Chapter 4

Infancy

What will you learn?

- Important milestones of physical development during infancy
- Why proper nutrition is crucial in this stage of life
- How babies think, and how we know what they are thinking
- How the ability to speak is acquired
- Development of the social, emotional, moral, and spiritual life of babies

*Introduction*

Babies enter the world essentially helpless. They cannot walk, talk, eat, or drink on their own. But at the same time, anyone who has had the good fortune of bringing an infant home from the hospital knows that this tiny, helpless human can also be a cruel taskmaster, depriving his or her parents of time, sleep, and even sanity itself (it seems). Those early days of adjustment pass quickly though, and soon that tiny infant grows into an active toddler charging full steam ahead into life.

The developmental changes we see in the first 2 years of life are truly amazing. In terms of physical growth, a typical child will quadruple his or her weight and stand about a foot taller. He or she will have learned to speak coherently and is well on the way to gaining independence in many basic life tasks. Great strides are made in emotional, social, moral, and spiritual development as well. All in all, this may be one of the most miraculous stages of life.

In this chapter we will begin by looking at physical growth, then move on to explore the changes in cognition in the first 2 years. Next we will study the social, emotional, and moral changes that take place as a child moves from birth to toddlerhood. Finally, we will learn about spiritual formation in these early years of life. We will begin with the amazing growth that takes place in the developing infant brain.*

**4.1 Physical Development**

**Brain Development**

Although the human brain is structurally and developmentally immature compared to other mammals at birth (Van Herck, Geysens, Delbaere, & Darras, 2013), its size at birth is closer to its adult size than any other body part. However, the infant brain changes quickly and dramatically. In fact, during the first two years of life—especially the first year—a massive amount of brain growth and development occurs (Webb, 2013). During the first years of life, the vast majority of brain change and development occurs through the development of neurons.

**Neuron Development**

Neurons are specific nerve cells located in the brain that store and transmit information. The number of neurons in the human brain has been compared to the number of stars in the galaxy, with an average estimate of around 100 billion (Benton, 2013). Neurons communicate and are interconnected with other neurons. However, these connections do not physically touch. Synapses are microscopic gaps or spaces between individual neurons where information is exchanged. Communication between neurons takes...
Figure 4.1: A typical neuron

Billions of neurons in the brain connect and communicate with one another to help us move, think, and experience the world.

Axon terminals are composed of an axon and multiple dendrites (see Figure 4.1). An axon sends messages or signals away from the neuron. The dendrites receive information from other neurons. Most axons are covered by a layer of fat cells called the myelin sheath. The myelin sheath increases the efficiency and speed of communication between neurons via the process of myelination (Glenn & Talbot, 2013).

As neurons form connections with other neurons, they need to be consistently stimulated in order to survive. In fact, when neurons are stimulated by other neurons, more synaptic connections are made. These connections can become increasingly more and more complex. This complex interconnection of neurons with other neurons forms the basis of our abilities. This is because the more connections that are provided, the greater the communication between neurons and, thus, the easier it is to perform any given task. However, whenever neurons are first stimulated, the overall tendency is for the neuron to produce an overabundance of synapses that ultimately do the same thing. This actually assures that the...
developing brain will have the capacity to form as many neural connections as are required of it. When neurons are not stimulated, they will lose their synapses and synaptic connections. This process is called synaptic pruning, and it results in a neuron no longer being committed to a particular connection. Future stimulation of that neuron may result in a synaptic connection with another neuron, which creates a new pathway of neural communication.

The type of information that is processed and sent by neurons may depend upon which side of the brain the neurons are from. This feature is called lateralization and is defined as the specialized function held by particular neurons based upon which side of the brain they occupy. For example, speech, language, and the use of grammar appear to reside in the left hemisphere of the brain (Andric et al., 2013), whereas emotional regulation resides in the right side of the brain (Lindell, 2013). However, complex tasks, such as the performance of music, typically involve both hemispheres of the brain (Tierney, Dick, Deutsch, & Sereno, 2013).

Structure and Function of the Brain

The brain is divided into two distinct hemispheres. When viewing the brain from above, this gives the impression that the brain is made up of a right half and a left half. Each hemisphere of the brain is also comprised of four major areas called lobes. The frontal lobes are often associated with executive function, which involves a range of controlled processes that are related to flexible and goal-directed behavior (Tsuchida & Fellows, 2013). The occipital lobes are primarily associated with visual processing (Chau, Taylor, & Miller, 2013); the temporal lobes are usually associated with memory and auditory processes (Olson, McCoy, Klobusicky, & Ross, 2013); and the parietal lobes play an important role with regard to monitoring one's spatial location (Vuilleumier, 2013).

Brain Growth

At birth, an infant’s brain is roughly two thirds the size of his or her adult brain, but only one fourth of the volume of his or her adult brain. By the time the child is two, his or her brain will be roughly 75% of the volume.
of his or her adult brain. The increase in size and volume during infancy is largely attributed to the process of neuron development, myelination, migration (proliferation and spreading out of neurons), and interconnection (Meyer, Wood, & Stanley, 2013; see http://www.ncbi.nlm.nih.gov/books/NBK26814/ for a more comprehensive description of this process).

The rapid growth of the infant brain makes its protection crucial for the well-being of the infant, child, and eventual adult. As such, care should be taken to avoid falls, injuries, or sudden jarring that may result in damage to the brain. **Shaken Baby Syndrome** is defined as a severe form of child abuse that results from the violent shaking of an infant that can lead to brain damage, long-term disabilities, and death (Menegazzo et al., 2012). Shaken Baby Syndrome is so disastrous to a child that prevention programs have been designed to stop it before it happens (Fujiwara et al., 2012).

In addition to protection from catastrophic effects of injury, the infant brain must also be consistently stimulated in order for it to reach its greatest potential. In fact, depressed brain activity has been associated with an infant who is reared in an environment devoid of stimulation (Fox, Levitt, & Nelson, 2010). In the case of infants, neural connections are "wired" or "re-wired" each time he or she is stimulated. This is typically through their senses, such as by touching objects and people, looking at and being responded to by a caregiver, or hearing noises. The infant’s brain can be thought of as a sponge, just waiting to absorb the various sounds, sights, tastes, smells, and touches that lead to its vast network of neural connections.

**Physical Growth and Change**

Recall from Chapter 3 that a newborn baby weighs only around 7.5 pounds and is about 20 inches long. Newborns are completely helpless and rely on the people around them to provide them with every need. However, it does not take very long for helpless infants to grow into toddlers who are running around and feeding themselves. How does this growth happen? We will examine this question as we explore all of the changes that occur across the lifespan.

**Shaken Baby Syndrome.** A severe form of child abuse that results from the violent shaking of an infant, which can lead to brain damage, long-term disabilities, and death.
Body Growth

As a child’s overall size increases, parts of the body grow at different rates. Two growth patterns describe the changes. The first one is the cephalocaudal trend. During the prenatal period, the head develops more rapidly than the lower part of the body. At birth, the head takes up one-fourth of the total body length. The second pattern is referred to as the proximodistal trend, meaning that growth proceeds from “near to far”—from the center of the body outward. During the prenatal period, the head, chest, and trunk grow first, then the arms and legs, followed by the hands and feet. Think about all of the processes that have to develop in order for a newborn to be able to live, including a heartbeat, respiration, digestion, and elimination of waste. All of these jobs are carried out by organs whose systems are close to the central axis. These functions must be ready to operate when the child is born.

The most dramatic gains in height and weight outside of the prenatal period occur during the first two years of life. Infants usually double their weight by 5 months and triple their weight by their first birthday. Their height increases by about 50% in their first year, so a child whose length at birth was 20 inches is likely to be about 30 inches at 12 months. Take a moment to imagine how big we would all be if our development continued on this same trajectory: What if, over the next year, you tripled your weight and got a few feet taller?

While the pace does slow down in the second year, 2-year-olds generally weigh about four times as much as they did when they were born and are about three feet tall. Children do grow and develop at their own rates. However, regular wellness visits with a doctor in which height and weight measurements are taken help to ensure that a child is developing at a pace within normal range.

Sleep Patterns

During the first few months of life, newborns sleep between 16 and 17 hours a day on average (Buysse, 2005; Titotzky & Sadeh, 2009; de Graag et al., 2012). However, an infant’s sleep often comes in periods of around two hours, each followed by periods of wakefulness. This sleep pattern tends to be exhausting for a newborn’s parents, whose sleep patterns usually involve a long stretch of sleep followed by a long stretch of wakefulness. Most babies do not sleep through the night for several months (Sadeh, 2007).

Luckily for parents, infants do gradually settle into a more adult-like pattern. Typically, by about 4 months old, an infant begins to sleep as much as 6 continuous hours at night, and daytime sleep also falls into regular
naptime patterns. Most infants sleep through the night by the end of the first year, and the total amount of sleep they need each day decreases to about 15 hours (Mao et al., 2004).

During periods of sleep, infants’ heart rates increase and become irregular, blood pressure rises, and they begin to breathe more rapidly (Heimann et al., 2013). Sometimes, their closed eyes begin to move back and forth, as if they are watching an action-packed movie. This period of active sleep, which is similar to the rapid eye movement (REM) sleep that is found in older children and adults, is associated with dreaming. At first, the active REM-like sleep takes up around one half of an infant’s sleep; however, the quantity of active sleep quickly declines and, by the age of 6 months, accounts only for just one third of an infant’s total sleep time (Heimann et al., 2013).

Knowing that infants have what appears to be active periods of sleep that are similar to REM sleep in adults raises the question of whether or not infants are dreaming during those periods. While no one knows the answer, it seems highly unlikely; infants do not have much to dream about, given their relatively limited experiences. Some researchers believe that this type of sleep provides a means for the brain to stimulate itself, a process called autostimulation (Schmidt, 1975). Stimulation of the nervous system would be particularly important because infants spend most of their time sleeping and so little of their time in an alert state. See Table 4.1 for other infant states of arousal beside sleep.

### Table 4.1: Infants’ states of arousal

<table>
<thead>
<tr>
<th>States</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular sleep</td>
<td>Infant is in full rest and shows little to no body movement</td>
</tr>
<tr>
<td>Irregular sleep</td>
<td>Gentle limb movements, occasional stirring</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>Infant is either falling sleep or waking up; body is less active than in irregular sleep but more active than regular sleep</td>
</tr>
<tr>
<td>Quiet alertness</td>
<td>The body is relatively inactive but eyes are open and attentive</td>
</tr>
<tr>
<td>Waking and crying</td>
<td>Shows frequent bursts of uncoordinated body activity; crying may occur</td>
</tr>
</tbody>
</table>

Motor Development

There are two main types of motor development that occur. The first type is referred to as gross motor skills. These skills refer to control over actions that help children move about in their environment. Examples of gross motor skills are things like crawling, walking, or standing. The second type, fine motor skills, has to do with smaller movements, such as reaching or grasping. There are two main ways that infants and toddlers learn to grasp items. The first way is through the ulnar grasp. This is a clumsy motion in which the baby’s fingers close against an object. Infants as young as 3 months know how to adjust this type of grasp in order to pick up smaller or bigger objects. It is not until about 9 months of age that we begin to see children use a pincer grasp. A pincer grasp is when infants use their thumb and index finger to grasp objects.

