maturation
  - Abstract logic
- A child develops the idea that all teachers are female because the child encounters only female teachers. This idea is an example of
  - a formal operation.
  - preoperational thinking.
  - a schema.
  - conservation.
- True or false? A 6-year-old who can't seem to understand anything other than her point of view is probably going through the formal operational stage.

## Social Development in Infancy and Childhood



**12-4** What are the probable effects of attachment types and parenting styles?

**stranger anxiety** The fear of strangers that infants commonly display, beginning by about 8 months of age.

**Stranger Anxiety**  
This 8-month-old seated with the man in the red suit is clearly experiencing stranger anxiety.



Jim David/Shutterstock

Some neighbors recently called me to come over and watch their 9-month-old son take some wobbly steps as he was learning to walk. The excitement in their voices was clear: Baby Tommy was taking his first steps! When I arrived, Tommy's father was changing his son's diaper, so I sat for a moment waiting for the baby's grand entrance. His dad brought Tommy in, placed him in a standing position, and encouraged him to walk. However, much to the dismay of his parents, Tommy took one look at me and started crying loudly enough to make the dog get up and leave the room. The child then started grabbing at his father's legs, frantically trying to climb up to safety.

Now, I don't exactly think of myself as scary looking, but Tommy was frightened by what he saw. His reaction to me was normal for his age and was a classic sign of **stranger anxiety**, the fear of strangers that infants commonly display beginning around 8 months of age. Around this age, children have established schemas for familiar faces and often greet strangers with crying and distress. Tommy had not assimilated my face into any of his existing schemas.

Tommy's reaction shows how physical, cognitive, and social-emotional behaviors develop simultaneously. A few months later, I thought I should give Tommy another try. So, I invited Tommy's family to our house, and he was fine when he came in. Then Emily, my oldest daughter, made the mistake of reaching

out her arms and asking, “May I hold you?” Tommy immediately tightened his grip on his mother and started saying, “No!” with plenty of volume. This time, Tommy was showing *attachment* to his mother. Let’s take a closer look at attachment and its effects on development.

## Attachment

**Attachment** is an emotional tie with another person, shown by seeking closeness to the caregiver and distress on separation. At least three elements contribute to the infant–parent bond that forms during attachment—body contact, familiarity, and responsiveness.

**Body Contact** Which is more important to fostering attachment: being fed or being held? Are you more likely to become attached to the person who nourishes you or to the person who provides you *contact comfort*? For years, developmental psychologists thought this question was a no-brainer. Surely, providing nourishment is the way to an infant’s heart. Then in the 1950s, psychologists Harry and Margaret Harlow tested this idea, using infant monkeys to assess whether food or contact comfort of something cuddly is more important for attachment.

In the experiment, the Harlows’ infant monkeys could choose between two artificial mothers. One was foam rubber covered with soft terry cloth, and the other was a bare-wire cylinder. It was no surprise that if both “mothers” had a bottle attached for feeding, the baby monkeys preferred the soft, cuddly mother. But what if only the wire mother had the bottle? Which mother would the baby cling to when alarmed or spend most of its time with? The Harlows surprised other psychologists (and parents) when they revealed that the infant monkeys preferred contact with the cuddly mother even while feeding from the wire mother.<sup>30</sup> (see **Figure 12.8**).

Attachment is not primarily a function of who provides the food. Human infants become attached to warm, soft parents who cuddle, rock, *and* feed. Early on, emotional communication between parent and infant takes place most often through touch. Snuggling soothes a baby, whereas tickling elicits smiles and laughter.<sup>31</sup>

Attachment provides an infant with a secure base from which to set out for wobbly explorations of the environment. Tommy needed the closeness of his mother, especially when he was stressed by the presence of someone he didn’t know. The attachment children experience shows up when they become parents. Those who did not experience secure attachment are more likely to describe parenting as stressful and unsatisfying, while securely attached children are more likely to describe parenting as enjoyable and meaningful.<sup>32</sup>