Table 4.2 demonstrates the average age at which infants and toddlers achieve a variety of gross and fine motor skills (Bayley, 1969, 1993, 2005). While each child develops at his or her own pace, there is a large age range within which most babies accomplish each skill. A baby who may be delayed in one area, such as crawling, is not necessarily delayed in learning to walk as well. Health practitioners are concerned about a child’s development when many of the motor skills are seriously delayed.

Table 4.2: Gross and fine motor development for infants and toddlers

<table>
<thead>
<tr>
<th>Motor skill</th>
<th>Average age achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold head erect and steady</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Lifts self by arms</td>
<td>2 months</td>
</tr>
<tr>
<td>Rolls from side to back</td>
<td>2 months</td>
</tr>
<tr>
<td>Grasp cube</td>
<td>3 months 3 weeks</td>
</tr>
<tr>
<td>Rolls from back to side</td>
<td>4½ months</td>
</tr>
<tr>
<td>Sits alone</td>
<td>7 months</td>
</tr>
<tr>
<td>Crawls</td>
<td>7 months</td>
</tr>
<tr>
<td>Pulls to stand</td>
<td>8 months</td>
</tr>
<tr>
<td>Plays pat-a-cake</td>
<td>9 months 3 weeks</td>
</tr>
<tr>
<td>Stands alone</td>
<td>11 months</td>
</tr>
<tr>
<td>Walks alone</td>
<td>11 months 3 weeks</td>
</tr>
<tr>
<td>Builds tower of two cubes</td>
<td>11 months 3 weeks</td>
</tr>
<tr>
<td>Scribbles vigorously</td>
<td>14 months</td>
</tr>
<tr>
<td>Walks up stairs with help</td>
<td>16 months</td>
</tr>
<tr>
<td>Jumps in place</td>
<td>23 months 2 weeks</td>
</tr>
<tr>
<td>Walks on tiptoe</td>
<td>25 months</td>
</tr>
</tbody>
</table>

Sources: Based on Bayley, 1969, 1993, 2005
Both nature and nurture are involved in motor development. Certain voluntary motor activities are not possible until the brain has matured in terms of myelination and the differentiation of the motor area of the cortex. For example, infants are unable to grasp an object that is sitting on the floor next to them until their brain has matured enough. Although the neonate shows stepping and swimming reflexes, as discussed in Chapter 3, these behaviors are controlled by more primitive parts of the brain and disappear later in infancy. Experience also plays a role in motor development. Infants need opportunities to experiment before they can achieve such milestones as sitting up and walking.

**Nutrition**

The first two years of a baby’s life are the most critical in how diet impacts physical development. An infant’s body and brain are growing at an extreme pace. Although they differ in terms of growth rates, body composition (or the percentage of fat, bone, and muscle), metabolism, and activity levels, there are some broad guidelines that we need to be aware of when feeding infants. In general, infants should consume 50 calories per day for each pound that they weigh (Skinner et al., 2004). Most adults do not count calories when they are feeding their infants because infants self-regulate quite efficiently.

**Breast or Bottle?**

One of the biggest debates in infant nutrition is about which is better: bottle or breast? For years, pediatricians agreed that bottle feeding an infant was best. The main rationale offered was that parents would know how much nutrition infants were getting and could maintain a good

**Web Field Trip: Physical Development**

The process of physical development has implications for a child’s ability to engage in a range of physical activities. Head to the following website:

http://www.healthychildren.org/english/ages-stages/baby/Pages/default.aspx

You will see on the left side of the page there are "Ages & Stages" headings. Click on “Baby,” “Toddler,” or "Preschool" to see a list of physical skills that we expect children to have at that stage. Look through the list and think of some of the conditions and events that could potentially affect a person’s healthy physical development. Can you think of any child in this stage that you know who can do some of these things?
eating schedule. However, things have now changed, and pediatricians agree that there is no better food for infants during their first year than breast milk. Breast milk contains all of the essential vitamins and nutrients that an infant needs, and it also seems to boost immunity to a variety of childhood diseases, such as earaches, diarrhea, allergies, and respiratory issues. In addition to helping immunity, breast milk is also easily digestible, making a breastfed baby hungry more often throughout the day. While most infants who are bottle fed can go 3–4 hours without feedings, breastfed babies usually become hungry every 1½ to 2 hours.

Breastfeeding can thus be less convenient for mothers, and is a bigger challenge for those mothers who must work in conditions that do not facilitate or allow it. Many mothers who return to work sooner begin weaning their babies from the breast earlier. However, more companies are creating policies to encourage women to continue to breastfeed or express their milk once they return to work. In one study, researchers found that mothers working in companies that have a lactation room with dedicated space, breast pumping breaks, and encouragement from colleagues and supervisors to use breast pumping breaks were significantly more likely to continue breastfeeding for more than 6 months after returning to work (Tsai, 2013).

Breastfeeding has health benefits for the mother, as well. It reduces the risk of early breast cancer and ovarian cancer; it builds the strength of muscle, which can reduce the likelihood of osteoporosis; it helps to shrink the uterus back to its original size after delivery; it suppresses ovulation; and, finally, it helps mothers lose pregnancy weight. A woman will burn anywhere from 500 to 1000 calories a day lactating, depending on how much milk she is producing.

However, breastfeeding has some disadvantages. For example, breast milk is one of the bodily fluids that transmits HIV. As many as one third of infants born to mothers who are infected with HIV, the virus that causes AIDS, become infected during pregnancy, childbirth, or breastfeeding (UNICEF, 2013). Alcohol, drugs, and environmental toxins, such as polychlorinated biphenyls (PCBs), can also be transmitted thought breast milk.

Around the age of 4 months, infants can be introduced to solid foods, the first of which should be a single-grain cereal such as rice or oatmeal cereal. Once a routine has been established, infants can then be introduced to vegetables and fruits. Infants should try vegetables before they are given fruit (Barends, de Vries, Mojet, & de Graaf, 2013). As noted in Chapter 3,
Infants should try vegetables before they are given solid foods. Around the age of 4 months, infants can be introduced to solid foods, the first of which should be a single-grain cereal such as rice or oatmeal cereal. Once a routine has been established, infants can then be introduced to vegetables and fruits. Infants prefer sweet tastes, so those who get a taste of fruit first are much more likely to reject vegetables because they do not taste as sweet.

Around the age of 12 months, children can begin drinking cow or goat milk. At this age, children need to drink whole milk because the fat promotes brain development (Chiasson et al., 2013). If a child is lactose intolerant, there are many other options, such as soy milk.

**Malnutrition**

Malnutrition is defined as the condition of having an improper amount and balance of nutrients, and it interferes with an individual's healthy development. Malnutrition is more of an issue for children in developing countries than for those in industrialized countries, and there are two main diseases: marasmus and kwashiorkor. A diet that is consistently lacking in vital nutrients is called marasmus. Marasmus occurs as a result of a mother's malnourishment and is passed along to the infant during the first year of life as a result of an inadequate milk supply and not enough formula (often due to contaminated water). The starving baby becomes painfully thin and is in danger of dying.

Kwashiorkor is the other dietary disease that plagues developing countries. Kwashiorkor is caused by an unbalanced diet very low in protein. The disease usually strikes between 1 and 3 years of age. Because the diet has so little protein, the body breaks down its protein reserve. As a result, the belly enlarges, the feet swell, the hair falls out, and a skin rash appears. These children often become irritable and listless (Claus, 2013).

Children who survive these diseases often grow to be smaller in all body dimensions and suffer lasting damage to the brain, heart, liver, or other organs (Muller & Krawinkel, 2005). It is also common for children who are thinking of breastfeeding their infants? What advice would you have for them?

Throughout its history, the La Leche League has been under scrutiny for some of its strong beliefs and practices when it comes to breastfeeding infants. After reading this book review, what do you think about breastfeeding practices? How would this information help you to talk to mothers who are thinking of breastfeeding their infants? What advice would you have for them?
who have suffered from malnutrition to have a lower metabolism, which may continue even after the nutrition improves. Malnutrition may also disrupt the appetite control centers in the brain, causing the child to overeat when food becomes available.

Health and Wellness

Health and Wellness for Infants

The majority of infants and children in the United States are reasonably healthy. For preschool children, the most frequently encountered acute illness is the “common cold.” In fact, the average preschooler experiences approximately 12 colds a year during peak cold season (Hendley, 1998). However, there is evidence that supports the contention that infants who experience acute illness during the first few months of life may be more susceptible to behavioral problems later in life (Brown, McIntyre, Crnic, Baker, & Blacher, 2011). In addition, the same relationship appears to exist amongst preschoolers, where preschoolers who experience more frequent instances of acute illnesses are more prone to behavioral problems as older children (Kolak, Frey, Brown, & Vernon-Feagans, 2013).

Case Study: Sudden Infant Death Syndrome

Sudden Infant Death Syndrome (SIDS) was originally classified in the International Classification of Diseases in 1965 as the death of an infant that occurred unexpectedly and without any apparent cause. SIDS occurs when an infant stops breathing while sleeping. It is responsible for the highest number of infant fatalities in the United States, where researchers currently estimate that SIDS is responsible for approximately 3,000 deaths per year. The risk of SIDS is highest when the infant is between the ages of 2 and 4 months. Over the past several decades, researchers have struggled with understanding the causes of this devastating phenomenon.

Currently, researchers believe there is a relationship between SIDS and infants who sleep on their stomachs (Ball & Volpe, 2013). However, the link does not appear to be causal. Accordingly, one of the primary ways in which researchers have battled this baffling phenomenon is by consistently encouraging caregivers to place infants on their backs when they are sleeping and to be sure that the sleeping environment is free of blankets, toys, and pillows.
Promoting Health and Wellness

Parents and caregivers are a key influence in the health, behaviors, and overall well-being of children (Campbell et al., 2013). Nonetheless, there are a variety of individuals who have the opportunity to promote health and wellness among children. Health promotion programs are relatively common in childcare centers (Minniss, Wardrope, Johnston, & Kendall, 2013). For example, researchers have developed and proposed comprehensive wellness promotion programs that target the immediate and indirect social environment of children in childcare (Park, Im, & Cho, 2013). However, researchers have also developed health promotion and wellness programs that specifically target the family (Davison, Lawson, & Coatsworth, 2012) and even investigated the feasibility of using cosmetologists as promoters of health and wellness among parents of infants (Ahlers-Schmidt, Redmond, Struemph, Hunninghake, & Nimeskern, 2013).

One of the primary ways in which infants and children are specifically targeted for wellness and health promotion is through immunization. Although many of the dangers associated with childhood diseases have dramatically decreased, it is still important to keep children on an immunization schedule (Shann, 2013). The immunization schedule typically runs from birth to age 16. A typical immunization schedule can be seen in Table 4.3.

Another crucial way in which caregivers promote the health and wellness of children is in monitoring children's behavior to avoid accidents. Accidents during childhood can have lifelong implications for both the family and the child (Phillips, 2013). In fact, accidents are the leading cause of death among children (Wallace, Thompson, & Anderson, 2013). During infancy, the most common types of accidents include suffocation, falls, and poisoning.

Table 4.3: Typical immunization schedule

<table>
<thead>
<tr>
<th>Age</th>
<th>Immunization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Hepatitis B</td>
</tr>
<tr>
<td>2 months</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Polio</td>
</tr>
<tr>
<td></td>
<td>Influenza</td>
</tr>
<tr>
<td>4 months</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Polio</td>
</tr>
<tr>
<td></td>
<td>Influenza</td>
</tr>
<tr>
<td>6 months</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Influenza</td>
</tr>
<tr>
<td>12 months</td>
<td>TB Test</td>
</tr>
<tr>
<td>15 months</td>
<td>Measles</td>
</tr>
<tr>
<td></td>
<td>Mumps</td>
</tr>
<tr>
<td></td>
<td>Rubella</td>
</tr>
<tr>
<td></td>
<td>Influenza</td>
</tr>
<tr>
<td>18 months</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Polio</td>
</tr>
<tr>
<td>4 to 6 years</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Polio</td>
</tr>
<tr>
<td>11 to 12 years</td>
<td>Measles</td>
</tr>
<tr>
<td></td>
<td>Mumps</td>
</tr>
<tr>
<td></td>
<td>Rubella</td>
</tr>
<tr>
<td>14 to 16 years</td>
<td>Tetanus-diphtheria</td>
</tr>
</tbody>
</table>

Source: Centers for Disease Control and Prevention, 2014a
Many of the accidents experienced by infants and children can be prevented. For example, parents and caregivers can “childproof” the surroundings of infants, toddlers, and children. Car seats, bike helmets, and electrical outlet covers can all be used to keep known dangers away and prevent accidents.

4.2 Cognitive Development

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

In this section, we will explore the stages of cognitive development proposed by Jean Piaget. Next, we will describe Vygotsky’s zone of proximal development, his concept of scaffolding, and his idea regarding private speech. Finally we will examine some amazing discoveries that have been made recently in research on infant cognition.

Piaget

The pioneering Swiss psychologist, Jean Piaget (1896–1980) championed the idea that infants come to understand their world through action. Piaget developed his theory of cognitive development through intense observation of children in their “natural habitat.” Trained as a biologist, philosopher, and zoologist, Piaget drew upon the various methodologies associated with these fields to create a theory of how children produce a working knowledge of their environments. In this effort, Piaget often observed his own offspring; he frequently watched his children playing games in an effort to understand the complex process of their developing knowledge.
Through meticulous observation, Piaget (1954) argued that infants and children, behaving like “young scientists,” actively organize knowledge through the development of mental representations based upon their actions. He called these **schemes**. Piaget believed that the basic building blocks of cognition or schemes within infancy were based upon the five senses (touch, smell, taste, sight, and hearing). During infancy, these schemes are developed based upon the simple actions and interactions of the infant with objects in his or her immediate environment. For example, sucking, grasping, and looking at a ball would all be examples of simple physical actions. However, as children develop, their schemes take on the mental characteristics associated with thought. Older children can develop plans and strategies for action based upon thought, without direct physical experiences. That is, they can imagine scenarios as opposed to having to view them directly and, as such, can act accordingly. Piaget argued that two underlying processes contributed to a child’s growing collection of schemes: assimilation and accommodation.

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

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

Piaget believed that the schemes that are developed during infancy are quickly altered via assimilation and accommodation. For example, infants’ inclination to put any object into their mouths occurs as a result of assimilation. However, they will quickly realize through accommodation that not everything tastes good. An infant may suck on her fingers and like the taste, keeping them in her mouth throughout the day. However, as soon as she puts her fuzzy blanket in her mouth, she will realize that she does not like the taste of the blanket nearly as much. As children start to explore and interact with their environment, the process of assimilation and accommodation become much more apparent.
Piaget believed that infants and children progressed through stages of cognitive development. He believed that there were four stages of cognitive development: sensorimotor, preoperational, concrete operational, and formal operational. Piaget’s stages are discussed in the sections that follow.

**Sensorimotor Stage**

Piaget argued that the first stage of cognitive development lasted from birth to around age 2. He labeled this the sensorimotor stage. He believed that infants constructed their understanding of their environments through the coordination of sensory experiences. The sensorimotor stage is further broken down into six distinct substages (see Table 4.4): the use of reflexes, primary circular reactions, secondary circular reactions, the coordination of secondary circular reactions, tertiary circular reactions, and mental combinations.

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

*Sources: Adapted from Piaget, 1952, 1954, 1964*

**Simple Reflexes**

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

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

Secondary Circular Reactions

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

Coordination of Secondary Circular Reactions

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

Tertiary Circular Reactions

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

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

Object Permanence

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

Attention and Memory

Type of Attention

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

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

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

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

**Attention in Infancy**

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

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

We also know that an infant’s attention is linked to new stimuli and environments. When infants see or interact with a new toy for the first time, the toy holds their attention for a longer period of time. However, as soon as that toy or stimulus becomes familiar, their attention to the toy decreases, making it more likely that they will be distracted by another stimulus (Snyder & Torrence, 2008).
It is also important to know that this attention that infants give to toys is the same attention they will give to adults who are interacting with them. For example, Trent, a 9-month-old, laughs hard the first few times his mother engages him in peek-a-boo. His mom knows that when he is getting crabby, peek-a-boo will make him laugh. However, the last time she tried to play peek-a-boo with him he did not laugh; instead, he just turned his head away. His mom now realizes that in order to keep Trent’s attention or to keep him engaged, she will have to interact with him in a new way.

Infants also engage in what is called **joint attention**. This is when two or more individuals focus on the same object or event. Joint attention requires three different things:

- the ability to track another person’s gaze,
- the ability to direct another person’s attention,
- the ability to have a reciprocal interaction.

When an infant is only a few months old, joint attention involves a parent or a caregiver pointing out or using words to get the infant’s attention. However, as the infant gets closer to the 12-month mark, joint attention skills are frequently observed, and we begin to see the infant engage or direct the caregiver’s attention by pointing at something (Kawai et al., 2010).

**Memory**

**Memory** is defined as the retention of information over a period of time. Without our memory, not many things in our life would make sense. Could you imagine waking up every day and not knowing what you have to do that day, or who the people around you are, or the roles that they play in your life? Memory is vital.

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

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

Some researchers have found that babies do not have explicit memory until the second half of the first year, and then memory improves three-fold during the second year of life (Bauer, Larkina, & Deocampo, 2011). In one longitudinal study, infants were assessed several times during the second year of life (Bauer et al., 2000). Older infants showed more accurate memory and required fewer prompts to demonstrate their memory than younger infants. Researchers have documented that 6-month-olds can remember information up to 24 hours, but by 20 months of age infants can remember information they encountered 12 months earlier. In general, we find that most young infants’ conscious memories are delicate and fade rather quickly until they are at least 2 years old.

Theories of Language Development

For countless generations, children have learned the native language spoken by their primary caregivers. Acquisition of language is often situated in the nature versus nurture debate, with the interactionist perspective representing the continuum between the two opposing views. In this section, we will explore the biological theoretical perspective, the environmental theoretical perspective, and the interactionist theoretical perspective with regard to language development.

The Biological Theoretical Perspective

The biological perspective is rooted in the premise that children from all across the world acquire language in extraordinarily similar ways. This appears to be true regardless of which of the thousands of different languages that are spoken worldwide a child is learning. Because of these similarities in language acquisition, language researchers believe that there must be biological processes at work. In fact, language researchers point to the brain and argue that Broca's area and Wernicke’s area (see Figure 4.2) are specifically predisposed for language usage (Friederici, Mueller, & Oberecker, 2011).
The brain is separated into lobes. Broca’s area of the brain is located in the frontal lobe in the left hemisphere. This part of the brain is associated with the muscles of the tongue, throat, and other areas of the face, which control our ability to produce words when we speak. Thus, it is associated with speech production. Additionally, Wernicke’s area is also located in the left hemisphere, but in the temporal lobe. Wernicke’s area is associated with language comprehension. Individuals with damage to either area display specific types of aphasia. Aphasia is defined as a loss or impairment with regard to language processing. Individuals with damage to Broca’s area typically have Broca’s aphasia, which is characterized by a difficulty producing words. Individuals with damage to Wernicke’s area typically have Wernicke’s aphasia, which is characterized by poor language comprehension; although they do not have difficulty producing words, they do have an inability to produce comprehensible speech that uses the proper words.

Language researchers who believe that biological processes and innate mechanisms direct language development are often called nativists. The nativist approach to language development was originally proposed by Noam Chomsky, who has been called the “father of modern linguistics.” Chomsky (1968, 1978, 1991, 1999, 2005) argued that individuals are all born with an innate ability to use language and that the language often emerges automatically over the course of the lifespan.

Chomsky attributed the innate tendency to acquire human language to the existence of the language acquisition device (1988, 1990). As a theoretical construct, support for Chomsky’s language acquisition device is buoyed by the universality of human language abilities, the regularity of the early production of sounds, and the fundamental sequence of language development that is seen among children regardless of the language that is spoken (Pinker, 2007). In fact, Chomsky argued that all of the world’s languages share a similar, underlying structure. He labeled this underlying structure universal grammar and said that it can be found in every child’s ability to follow simple rules of language, such as asking questions and forming plurals. He further maintained that even though each language was unique in vocabulary and specific rules (something he called surface structure), all languages shared an underlying set of rules that governed our ability to transform our ideas into words (something he called deep structure). In his studies of multiple languages, Chomsky believed that children were prewired to listen to language in such a way as to foster their abilities to understand the rules that govern our language. In addition, he believed that children are attuned to language on account of the innate human need to converse with others.

Although supporters of Chomsky’s language acquisition device argue that the universal milestones of language acquisition that span various languages and cultures supports the theoretical construct, it does not account for language acquisition in its entirety. Other language researchers point to the role of the environment in terms of fostering our ability
Section 4.2 Cognitive Development

In the next section, we will explore the environmental theoretical perspective on language acquisition.

**The Environmental Theoretical Perspective**

As you may recall from Chapter 1, Skinner (1957) detailed the process of learning as a function of reinforcement and conditioning, and early behaviorists argued that language acquisition follows the same principles outlined by these fundamental concepts. For example, when Molly, a 5-month-old infant utters the sound “da-da,” her father might instantly pick her up, hug her, and shower her with kisses. Subsequently, Molly may utter the phrase “da-da” more and more in an effort to be rewarded with the outpouring of affection. As a consequence, Molly builds her language skills piece by piece through conditioning and reinforcement. For Skinner, an infant’s acquisition of language is nothing more than the reinforcement of learned behavior. Slowly, but steadily, Molly may move closer to the word “daddy” as her father requires that Molly’s utterance of “da-da” gets closer and closer to the word “daddy” before he reinforces her through
Section 4.2 Cognitive Development

affection. This process is called shaping and is defined as the tendency to require additional refinement in behavior (or in this case, speech) before reinforcement is provided.

There are several problems that arise from the behaviorist approach to language acquisition. For example, the behaviorist approach does not account for “new” and grammatically correct sentences spoken by children—sentences that children utter that they have never heard before. A behaviorist would argue that the child must hear it in order to reproduce it. In addition, children appear to learn the structure or syntax of language even if they are not reinforced for doing so (Brown, 1973). For example, Brown discovered that many parents did not offer reinforcement or reward their children for sentences that were grammatically correct and, ultimately, those children did learn the rules for grammar and appropriate sentence structure anyway.