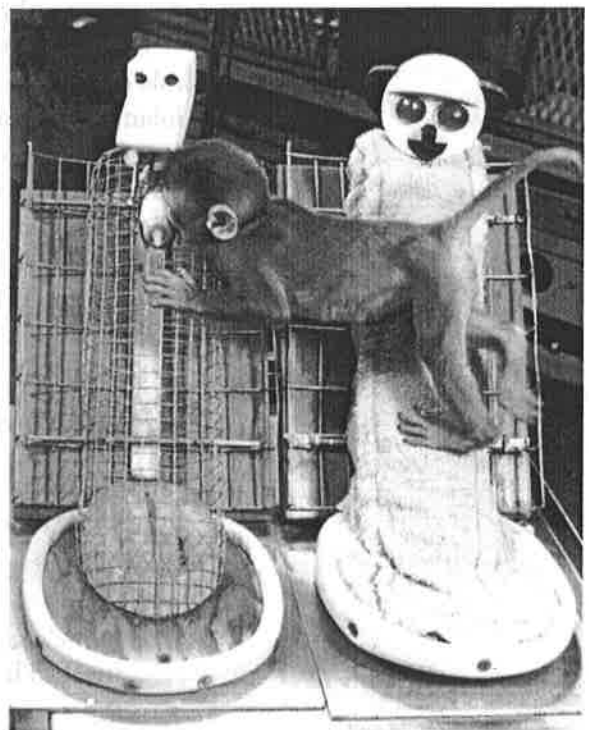
Attachment appears to play a role in our adult lives in other ways as well. Adults who experienced secure attachment as children are more driven to achieve and less likely to express a fear of failure.<sup>33</sup> We still seek to maintain a secure base as we mature, although that base tends to become good friends and partners.<sup>34</sup> We have a greater chance of flourishing when we know a trusted friend or loved one will stand behind us, no matter what.

**attachment** The emotional tie with another person shown by seeking closeness to the caregiver and showing distress on separation.

**FIGURE 12.8**

### Out to Lunch

The Harlows’ monkeys preferred the soft, comfortable “mother” to the bare wire, wooden-headed “mother,” even though the wire model provided nourishment. This discovery, that attachment is formed more through comfort than through nourishment, surprised many psychologists.






**KONRAD LORENZ (1903–1989)**

Researcher who focused on critical attachment periods in baby birds, a concept he called imprinting.

**critical period** The optimal period shortly after birth when an organism's exposure to certain experiences produces proper development.

**imprinting** The process by which certain animals form attachments during a critical period early in life.

**Familiarity** Body contact is one piece of the attachment puzzle; familiarity is another. My daughter and I were unfamiliar faces to Tommy, so he pulled back to the safety of his parents. For some species, the attachment bond forms during a **critical period**—an optimal period shortly after birth when an organism's exposure to certain experiences produces proper development. **Konrad Lorenz**<sup>35</sup> found that a newborn duckling, chick, or gosling will follow the first moving object it sees, which typically is the little creature's mother. This process, known as **imprinting**, is an adaptive response: Following and staying close to Mom provides safety and nourishment for these birds. Lorenz showed, however, that because of the critical period for attachment in baby birds, fledglings would also imprint on black boots with yellow stripes or on bouncing balls if either of those objects was the first thing they saw.<sup>36</sup> Ducklings that imprinted on the boots would follow those boots wherever they went, regardless of who was wearing them. Attachment in these animals is hard to reverse once established.

Do humans have a similar critical period for attachment? *No*. Humans do not imprint, and babies who are adopted days, weeks, or even months after birth can become every bit as attached to their new caregiver as any child does to its birth parents. Familiarity fosters contentment, but human attachment develops gradually.