Some language researchers maintain that language is learned in a social environment. After all, children are inundated with language from a very early age (Kuhl, 2011) and when they are not, the neural connections that represent the associations between language and emotion are often not developed (Berko Gleason, 2009; Berko Gleason & Ratner, 2009). In fact, supportive and actively involved parents, caregivers, and teachers are primary sources of influence with regard to language development and acquisition (Ariza & Lapp, 2011; Jalongo, 2011). Teachers, caregivers, and parents often specifically engage in various strategies to assist with children’s language acquisition. Four of these strategies are called recasting, expanding, labeling, and infant-directed speech (also called IDS or “motherese”).

Recasting is defined as the deliberate rephrasing of an utterance or phrase into a grammatically correct statement or question. Recasting has been shown to be an effective method for improving grammatically correct language development in children (Hassink & Leonard, 2010). For example, Molly, a 3-year-old, may say, “Finny was walking,” and her father may ask, “Where was Finny walking?” By recasting the sentence, Molly is engaged in the conversation and, consequently, her language must be used and further developed and refined in an effort to elaborate on the initial sentence.

Expanding is defined as the purposeful restatement of a simple phrase into a linguistically sophisticated and grammatically correct form. Expanding has also been associated with improved language development (Ingersoll, 2011). For example, Molly may say “Finny eat,” and her father may reply, “Yes, Finny is eating his breakfast.”
Labeling involves the intentional naming of objects; it has been called “the original word game” (Brown, 1968) and has been shown to have positive implications for language development (Low & Simpson, 2012). For example, much of a child’s vocabulary is based upon the naming of objects. In fact, many adults naturally point to various objects, people, or places, and ask, “What’s that?” By doing so, children learn the names of things and steadily build their vocabulary.

Infant-directed speech (IDS or “motherese”) occurs when a caregiver speaks in a higher pitch than normal, using simple words and sentences (Clark, 2009). More specifically, the characteristics of IDS include “a higher pitched voice, greater pitch variations, slower rate of speech, shorter, simpler sentences, simple and concrete words, clearer articulation, repetitive speech, and exaggerated facial expression” (Kargar, 2012, p. 870). Although it has been called motherese, the reality is that mothers, fathers, grandparents, siblings, and various other caregivers use this type of language when speaking with infants (Broesch & Bryant, 2013). In addition, IDS is used in a variety of languages and cultures (Lee & Davis, 2010) and has been associated with early language acquisition (Saint-Georges et al., 2013).

The Interactionist Theoretical Perspective

The interactionist theoretical perspective maintains that neither the biological nor the environmental theoretical perspective can account for language acquisition in its entirety, and argues that the acquisition of language requires both biological processes and experience (Ambridge & Lieven, 2011; MacWhinney, 2010). After all, if biological processes were all that were needed to learn language, everyone with the correct brain areas other apparatures vital to speech production would learn how to speak—even individuals reared in isolation—but this is not always the case (see “Web Field Trip: Language Acquisition: ‘Feral Children’”). Language researchers argue that it is a combination of both and point to the variations in language acquisition across individuals and cultures in support of this contention.

*Web Field Trip: Language Acquisition: “Feral Children”*

Is language acquisition a function of nature or nurture? This documentary examines several cases of children raised without human interaction. Their stories provide insight for this debate.

Wild Child: The Story of Feral Children

https://youtu.be/BWem7F1bO2Y

Given what you have learned about the biological, environmental, and interactionist theoretical perspectives, how would you explain feral children in terms of language acquisition? Be sure to support your explanation using empirical sources. In addition, what comparisons and differences can you perceive between John (the boy raised by monkeys) and Oxana (the girl forced to live with dogs)? What academic research supports your assertions?*
The Process of Language Development

Now that we have explored some of the theories behind how we learn language, we can examine how language develops throughout the first few years of life. We all know that when infants are born they do not use language, but that does not mean that they are not communicating with us. In this next section, we will explore pre-linguistic development and the role that gestures play while infants are still non-verbal. We will then look at what those first words and sentences look like.

Pre-Linguistic Development

Long before infants say their first word, they can make fine distinctions among the sounds of language (Sachs, 2009). In Patricia Kuhl’s (2011) experiment, phonemes (the basic units of language) from various world languages are piped through a speaker for an infant to hear. A box with a bear in it is placed where the infant can see it. A string of identical syllables is played and then the syllables are changed (from babababa to lalalala). If the infant turns her head when the syllables change, the box lights up and the bear begins to dance around, rewarding the infant for noticing the change. This research has showed that from birth to about 6 months of age, infants have the ability to recognize when sounds change (most of the time) regardless of the language that the syllables are coming from. Kuhl (2011) calls these children “citizens of the world.” However, over the next 6 months infants get even better at recognizing the changes in sounds from the language that they hear spoken at home, and they gradually lose the ability to recognize phonemic differences that are not a part of their own language.

Children develop language according to an invariant sequence of steps or stages. Infants begin with what we call pre-linguistic vocalizations, which are a form of communication. These vocalizations do not represent an object or an action; they are merely forms that an infant uses to communicate to those around them. The first type of pre-linguistic development is crying. While this may not seem like communication, ask any parent, teacher, or other caregiver how their infants communicate and you will hear a resounding answer of “crying.” For new infants, only a few weeks old, crying is the only way that they can communicate their needs. To an untrained ear, all cries may sound alike, but if you ask someone who has spent a lot of time around one infant, that caregiver would tell you that there are different types of cry, each indicating whether the infant is hungry, tired, or experiencing other discomfort. Table 4.5 provides a summary of these stages.
## Table 4.5: Milestones in language development during infancy

<table>
<thead>
<tr>
<th>Approximate age</th>
<th>Vocalization and language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>• Cries</td>
</tr>
</tbody>
</table>
| 12 weeks        | • Smiles when talked to and nodded at  
|                 | • Engages in squealing and gurgling noises  
|                 | • Sustains cooing for 15–20 seconds |
| 16 weeks        | • Responds to human sounds more definitely  
|                 | • Turns head and searches for speaker  
|                 | • Laughs occasionally |
| 20 weeks        | • Cooing becomes interspersed with consonant-like sounds  
|                 | • Vocalizations differ from the sounds of mature language |
| 6 months        | • Cooing changes to a single syllable babbling  
|                 | • Neither vowel or consonants have fixed pattern or recurrence  
|                 | • Common utterances sound somewhat like ma, mu, da, or di |
| 8 months        | • Continuous repetition enters into babbling  
|                 | • Patterns of intonation become distinct  
|                 | • Utterances can signal emphasis and emotion |
| 10 months       | • Vocalizations mixed with sound play, such as gurgling, bubble blowing  
|                 | • Makes effort to imitate sounds made by older people with mixed success |
| 12 months       | • Identical sound sequence replicated more often  
|                 | • Words (such as mama or dada) emerge  
|                 | • Many words and requests are understood (for example, “Point to your eyes”) |
| 18 months       | • Repertoire of 3–50 words  
|                 | • Explosive vocabulary growth  
|                 | • Babbling consist of several syllables with intricate intonation  
|                 | • Little effort to communicate information  
|                 | • Little joining of words into spontaneous two-word utterances  
|                 | • Understands nearly everything spoken |
| 24 months       | • Vocabulary of more than 50 words, naming everything in the environment  
|                 | • Spontaneous creation of two-word sentences  
|                 | • Clear effort to communicate |

Source: Adapted from Lenneberg, E.H. (1967)

NOTE: All ages are an approximation. Slower development does not necessarily indicate language delays.

During the second month of life, infants will begin cooing. Cooing is different from crying. These gurgling sounds, which typically emanate from the back of the throat, may resemble extended “oohs” and “ahs.” Cooing appears to link to feeling of pleasure and positive excitement and is not done when an infant is hungry, tired, or in distress.

While it is true that crying and cooing are innate, research has shown us that these things can be modified by experience (Majorano, Vihman, & DePaolis, 2013). When mothers respond positively to cooing by talking to their infant, smiling at their infant, or imitating their infant, the infant will increase the amount of cooing. Early parent-infant “conversations” in which the parent coos and then waits for the infant to coo in response may
foster an infant’s awareness of “taking turns” as a way of verbally relating to others (Majorano, Vihman, & DePaolis, 2013).

By the time an infant reaches 8 months old, the amount of cooing decreases substantially. However, somewhere between 6 months and 9 months infants begin to babble. **Babbling** is the first vocalizing that sounds like human speech. In babbling, infants frequently combine consonants and vowels, such as *ba, ga*, and sometimes, if parents are lucky, *mama* or *dada* (McCardle, Colombo, & Freund, 2009). At first, these *mama* and *dada* sounds are purely accidental, despite the families’ joy of hearing them.

In verbal interactions between infants and adults, the adult will frequently repeat the syllable of the sounds that the infant is saying. For example, if Tina, who is 9 months old, is saying *ba*, her mother is more likely to repeat that back to her, saying *bababa* instead of just saying the one syllable. Infants who hear this redundancy of syllables are more likely to discriminate these sounds from others and are further encouraged to imitate or repeat after their parents or caregivers (Elkind, 2007).

After infants have been babbling for several months, parents often conclude that their children are having conversations with themselves. At 10–12 months of age, infants tend to repeat syllables, showing what linguists refer to as echolalia. **Echolalia** is defined as the automatic repetition of sounds of words. It is very common for parents or caregivers to overhear an infant going on and on, repeating consonant-vowel combinations such as *ah-bah-bah-bah-bah*, and then pausing and switching to another combination such as *da-la-la-la-la*. Towards the end of the first year, infants are also using patterns of rising and falling intonation that resemble the pattern of adult speech. **Intonation** is the use of pitches of varying levels to help communicate meaning. It may actually sound like an infant is trying to speak caretakers’ native language.

**Gestures**

Before a baby can even say a first word, they point (Liszkowski, Carpenter, Striano, & Tomasello, 2006). For instance, at 11 months old, Susan points to her bear to show her mother that she wants to hold it. The next day, she points to their family dog, Rover, who is running around the kitchen. Her mother looks at her and says, “Oh, are you trying to tell me to look at how silly Rover is being?” Months later, she is sitting in her highchair when her sister drops her fork on the floor. Susan points to the fork on the floor, alerting her sister to where it has fallen. Pointing is one of the first ways that we see infants communicate with the people around them.

There are several other types of gestures that we see infants engage in. The first is conventional social gesture. Children who are waving hello or good-bye, or who are blowing kisses, are using gestures that everyone knows. As children get a bit older, usually around 13 months, they are able to use more elaborate gestures and move on to representational gestures.
For example, Kaitlynn is with her mother at a neighbor's house. During the visit, Kaitlynn looks up at her mother and puts her arms in the air. Kaitlynn's mother knows that when Kaitlynn puts her arms up like that, she would like to be picked up. Symbolic gestures are those that we use to symbolize something. For example, when Todd knows something is hot, he starts to blow on it. For him, blowing air through his mouth symbolizes that something is hot. Both children who are deaf and who have hearing use such gestures in the same way (Goldin-Meadow, 1997).

Learning gestures can help babies to learn how to talk. In fact, early gestures are a good predictor of later vocabulary size (Goldin-Meadow, 2007). Once infants can produce about 25 words, they drop back with their use of gestures and just begin saying the words.

### Web Field Trip: Similarities of Gestures of Apes and Children

How similar are human infants' gestures to those of other species? This article examines the development of gestures across species:

http://newsroom.ucla.edu/portal/ucla/how-similar-are-the-gestures-of-246499.aspx

What is your reaction to the findings presented in the article? Would you have thought that an infant and an ape would be using the same type of gestures to communicate? Why or why not? Does the theory presented in the article support the conclusions? Why or why not? Make sure your answer is supported by at least one scholarly article. Google Scholar or your university's library is a good place to begin your search for articles on this topic.

### First Words

Before we can jump into first words, we first have to look at vocabulary development. Vocabulary development refers to the process of a child learning the meanings of words. Children have two different types of vocabulary: expressive and receptive. **Expressive vocabulary** is the number of words that one can use in producing language. In other words, these are the words that we hear a person speak or say. **Receptive vocabulary**, on the other hand, is the number of words that someone understands. In general, infants understand many more words than they know how to say. Infants have the ability to listen to what the adults around them are saying and understand what the adult is asking or telling them. In fact, in one study, 12-month-olds could speak on average 13 words but knew or understood around 84 words (Tamis-LeMonda, Crostafaro, Rodriguez, & Bornstien, 2006).

Parents wait excitedly to hear their child’s first word; it really is such a milestone for each baby! A child’s first word is typically spoken between the ages of 11 and 13 months of age, but within the range of 8 to 18 months is considered normal (Klee & Stokes, 2011). First words tend to be brief and consist of one or two syllables. Each syllable is likely to consist of a
consonant followed by a vowel. It is important to know that an infant’s spoken vocabulary is very slow at first, and it may take some children 3–4 months after they say their first word to be able to speak 10–30 words.

Infants’ first sentences are usually two-word utterances; however, they convey a complete thought or idea and therefore can be thought of as a sentence. Roger Brown (1973) called these brief expressions that have the same meaning as a sentence telegraphic speech. For example, Debbie, who is just 12 months old, is eating dinner with her family. During the meal, she picks up her milk and says to her dad, “more milk.” Her dad smiles and says, “Oh, it looks like Debbie wants more milk with her dinner.”

By the time an infant is around 18 months of age, she may be saying up to 50 words. Most of these words are ones that are heard on a daily basis such as no, mamma, milk, hi, and eat. However, they are also saying words such as all-gone or bye-bye. While these words are not found in the dictionary, they do function as part of the child’s vocabulary. More than half of a child’s expressive language at this age is made of general nominals and specific nominals (Nelson, 1973). General nominals are similar to nouns in that they include the names of classes of objects, such as ball or car; animals, such as dog or cat; and people, such as boy or girl. They also include personal and relative pronouns, such as she or that. Specific nominals are proper nouns, such as Daddy or Sparky.

At around 18–22 months of age, there is a rapid burst of vocabulary (Tamis-LeMonda et al., 2006). Vocabulary can increase from 50 words to over 300 words in only a few months. This vocabulary spurt can also be called a naming explosion because almost 75% of the new words are nouns. This momentum of learning new words continues into preschool, where children are typically adding about nine new words per day to their vocabulary (Hoff, 2006).

You may have noticed, if you have ever spoken with a young child, that they try to talk about more objects than they have words for. To compensate for this issue, young children will “stretch” the meaning of one word to refer to things and actions for which they do not know the words (Mayor & Plunkett, 2010). This process is called overextension. For example, Ralph, who is 2 ½ years old, spends a weekend with his grandpa, who has come to visit and fix a few things around Ralph’s house. Ralph’s grandpa wears work boots, overalls, and a baseball hat, and Ralph spends most of the weekend following his grandfather around, trying to help him. The following week, the doorbell rings at Ralph’s house, his mom lets in a man wearing work clothes, and she shows him to the bathroom. When the man starts to fix a leak in the pipes, Ralph asks his mom if he can help “grandpa” with the pipes. Ralph has overextended the meaning of grandpa to anyone who is fixing things in their house.

Eve Clark (1975) studied infant language development and found that overextensions are generally based on perceived similarities in function.
and form between the original object or action and the new one. She used as an example the word *moon*, which one child originally used to talk about the moon and then overextended to designate all round objects, including the letter *o* and cookies and cakes. Overextensions gradually pull back to their proper reference as the child's vocabulary and ability to classify objects develop (Mayor & Plunkett, 2010).

Another common issue with young children's language is **underextension**—applying a word too narrowly. For example, Joy, who is 16 months old, uses the word *bear* to refer only to the stuffed bear that she sleeps with every night. When she sees pictures of bears in a book and her parents tell her, "Look at the bear, Joy," she says, "That not a bear." Then she picks up her bear and says, "This a bear."

*As you have seen, the process of language acquisition is a complex process requiring many cognitive skills—yet it is easily mastered by most children before they reach 3 years of age. Clearly a degree of intelligence is required even in the earliest months and years of life. In the next section we will look at infant intelligence. We will seek to answer these questions:

- What is intelligence?
- How is it measured?
- Can parents facilitate an increase in their child's intelligence?
- How influential is early development to intelligence later in life?*

**Infant Intelligence**

To measure an infant's intelligence the same way that we measure an adult's intelligence would be nearly impossible because infants lack the language skills to communicate their answers. However, there are some ways in which we can assess infants and their abilities.

**Habituation**

Some research has found that **habituation** tasks have the potential for measuring an infant's intelligence. For example, if a baby is shown a toy or a picture over and over, how many times does that child have to be shown that item to no longer show any interest in it? The speed at which habituation or recognition of the item occurs may be related to both a baby's neurological and cognitive development. That is, neurological and cognitive processes may be related to the characteristics that psychologists refer to as intelligence. As a result, the variations among an individual's rate...
of habituation within the first few months of life may predict later intelligence scores. In fact, several studies done on this very idea have found that to be true: The earlier the infant becomes habituated to the object or recognizes the object, the higher their IQ later in life (Cuevas & Bell, 2013; Domsch, Lahaus, & Thomas, 2010).

**Fagan Test of Infant Intelligence**

If recent research has indicated that habituation tasks have some insight into an infant’s intelligence, are they the best way for psychologists to measure infant intelligence? Some believe that they are. Joseph Fagan, who is a psychologist, developed a standardized measure for the habituation rate: the Fagan Test of Infant Intelligence (Fagan & Detterman, 1992). He believed that a test of the habituation rate, referred to as novelty preference and visual recognition, is appropriate for infants who perform poorly on conventional tests such as the Bayley Scale on Infant Development (which we will discuss in the next section). For example, an infant who suffers from cerebral palsy may be unable to complete many of the tasks in other assessments; however, she may be fully capable of viewing visual stimuli and exhibiting habituation to them. The Fagan Test of Infant Intelligence is a useful measure of cognitive function among special populations (Fagan & Detterman, 1992; Gaultney & Gingras, 2005; McCorry & Hepper, 2010).

Research examining the utility of the Fagan Test of Infant Intelligence on children without any issues or delays has produced inconsistent results. For example, an infant’s scores on the Fagan test have been shown to be related to specific cognitive functions, such as language comprehension, as captured by tests of intelligence that are administered at a later stage in the child’s life (Andersson, 1996; Domsch, Lahaus, & Thomas, 2010; Thompson, Fagan, & Fulker, 1991). However, other studies have shown no such relationship with later measures of those same variables, such as language (Cardon & Faulker, 1991; Tasbihsazan, Nettelbeck, & Kirby, 2003). Therefore, we cannot say for certain whether or not habituation rate can be used as a standardized measure of intelligence for infants.

**Bayley Scales of Infant Development**

The best known and most widely used scale for infants is the Bayley Scales of Infant Development, which attempt to measure how children think about, react to, and learn about the world around them (Bayley, 1969, 2006). The language portion of the Bayley Scales consists of two parts: receptive language skills, which reflect how well a child recognizes sounds and how much a child understands spoken words and directions, and expressive language skills, which reflect how well a child is able to use a variety of spoken words. The scales also assess motor skills, which also consist of two parts: fine motor skills, which reflect how well a child can use his or her hands and fingers to make things happen, and gross motor skills, which reflect how well a child can move his or her
body. In addition, the scales look at social-emotional milestones and adaptive behavior.

The scales measure development by identifying milestones that are normally achieved by certain ages. For example, a 3-month-old infant is challenged to reach for a dangling ring, a 9-month-old is observed attempting to put cubes in a cup, and at 17 months old, children are observed while they build a tower of three cubes. When looking at cognitive development, a child who is 8 months old is expected to find a hidden toy under a cloth to exhibit object permanence. The purpose of the scales is to identify young children with developmental delays and to provide information for intervention planning (Bayley, 2006). This tool is not used as a predictive instrument for forecasting later IQ or school performance.

Many parents today spend a good deal of time trying to teach their children skills that will enhance their IQs. Any number of commercial products prey on parents' fears that their children may not measure up, and these products are found on many toy store shelves. While it is clear that these products do not decrease a child’s potential IQ, there is no evidence that they enhance them either. Parents may find that it is better to spend their time reading to their infants, playing with them, and taking them out on stimulating excursions. A grocery store can provide ample opportunities for learning when parents talk about shapes, colors, temperatures, and types of foods with their children.

*Web Field Trip: iPads for Infants*

There is no doubt about it. Viral videos of very young babies using interactive media does make these children look very smart. But does the use of technology such as this help or hurt children? These articles express two very different opinions about the danger or value of technology for children.

**Researchers: Using an iPad or smartphone can harm a toddler’s learning and social skills**


**Mobile and Interactive Media Use by Young Children: The Good, the Bad, and the Unknown**

http://pediatrics.aappublications.org/content/pediatrics/135/1/1.full.pdf

1. In what ways might the use of mobile and interactive media be helpful for children?
2. In what ways might the use of this technology be harmful for children?
3. What special precautions should parents recognize when considering the use of these devices with very young children?
4. What issue is currently unclear in this debate?*
4.3 Social, Emotional, Moral, and Spiritual Development in Infancy

*At first, it would seem the social, emotional, moral, and spiritual development in infants would be a very short and simple discussion. However, from the earliest moments after one’s birth, important connections are formed that provide a basis for future relationships—with others and, interestingly enough, with God. In this section we will look at emotional expression during infancy, examine temperament, and see how one’s basic disposition is evident in infancy. We will explore attachment theory, learning about how our early relationships are formed. We will discover how current research reveals the moral sense that is evident even in very young children. Finally, we will see how spirituality takes root and begins to grow during the first years of life.*

Across cultures all babies share common expressions to communicate their emotions.
Emotional Development

As individuals progress throughout the lifespan, social, emotional, and moral development occurs. As such, the way people interact with each other evolves and changes over time. This chapter presents the process of emotional development throughout infancy.

Emotional development is something that occurs throughout our lifespan. Emotion is a concept that is used to represent the intensity and valence of an experience as it pertains to an individual. Here, intensity is defined as the extent to which a feeling is expressed and valence is defined as the extent to which an individual is attracted to or repelled by an experience. There is a wide spectrum of different emotions that human beings experience. In this next section, we will explore the development of emotions in infancy and how infants relate to others around them.