**Responsiveness** The third element of the attachment bond is responsiveness. Responsive parents are aware of what their children are doing, and they respond appropriately. Unresponsive parents often ignore their babies, helping them only when they feel like it. Mary Ainsworth<sup>37</sup> found that responsiveness appears to affect whether a child is securely or insecurely attached. *Securely attached* children happily explore their environment when their primary caregiver is around. If that caregiver leaves, they appear distressed, and they go to their caregiver as soon as he or she returns. *Insecurely attached* children are often clingy and are less likely to explore and learn about the environment. When their caregiver leaves, they either cry loudly or show indifference to the caregiver's departure and return.

Dutch researcher Dymphna van den Boom<sup>38</sup> designed a study to assess the role of the environment in attachment. She took 100 temperamentally difficult infants and randomly assigned half to a group in which their mothers received training on how to be a responsive caregiver and half to a group where the mothers received no training. When the children reached their first birthday, van den Boom assessed their attachment to their mothers. A whopping 68 percent of the children whose mother received training were deemed securely attached. Only 28 percent of the children in the other group were securely attached. Responsiveness matters.

## Effects of Attachment

Does what we learn in the cradle last to the grave? Said differently, does secure or insecure attachment have long-term effects, or do these terms simply describe some bonds and behaviors limited to our early childhood? Consider the following:

- *Secure attachment predicts social competence.* Children identified as securely attached between 12 and 18 months of age were more outgoing, more



confident, and more persistent in solving challenging tasks when restudied as 2- and 3-year-olds.<sup>39</sup>

- *Deprivation of attachment is linked to negative outcomes.* Babies who grow up in institutions without a caregiver's regular attention do not form normal attachments and often appear withdrawn and frightened.<sup>40</sup> Physical and emotional abuse often disrupts attachment as well. While most abused children show great resilience and do not grow up to be violent criminals or abusive parents, most abusive parents were, in fact, battered or emotionally abused as children.<sup>41</sup>
- *A responsive environment helps most infants recover from attachment disruption.* Children who have been neglected but who are later adopted between 6 and 16 months of age at first have trouble sleeping, eating, and relating to their new parents.<sup>42</sup> However, by age 10, this same group of adopted children showed virtually no adverse effects from the early neglect.

The evidence is consistent and clear. Children who have a warm relationship with familiar, responsive caregivers reap the benefits of secure attachment. Most often, attachment is a direct result of the parenting children receive. As long as parents are responsive, does the way they parent—their parenting *style*—matter? Let's take a look.

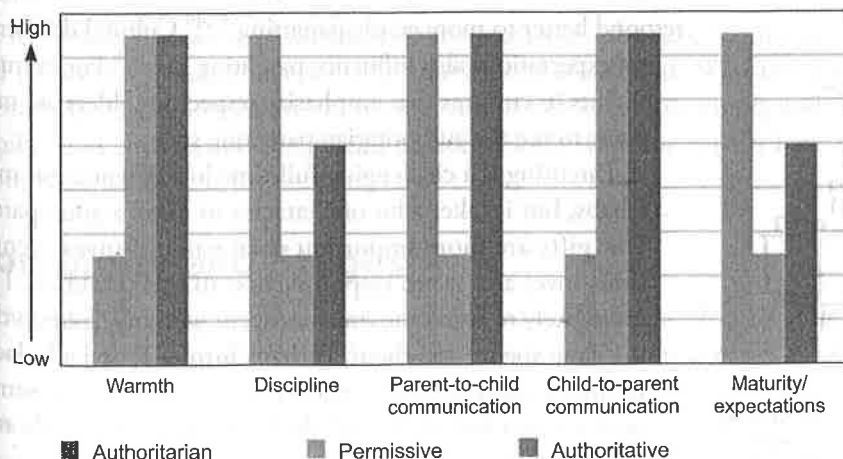
## Parenting Patterns

Most people your age eventually wind up raising a child. Assume for a moment that you are the parent of a 2-year-old. What kind of parent are you? Do you try to talk everything out? Are you strict or permissive? Do you follow through on the rules you set? How will your parenting style affect your child's development?