Infants from birth to around 1 year display a wide spectrum of emotions, which can be both primary and self-conscious (Muris & Meesters, 2013). Primary emotions appear in the very early stages of infancy and are culturally universal—people of all cultures understand what these primary emotions are. Examples include joy, anger, sadness, and fear. Self-conscious emotions do not typically emerge until a child is at least 6 months of age; they show that the child has self-awareness. Examples of self-conscious emotions include empathy, jealousy, and embarrassment, which appear first, followed by pride, shame, and guilt.

For example, infants have the capacity to display happiness with a smile and frustration with a frown or furrowed brow (often within a few minutes of each other). In fact, the basic facial expressions of infants appear to be remarkably similar regardless of the country in which they are born or the culture in which they are raised (Lewis, Haviland-Jones, & Barrett, 2010). That is, nonverbal encoding—the nonverbal expression of emotion—appears to be a basic innate ability found in all people across the world (Bornstein, Suwalsky, & Breakstone, 2012). However, even though all infants appear to have the capacity to display similar kinds of emotion, the degree or intensity of emotional expression differs from culture to culture and from individual to individual. For example, by the age of 1 year, Chinese infants are less expressive than their counterparts in Japan, Europe, and the United States (Buss & Kiel, 2004).

Infants also appear to be able to interpret the emotions of others. For example, an infant has the capacity to discern when a caregiver is happy or worried (Hoehl, Wahl, Michel, & Striano, 2012). However, this capacity is limited to infants that are older. This is because for the first 6 to 8 weeks, their eyesight and visual precision is limited. By the time they reach the age of 4 months, most infants are able to understand, produce, and decode the emotions of others (Messinger, Mattson, Mahoor, & Cohn, 2012).
Stranger and Separation Anxiety

Although the range of emotional expression and the ability to decode emotions may differ slightly among infants, by the time an infant reaches the end of his or her first year, two emotional reactions typically surface among all infants. These emotional reactions are called stranger anxiety and separation anxiety.

Stranger anxiety is defined as an emotional reaction marked by caution and wariness when an infant encounters an unfamiliar person. Between the ages of 6 and 9 months, an infant spends a considerable amount of time attempting to understand his or her surroundings. This often includes trying to anticipate and predict events. In addition, they are able to separate people into two groups: people they know and people they do not know. When something happens that they cannot predict (such as meeting a stranger), they display fear, which marks the beginning of stranger anxiety (Ainsworth, 1973). However, although all infants around the world display stranger anxiety at about the same age, the intensity of the fearful reaction varies from child to child and even from culture to culture (Otto, Potinius, & Keller, 2014).

Separation anxiety is defined as a fear and distress reaction displayed by infants when their primary caregiver leaves their side. Separation anxiety appears to be universal in the cultures that have been studied (Kagan, Kearsley, & Zelazo, 1978). However, the intensity of the experience appears to differ across cultures, which may be attributed primarily to different parenting practices (Essau, Sakano, Ishikawa, & Sasagawa, 2004). It usually appears around 7 to 8 months, peaks around 14 months, and then gradually decreases.

Social Referencing

Social referencing is marked by the reliance on others in an effort to make sense of events or circumstances. Similar to stranger and separation anxiety (which occur in a social environment and depend upon the actions of another individual), social referencing results in an emotional response that depends upon the behavior of another person. Social referencing appears to emerge around 8 to 9 months—a remarkable occurrence, given that in order for an infant to use social referencing, he or she must be able to understand the meaning of another person’s behavior within the context of a specific situation (Stenberg, 2009). For example, when a new person comes to the door, infants may display fear. However, their expression may quickly change as they look to their mother’s reaction as a cue for how to respond; if she appears happy, the signs of fear subside and they become calmer.
Temperament

Every person has a temperament that is evident from early infancy. **Temperament** is the patterns of arousal and emotionality that are a consistent and enduring characteristic of an individual. Some researchers believe that temperament involves a genetic component (Elliot & Thrash, 2010; Zuckerman, 2011). A child’s temperament can include many different aspects of behavior, such as activity level, smiling and laughing, regularity of eating and sleep habits, approach or withdrawal, adaptability to new situations, intensity of responsiveness, general cheerfulness or unpleasantness, distractibility or tenacity, and how easily they are soothed (Thomas & Chess, 1989).

**Thomas and Chess Classification**

Thomas and Chess (1989) carried out a large-scale study on a group of infants that has become known as the New York Longitudinal Study. In their study, they found that from the very beginning of life (within the first few days after birth), some children could be classified into one of three types of temperament: “easy” (40% of their sample), “difficult” (10% of their sample), and “slow to warm up” (15% of their sample). The “easy” children have regular sleep and feeding times, approach new situations (such as a new school or even a new food) with enthusiasm, adapt to them easily, and are generally cheerful. The “difficult” child, on the other hand, has irregular sleep and feeding schedules, is slow to accept new people and situations, takes a long time to adjust to new routines, and, when frustrated, responds by having a tantrum and crying. Children who fall into the “slow to warm up” category fit between the other two; they show a mixture of temperament traits. For example, Marcia, who has very consistent eating and sleeping patterns and is generally a very happy child, is frightened when she is put into new situations. She may reject a new food, but once she is exposed to it several times, she begins

*Web Field Trip: The Strange Situation*

Mary Ainsworth’s Strange Situation has been used many times to test the attachment relationship of children. This video provides an excellent overview:

https://youtu.be/9HG05AIH6Y

- How does a caregiver foster secure attachment?
- What are the long-lasting implications of attachment theory?
- Is there any hope for an individual who “missed” a secure attachment in infancy?*
to try it and then to like it. Likewise, when they are introduced to a new person, they may be shy or cry at first, but once they have been around the person for a while, they do just fine.

The remaining 35% of children that they examined could not be consistently categorized. These children would show a variety of characteristics. For example, one child may have a happy disposition but react strongly and negatively to new situations.

Although not all children are born with the same temperament, there is at least a moderate consistency in the development of an individual’s temperament from infancy through the lifespan (Elliot & Thrash, 2010; Zuckerman, 2011). In general, an infant who has an easy temperament and a happy disposition will have those same characteristics as an adult. Likewise, an infant who is very active and cries often can become a fearful toddler.

**Rothbart and Bates Classification**

New classifications of temperaments continue to be researched. Mary Rothbart and John Bates (2006) have argued that three comprehensive scopes best represent what researchers have found to classify the organization of temperament:

1. **Extraversion/surgency**, which includes “positive anticipation, impulsivity, activity level, and sensation seeking” (Rothbart, 2004, p. 495). Infants who fall into this category may react to unfamiliar people and situations with initial avoidance, distress, or subdued affect.
2. **Negative affectivity**, which includes “fear, frustration, sadness, and discomfort” (Rothbart, 2004, p. 495). Infants who fall into this category are easily distressed and may cry a lot.
3. **Effortful control** (self-regulation), which includes “attention focusing and shifting, inhibitory control, perceptual sensitivity, and low-intensity pleasure” (Rothbart, 2004, p. 495). Infants who have good effortful control have the ability to keep their arousal level from going too high and also have the ability to self-soothe.

It is important to keep in mind that the description of temperament categories reflects the development of normative capabilities of children, and not the individual differences that we may see in children. For example, effortful control is something that all children have; however, the degree to which each uses it varies among children (Bates, Schermerhorn, & Goodnight, 2010).
Biological Foundations of Temperament

Research shows that temperament does seem to be related to genetics, but to what degree? Kagan (2008) argues that children are born with a physiology that makes them biased toward a particular type of temperament. However, we cannot discount how the environment affects how children learn to modify their temperament, at least to some degree (Thompson, Winer, & Goodvin, 2011).

Some physiological characteristics have been correlated with different temperaments. For example, a person who has a shy temperament (i.e., "slow to warm up") is associated with a unique physiological pattern that includes a heart rate that is consistently faster than average, a high level of cortisol (stress hormone), and high rates of activity in the right frontal lobe of the brain (Kagan, 2010). This pattern could be connected to the excitability of the amygdala, the structure in the brain that plays an important role in fear and inhibition (Kagan, 2010).

There have also been some studies that seek to examine the role of heredity on temperament. Twin and adoption studies suggest that heredity makes a moderate contribution to the differences in temperament within a group of people, meaning that families do have an influence on our temperament.

Goodness of Fit

Now that we know that children can be born with biological predispositions to a certain temperament, we can look to see how the environment also plays a role. Initial predispositions of temperament can be manipulated by the parents’ reactions to a child. For example, a parent may react to a difficult child by enforcing strict caregiving rituals, which in turn just increase the child’s frustration levels (Schoppe-Sullivan, Mangelsdorf, Bown, & Sokolowski, 2007). One of the things that parents can do is find a match between a child’s temperament and the environmental demands that the child must cope with. This is often referred to as goodness of fit. When parents are able to match their parenting methods to a child’s temperament, they may actually see their child’s behaviors improve (Bird, Reese, & Tripp, 2006; Schoppe-Sullivan et al., 2007). For example, Mary is enrolling her daughter in child care for the first time when she is 3 years old. Mary knows that her daughter has a “slow to warm up” temperament and she does not react to new situations very well at first. Mary asks the director if she can bring her daughter in for a few days before she is supposed to start so that her daughter can become familiar with the teachers.

Think About It: Your Temperament

Take a moment to reflect on your own temperament and the temperaments of the other members of your family. Do you have the same or similar type of temperament to one of your parents? How about your siblings? Or do you find that everyone in your family has their own unique temperament? Search the literature for evidence regarding the extent to which the noted differences in temperament result from the relative contribution of nature and nurture.
children, and classroom. The director agrees, and Mary and her daughter visit the facility every day for a few hours for a week so that her daughter can become acquainted with the new situation. On the day that Mary has to leave, her daughter still protests and cries a little, but after just a few minutes she begins playing happily with the other children.

**Attachment**

Attachment is what many people refer to as love and affection, and it starts when we are just infants. John Bowlby (1988) was one of the first researchers to study attachment, and he believes that attachment is essential to the survival of an infant. He believes that babies are born with behaviors, such as crying, smiling, and clinging, that stimulate caregiving from adults, which leads to attachment. For example, Molly, who is 8 months old, smiles every time she hears her mother’s voice and starts to clap her hands. When Molly’s mother sees this behavior, she cannot help but go over to Molly, pick her up, kiss her, and smile back at her. Most anyone witnessing this interaction would conclude that Molly and her mother have an attachment to one another. Bowlby is not the only researcher who studied attachment. Later, a student of Bowlby’s, Mary Ainsworth (1989), took Bowlby’s idea of attachment a step further. She defines attachment as an enduring emotional bond between one person or animal and another.

**Theories of Attachment**

There are several theories of attachment. The cognitive view of attachment suggests that an infant must develop the concept of object permanence before attachment is possible. An infant would have to know that a person exists even when that person is not in sight in order to have an attachment. If infants forget that people exist the minute they leave the room, how would they ever build an attachment to a person?

Another theory of attachment is the psychoanalytic view. According to this view, the caregiver, which is usually the mother, becomes a “love” object, who forms the basis for all later attachments. As you recall from Chapter 1, Freud emphasized the importance of oral activities during infancy. Freud believes that an infant becomes emotionally bonded to the mother because she is the primary satisfier of the infant’s need for food. Erik Erikson believed that infants are in the stage of trust vs. mistrust, and that this first year is critical for developing a sense of trust in the mother, which in turn fosters attachment. The mother’s general sensitivity to her child’s needs helps to foster the development of trust and attachment.
Harry and Margaret Harlow performed a well-known experiment in which they demonstrated how feeding is not critical to the attachment process as Freud believed (Harlow & Harlow, 1966). In this study, the Harlows placed a rhesus monkey infant with two “surrogate” mothers. One of the mothers was made out of wire mesh from which a bottle extended, and this is where the monkey would go to get food. The other mother was made out of a soft terry cloth but did not have a bottle attached to it, so the monkey would not be able to get food from that mother. The infant monkeys spent most of their time clinging to the cloth mother, even though she never offered any food. In fact, at some points during this experiment, the infant monkeys would spend anywhere from 12–16 hours a day clinging to the cloth mother, whereas they would only spend 2–3 hours clinging to the wire mother. The Harlows concluded that monkeys and, presumably, humans have a built-in need for contact comfort, defined as the pleasure derived from physical contact with another.

Another perspective on attachment is the ethological view. An ethologist is a scientist who studies behavior patterns characteristic of various species. This view purports that for many animals, attachment is an inborn or instinctive response to a specific stimulus. Some researchers believe that a baby's cry stimulates caregiving in adults. By the time infants reach 2–3 months, they begin to elicit a social smile, which is a smile that occurs in response to a human's voice or face. Researchers theorize that this social smile helps ensure the survival of infants by eliciting affection from the adults around them (Ainsworth & Bowlby, 1991; Bowlby, 1988). Reciprocally, adults' reactions to an infant looking at them can produce an infant's smile (Jones & Hong, 2005). This pattern helps to contribute to a mutual attachment.

Ainsworth and Bowlby wrote that “one of the distinguishing characteristics of the theory of attachment that we have jointly developed is that it is an ethological approach” (1991, p. 333). However, they go on to say that attachment in humans is largely learned; it is not inborn. Also, unlike animals, the period of attachment for humans extends to months and even years (Ainsworth & Bowlby, 1991; Upton & Sullivan, 2010).

**Patterns of Attachment**

Ainsworth and her colleagues (1978) studied infant attachment through a lab setting experiment that she called Strange Situation (Table 4.6). In this method, an infant is exposed to a series of separations and reunions with a caregiver (most often the mother) and a stranger, who was an actor that the researchers trained. In this experiment, there was a series of eight episodes, which involved the following interactions: (1) with mother, (2) with mother and a stranger, (3) alone with stranger, (4) completely alone for a few minutes, (5) reunited with the mother, (6) alone again, (7) with the stranger again, (8) reunited with the mother. The reunion episodes provided the best assessment of attachment strength.
Table 4.6: Episodes in Strange Situation

<table>
<thead>
<tr>
<th>Episode</th>
<th>Event</th>
<th>Attachment behavior observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Researcher introduces parent and baby to playroom and then leaves</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Parent is sitting while baby plays with toys</td>
<td>Parent as a secure base</td>
</tr>
<tr>
<td>3</td>
<td>Stranger enters, is seated, and talks to parent</td>
<td>Reaction to unfamiliar adult</td>
</tr>
<tr>
<td>4</td>
<td>Parent leaves the room. Stranger responds to baby and offers comfort if baby is upset</td>
<td>Separation anxiety</td>
</tr>
<tr>
<td>5</td>
<td>Parent returns, greets baby, and offers comfort if necessary. Stranger leaves the room</td>
<td>Reaction to reunion with parent</td>
</tr>
<tr>
<td>6</td>
<td>Parent leaves room</td>
<td>Separation anxiety</td>
</tr>
<tr>
<td>7</td>
<td>Stranger enters the room and offers comfort</td>
<td>Ability to be soothed by a stranger</td>
</tr>
<tr>
<td>8</td>
<td>Parent returns, greets baby, offers comfort if necessary and tries to re-interest baby in toys</td>
<td>Reaction to reunion</td>
</tr>
</tbody>
</table>

Source: Adapted from Ainsworth, M. D. S. (1973).

Note: Episode 1 lasts about 30 seconds; each additional episode lasts about 3 minutes. Separation episodes are cut short if the baby becomes too upset. Reunion episodes are extended if the baby needs more time to calm down and return to play.

**Securely attached.** When infants mildly protest their mother’s departure, seek interaction when she returns, and are readily comforted by her.

**Avoidant attachment.** The type of attachment in which infants are not too distressed when the mother leaves, they are able to play alone without being upset when the mother is gone, and they will ignore the mother upon her return.

**Ambivalent/resistant** A type of attachment that is defined by the most intense emotion. Children exhibiting this type of attachment are typically upset when their mother leaves, yet show ambivalence when they return by alternating between clinging to her and pushing her away.

**Disorganized-disoriented attachment.** The process by which an infant seems to be confused or disoriented in terms of a caregiver’s departure and arrival.

From this experiment, Ainsworth found that there are three main types of attachment: secure attachment, avoidant attachment, and ambivalent/resistant attachment. **Securely attached** infants mildly protest the mother’s departure, seek interaction when she returns, and are readily comforted by her. The other two types of attachment are both insecure. Infants who showed **avoidant attachment** are not too distressed when the mother leaves; they are able to play alone without being upset when the mother is gone and will ignore the mother upon her return. **Ambivalent/resistant** infants are the most emotional. They are intensely upset when the mother leaves; however, they show ambivalence when she returns by alternating between clinging to her and pushing her away. Since this experiment, another category of insecure attachment has been added: **disorganized-disoriented attachment**, which is when infants seem to be confused or disoriented. They may also show contradictory behaviors, such as moving towards the mother while looking away from her.

A lot of research has been done on the outcomes of children and their attachment styles to their caregivers. Infants and toddlers who have a secure attachment are happier, more sociable, and more cooperative with caregivers. Around the ages of 5 and 6, they get along better with peers and are better adjusted in school than insecure children (Borelli et al., 2010; George et al., 2010). Insecure attachment at the age of 1 predicts psychological disorders around the age of 17 (Sroufe, 1998).
Establishing Attachment

What can caregivers and parents do to help promote a secure attachment? We know that attachment is related to the quality of infant care (Belsky, 2006a; Sullivan et al., 2011). Research has shown that parents of securely attached infants are more affectionate, cooperative, and predictable than parents of insecure infants. They also have a tendency to respond with more sensitivity to their infants’ smiles and cries (Bigelow et al., 2010; Xue, Moran, Pederson, & Bento, 2010). Take, for example, Carter’s parents. Whenever Carter begins to cry, his parents immediately go to him and in a soft tone say things such as, “What’s the matter, Carter? It’s OK, mommy is here.” On the other hand, when Steven begins to cry and fuss, you can often hear his mother or father yell from another room, “What’s the matter with you now? Stop crying.” It is likely that how a parent or caregiver reacts will have an effect on the child’s attachment to that person.

Research has also found evidence that supports “intergenerational transmission of attachment” (Hautamaki, Hautamaki, Neuvonen, & Maliniemi-Piispanen, 2010). What this means is that children of secure mothers showed the most secure patterns of attachment themselves (Cicchetti, Rogosch, & Toth, 2006). Research also finds that security is connected with an infant’s temperament (Belsky, 2006b; Solmeyer & Feinberg, 2011). Mothers of more “difficult” children are less responsive to them and often report feeling more distance from them (Morrell & Steele, 2003).

Another factor in establishing attachment relates to the involvement of fathers. How involved is the father with his infant and how does that affect the infant’s attachment to him? Fathers are more involved today than they were 50 years ago; however, mothers engage in more interactions with their infants than fathers and are still more likely to be the person who cleans and feeds them, while fathers are more likely to engage in playful activities with them (Lucassen et al., 2011). Fathers, more often than mothers, will engage in rough-and-tumble play with their children, whereas mothers are more likely to play games such as peek-a-boo or patty-cake (Lucassen et al., 2011). How strongly an infant is attached to his or her

*Web Field Trip: Attachment Theory and God*

How do human beings develop a concept of God from which a relationship with Him might grow? Some researchers believe that one’s desire to connect with God later in life begins very early in life, and is linked to one’s attachment to early caregivers.

http://timclinton.com/articles/1/cnn-belief-blog-on-god-attachment/

- What is the difference between a cognitive recognition of God and an emotional connection?
- What hope is there for individuals who did not experience a secure attachment?
- What does attachment theory have in common with Erikson’s stage theory regarding the basic psychosocial need of very young children? How does this relate to spiritual development?*
father is primarily related to the sensitivity level of the father. The more sensitive the father is to the infant’s needs, the stronger the attachment is (Lucassen et al., 2011).

**Stages of Attachments**

Now that we know more about attachment, we can turn our discussion to the stages of attachment. Much research has led to the idea that attachment occurs in stages. In fact, John Bowlby came up with a widely accepted view, the **ethological theory of attachment**, “which recognizes the infant’s emotional ties to the caregiver as an evoked response that promotes survival” (Bowlby, 1969, p. 23). According to Bowlby, an infant is not born with a bond or attachment to their parents. However, he does believe that infants are born with a set of innate signals that alert the parents to come over to their child and interact with him or her. Bowlby believes that attachment or bonding develops over time as the infant’s emotional and cognitive capacities grow. He also proposes that attachment develops in four stages:

1. **Pre-attachment phase (birth to 6 weeks).** During this stage of attachment, infants have innate signals, such as grasping, smiling, crying, and gazing into adults’ eyes, that help bring the newborn into close contact with other humans. Once the adult has come close to the newborn to soothe his or her cries, the infant will encourage the adult to stay close because close contact is comforting. During this first stage of attachment, newborns will recognize their mothers’ smell, voice, and face. However, they do not have any attachment to them at this point, which is why newborns can be soothed by any adult.

2. **Attachment in the making phase (6 weeks to 6–8 months).** During this second stage of attachment, an infant will begin to respond differently to a more familiar caregiver than they will to a stranger. A baby is more likely to smile, babble, and even be quieted or calmed more easily when a familiar caregiver, such as a mother or father, tries to soothe them. During this time, infants start to realize that their actions have an effect on others. They begin to gain a sense of trust based on the expectation that the caregiver will respond when signaled. It is important to point out that while during this time the infant does prefer an adult or caregiver with whom they are more familiar, they will not protest when they are separated from them.

3. **Clear-cut attachment phase (6–8 months to 18 months–2 years of age).** During this third phase, attachment to a familiar caregiver is evident. Babies will begin to show signs of separation anxiety. While not every infant will display signs of separation anxiety, there is an increase in this behavior for children between the ages of 6 and 15 months old, reinforcing the idea that infants have now developed object permanence. Babies in this phase will protest the departure of their familiar caregiver.
Older infants and toddlers in this phase will use their caregiver as a secure base; they will follow, climb on, and approach them more than others. For example, Laurie has just had her first baby, Abby. When her good friend, Eileen, meets Abby for the first time at just a few days old, Abby has no issues with Eileen holding her and even giving her a bottle. However, when Eileen returns to visit when Abby is 18 months old, that is no longer the case. Abby prefers to be with her mother, Laurie. In fact, at one point during the visit when Laurie leaves the room to answer the door, Abby begins to cry and follow her. Even when Eileen tries to comfort Abby or get down to her level to play with her, Abby continues to stay close to Laurie throughout the entire visit.