Diana Baumrind<sup>43,44</sup> was the first to describe three main parenting styles—authoritarian, permissive, and authoritative—and their characteristics (see **Figure 12.9**):

- **Authoritarian parenting** is marked by imposing rules and expecting obedience. These parents are low in warmth, and their version of discipline is strict and often physical. Communication is high from parent to child but low from child to parent. Maturity expectations are high.

**authoritarian parenting**  
A style of parenting marked by imposing rules and expecting obedience.



**FIGURE 12.9**  
**Parenting Styles**

These three parenting styles differ greatly in the areas of warmth toward children, discipline, communication, and expectations. What kind of parent would you like to be?

**Which Style?**  
Is this parent more likely to be authoritative or authoritarian?

### CHEEVERWOOD

...ONE THING, BEFORE YOU SEND ME UP TO MY ROOM FOR THE REST OF MY LIFE... HAVE YOU READ THOSE STUDIES THAT SAY YOU SHOULD REASON WITH YOUR KIDS INSTEAD OF PUNISHING THEM?

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#### permissive parenting

A style of parenting marked by submitting to children's desires, making few demands, and using little punishment.

#### authoritative parenting

A style of parenting marked by making demands on the child, being responsive, setting and enforcing rules, and discussing the reasons behind the rules.

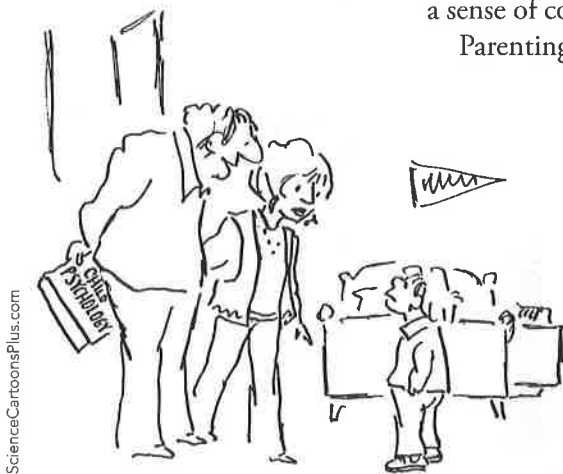
- **Permissive parenting** is marked by submitting to children's desires and using little punishment. These parents are high in warmth, but they rarely discipline their children. Communication is low from parent to child but high from child to parent. Expectations of maturity are low.
- **Authoritative parenting** is marked by making demands on the child, being responsive, setting and enforcing rules, and discussing the reasons behind the rules. These parents are high in warmth, and their version of discipline is moderate. Communication is high from parent to child *and* from child to parent. Maturity expectations are moderate.

A fourth style often added to Baumrind's work is called *neglectful parenting*. In this kind of parenting, parents provide for a child's physical needs but are often distant or disengaged emotionally. Neglectful parents are low in warmth and responsiveness and are less likely to hold their children responsible for their behaviors.

Does one form of parenting have a clear advantage over the other forms? According to Baumrind and others, authoritative parents often produce children high in self-esteem, self-reliance, and social competence.<sup>45</sup> These children are usually more successful, happy, and generous with others. What accounts for these findings? One factor may be that authoritative parents allow their children to develop a *sense of control* over their lives. People who believe they have some control over their destiny tend to be motivated and self-confident. Those without a sense of control are more likely to feel incompetent and helpless.<sup>46</sup>

Parenting style is not, however, a one-size-fits-all proposition. Bolder children often need more restrictive parenting, whereas fearful children often respond better to more gentle parenting.<sup>47,48</sup> Cultural differences and expectations also influence parenting style.<sup>49</sup> For example, parents in cultures that emphasize respect for elders are more likely to use the authoritarian parenting style.

Parenting is a challenging full-time job. Anyone can make a baby, but it takes a lot of character to make a good parent. Few gifts are more important than parents' investment of time, love, and warm responsiveness to their children. I am more likely to regret the time not spent with my children than the time spent with them. Perhaps former First Lady Jackie Kennedy summed it up best when she said, "If you bungle raising your children, I don't think whatever else you do matters very much."<sup>50</sup>



"DON'T YOU REALIZE, JASON, THAT WHEN YOU THROW FURNITURE OUT THE WINDOW AND TIE YOUR SISTER TO A TREE, YOU MAKE MOMMY AND DADDY VERY SAD?"

**MAKE IT STICK!**

1. Stranger anxiety typically starts to show in children of about what age?
  - a. Birth
  - b. 2 years
  - c. Stranger anxiety actually does not exist.
  - d. 8 months
2. Which of the following is true about children who are securely attached to their primary caregiver?
  - a. They are more socially competent than insecurely attached children.
  - b. Deprivation of attachment is linked to positive outcomes.
  - c. A responsive environment does not help infants recover from attachment disruption.
  - d. Securely attached children tend to lack confidence and lack persistence when solving problems.
3. What kind of parenting is characterized by meeting a child's physical needs but remaining distant emotionally?
  - a. Authoritarian
  - b. Authoritative
  - c. Permissive
  - d. Neglectful
4. Parents who want to increase the likelihood of their children developing secure attachments to them should pay most attention to
  - a. the concrete operational stage.
  - b. their own responsiveness.
  - c. imprinting shortly after birth.
  - d. sensorimotor stage schemas about temperament.
5. Which of the following best describes the most advantageous parenting style according to Diana Baumrind's research?
  - a. Parents set rules and make sure children follow the rules without questioning or discussion.
  - b. Parents encourage children to learn the rules themselves and don't set family rules or enforce them.
  - c. Parents require children to follow rules but explain and discuss the rules as a family.
  - d. Parents let the children set and enforce the rules of the family and work to be friends with their children.

## Three Key Developmental Issues



**12-5** What are the three major issues developmental psychologists debate regarding infant and child development?

We have looked at some of the important research on physical, cognitive, social, and emotional development during infancy and childhood. We can view this research on development in terms of three important issues: continuity and stages, stability and change, and nature and nurture. Here's what the experts have to say about these issues.

### Continuity and Stages

How is our development continuous, and how do we develop in stages? In some areas, such as attachment, development is a continuous process. Cognitive development is also more continuous than stagelike. But in other areas—such as motor development, where milestones are more easily viewed—we clearly pass through stages.

## Stability and Change

What remains stable across our development, and how do we change? Clearly, we change physically, cognitively, and socially as we grow up. On the other end of the spectrum, temperament is relatively stable throughout the life span. Fortunately, change is possible for infants from neglectful backgrounds who move into more nurturing homes if the move takes place early enough in the child's life.

## Nature and Nurture

How does the interaction of nature and nurture affect development? The interaction between heredity (nature) and environment (nurture) shapes a child's development. In the area of physical development, for example, environmental factors combine with a child's genetic tendencies to shape the fetus until the moment of birth. Two outcomes stemming from this interaction are evident: the relative health of a child whose mother avoided alcohol and nicotine during pregnancy, and the illnesses of children with FAS. In the area of cognitive development, children learn new behaviors based not only on developmental readiness but also on whether they are raised in a stimulating or a nonstimulating environment. And in the area of social development, children's interactions are influenced by both their inborn temperament and the supportive or neglectful environments in which they are raised.

We have evidence for both continuity and stages in a child's growth. Children's lives have both stability and the capacity for change. And both nature and nurture make us who we are.

### MAKE IT STICK!

1. Discussions on temperament typically fall under the category of which major developmental issue?
  - a. Stability and change
  - b. Nature and nurture
  - c. Continuity and stages
  - d. Assimilation and accommodation
2. Which key developmental psychology issue is most relevant to criticism of Piaget's cognitive development theory?
  - a. Stability and change
  - b. Continuity and stages
  - c. Nature and nurture
  - d. Assimilation and accommodation
3. Which key developmental psychology issue best addresses the question, Does basic personality develop over time, or do people keep the personality they had as children?