4. **Formation of reciprocal relationship phase (18 months–2 years and on).** In this fourth and final stage of attachment, toddlers have undergone rapid development in representation and in language, which now allows them to understand some of the reasons for parents’ coming and going. This cognitive jump allows toddlers to predict their parents’ return. At this age, children do not seem to protest any longer when their caregiver leaves, but instead will try to negotiate with their caregiver, using requests and persuasion to alter their goals. For example, when Abby is 3, she asks her mom Laurie to read her three books, instead of her usual one, before she goes to bed because she knows that her mom is leaving her with a baby sitter. The extra time Laurie spends with Abby gives her a better understanding of where she is going (out to dinner with Aunt Eileen) and when she will be back (after bedtime). It helps Abby understand her mother’s brief absence. It is typical that during this phase a toddler or child becomes less concerned with the physical proximity of the caregiver and has more of a sense of confidence that the caregiver will be accessible and responsive in a time of need.

According to Bowlby (1980), the experiences that children have during these stages will lay the ground work for children to have enduring affectionate ties with their parents and primary caregivers. A child can draw upon these experiences as a source of comfort when the caregiver is not around, thus creating an **internal working model**. This model is the set of expectations about the accessibility of the people who the child is securely attached to, and the probability that these people are going to be able to provide support during times of stress.

**Moral Development**

*For many years psychologists believed that moral development did not begin until well into early or middle childhood. Piaget’s theory indicated that moral development began at about 4 years of age. Another important theorist, Kohlberg, said that the first stage in his theory of moral development began at around 2 years of age. However, recent studies have implemented novel methods to determine whether preverbal children (even
those as young as 3 months of age) show signs of moral development. Interestingly enough, studies indicate that very young children exhibit behaviors that seem to provide a foundation for moral development (Hamlin, Wynn, & Bloom, 2007).

To test their theory, researchers set up a series of experiments in which infants watched a puppet show featuring “actors” who displayed prosocial (helpful) behavior or antisocial (unhelpful) behavior. After the puppet show, the children were allowed to choose one puppet or the other. Children consistently chose the helpful puppet over the one that was not helpful (Hamlin, Wynn, & Bloom, 2007). According to the researchers, this indicated that children recognize and prefer good behavior over bad behavior.

In another study at the Yale Baby Lab, researchers wanted to find out whether infants would express a bias toward individuals they perceived as being like them. Children were given the choice of graham crackers or green beans. They then watched a puppet show in which one puppet expressed the same food preference as the infant. After that, puppets performed another show in which the puppet that was like the infant (in that the puppet shared the baby’s food preference) was either helped or harmed. Infants consistently “liked” the puppet that helped the one who shared his or her food preference.

Surprisingly, when the show was repeated and the puppet who did not share the infant’s food preference was helped or harmed, infants preferred the puppet that harmed the dissimilar character. The researchers believe that this may indicate a negative social bias toward individuals the baby believes are different than themselves, actually “liking” the puppet who harms the one who is different (Hamlin, Mahajan, Liberman, & Wynn, 2013).*

Web Field Trip: Moral Development: Process-Based or Inherent?

In the video “Born Good? Babies Help Unlock the Origins of Morality,” Yale’s baby lab researchers take an in-depth look at whether moral development is inherent or procedural:

https://youtu.be/FRvVF8S5cU

Do you think that babies are born knowing right from wrong? Why or why not? Do you think that babies are born with a bias against others who do not look like them? Why or why not? Support your answer with scientific evidence. In the video, Dr. Paul Bloom attributes our “natural” tendency toward bias against others to the evolutionary drive for survival. What might a psychologist operating from a Christian worldview attribute this to?
Understanding the Self

Self-understanding in infancy is comprised primarily of a rudimentary type of self-recognition that is measured by an infant’s attentiveness and positive regard toward his or her own image in a mirror. This usually appears by around 3 months of age (Mascolo & Fischer, 2007). However, the ability to fully recognize individual facial features does not appear until much later, usually around age 2 (Thompson, 2006).

One method of testing for infant self-recognition is the rouge test (Amsterdam, 1968; Lewis & Brooks-Gunn, 1979). Here, a researcher places a small amount of brightly colored make-up or paint on an infant’s nose. Let’s say, for the purposes of this example, that the tested child is a girl. She is then monitored to see how many times she touches her nose. Next, the infant is placed in front of a mirror and is monitored to see whether she touches her nose more often. If she touches her nose more often, this is taken as an indication of her ability to recognize the child in the mirror as herself.

For infants, self-recognition typically emerges gradually over time. For example, infants may begin by recognizing their own images in reflections. Then, they may begin to use the word “me.” Finally, they may begin to recognize themselves in pictures of themselves (Courage, Edison, & Howe, 2004). Lewis (2005) argued that these behaviors are the early stages of infants understanding themselves as being “objects in their own mental representation of the world” (p. 363).

Between ages 2 and 3, toddlers begin to show other forms of self-recognition and self-understanding regarding “me,” especially with regard to their relationship with others (Laible & Thompson, 2007). For example, they say things like “I do it myself” or claim ownership of objects. As children enter early childhood and their language abilities increase, their self-understanding improves.

Erikson

Theorist Erik Erikson (1950b, 1968) situated the personality development of individuals within the context of their social environments and posited that each individual’s personality is a result of his or her interactions with the surrounding people. Furthermore, Erikson argued that human development progressed through eight distinct stages of social development and that each stage included a crisis. How an individual resolves each crisis leads to a particular developmental outcome. Table 4.7 provides an overview of Erikson’s theory. Unlike most of his contemporaries, Erikson believed that...
psychosocial development occurred throughout the lifespan. In addition, he believed that an individual's social development had profound implications for an individual's sense of self.

Table 4.7: Erikson's stages of psychosocial development

<table>
<thead>
<tr>
<th>Stage</th>
<th>Explanation</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust versus Mistrust</td>
<td>Infants must learn to trust the caregivers and their environment to meet their basic needs.</td>
<td>Birth–18 months</td>
</tr>
<tr>
<td>Autonomy versus Shame and Doubt</td>
<td>Toddlers are developing a balance between independence and not being able to do things on their own, which leads to shame and doubt.</td>
<td>18 months–3 years</td>
</tr>
<tr>
<td>Initiative versus Guilt</td>
<td>Preschool children are dealing with conflicting feelings that they have about themselves as they begin to develop a sense of purpose, which leads them to plan and carry out activities. Success leads to a sense of purpose, while failure or stifled efforts lead to a sense of guilt.</td>
<td>Early childhood</td>
</tr>
<tr>
<td>Industry versus Inferiority</td>
<td>Children are learning the skills that are important to their culture. If these productive skills are not learned or acquired, the child may experience feelings of inferiority.</td>
<td>Middle childhood</td>
</tr>
<tr>
<td>Identity versus Identity Confusion</td>
<td>Adolescents are either establishing a clear and definite identity or experiencing identity confusion, which is a failure to form a stable and secure identity.</td>
<td>Adolescence</td>
</tr>
<tr>
<td>Intimacy versus Isolation</td>
<td>Young adults face the challenge of connecting one's newly formed identity to other people in enduring committed relationships or else become isolated.</td>
<td>Young adulthood</td>
</tr>
<tr>
<td>Generativity versus Stagnation</td>
<td>Adults either have the motivation to contribute to the well-being of generations to come or focus on narrow self-interest without the concern for the good of others.</td>
<td>Middle adulthood</td>
</tr>
<tr>
<td>Integrity versus Despair</td>
<td>Older adults either achieve integrity, in which they are able to look back on their life and accept the outcomes or fall into despair, experiencing regrets and bitterness about the course of their life.</td>
<td>Late adulthood</td>
</tr>
</tbody>
</table>


Erikson's first stage of psychosocial development identifies the foundation for a child's self-esteem. Erikson theorized that the primary task of infancy was the establishment of trust. In this first stage, Trust versus Mistrust, infants (typically birth to 18 months) must learn to trust their caregivers and their environment to meet their basic needs. A child whose needs are not being met will ultimately develop a sense of mistrust in their caregivers and environment. For example, Marti, a 4-month-old child, goes to Sunnyside Childcare. The curriculum of Sunnyside Childcare is based upon the principles of Erikson's theory of psychosocial development. This means that when Marti cries to let her caregiver know that she is hungry, Marti trusts that this person will hear her cries and ultimately
meet her needs. As outlined by the curriculum at Sunnyside, Marti’s caregiver always responds to her cries and begins to feed her. This trusting relationship is reciprocal in that Marti trusts her caregiver to meet her needs when she cries and the caregiver trusts that Marti will cry when she has a need to be met.

We will see in the final section of this chapter that Erikson’s theory may also provide insight into the spiritual development that takes place during infancy.

4.4 Spiritual Development in Infancy

*What Does Scripture Say about Infants?*

When considering the topic of spiritual development in infancy, it might be interesting to review what the Bible says about infants. We find that children are considered a gift from God (Psalm 127:3-5). Each one is specially created for a special purpose (Jeremiah 1:5). No child is conceived by chance—God sees and knows each and every person who has ever grown in his or her mother’s womb (Psalm 139:13-16). Every child bears the image of God and, as a result, is of the utmost worth and significance (Genesis 1:27). In the well-known New Testament story where Jesus demonstrates His love for children (found in three of the Gospels), the Greek word used for children could also be translated “infants.” Thus, Jesus took time for and ascribed great value to even the youngest members of humanity.

**Nurturing the Soul**

If we consider our definition of spiritual development from the first chapter, it involves growth in one’s awareness of, a seeking for, and a devotion to that which is sacred. So how does this happen in the life of a baby? Empirical evidence is scant. Babies cannot complete a survey or respond to questions related to spiritual development. Also, ethical standards for research would prevent anyone from testing these ideas on infants. However, our knowledge of developmental capabilities and theories can provide direction in this ongoing discussion.

**Focus on Memory**

For some, spiritual formation in infancy is focused on laying a foundation for faith through the establishment of implicit memories. As you may recall, implicit memories are those that are planted in the subconscious mind (preverbal). Later, under the right circumstances these implicit memories are activated. For example, if an infant experiences positive, responsive, and loving care in the church nursery, he or she is
likely to grow up with positive feelings toward church. In theory, these pleasant feelings will provide a platform from which faith can grow. This approach to spiritual formation would direct parents to create pleasant memories related to church, faith, and God (Morgenthaler, Keiser, & Larson, 2014). Understandably this is an idea that would be difficult to test empirically. However, there is support for it in Scripture: "Start children off on the way they should go, and even when they are old they will not turn from it" (Proverbs 22:6, New International Version).

**Trust vs. Mistrust**

As you know from earlier in the text, Erikson said that the psychosocial crisis encountered in infancy is Trust vs. Mistrust. According to Erikson, if this crisis is resolved successfully, the resulting virtue is hope. Thus, if children are cared for by responsive, nurturing adults, then they will realize that the world, and those who inhabit it, are trustworthy. As a result, the virtue "hope" will become a fundamental part of who they are (Capps, 2012). When an infant becomes hope-filled, expecting that his or her deepest needs will be met, a foundation for the development of faith is established.

**Training the Brain**

In our discussion of brain development, we learned that the infant brain undergoes an amazing period of growth. We also understand that prolific synaptic growth and pruning depends on the experiences to which a child is exposed. Psychologists remind parents that this window of opportunity for learning is best cultivated through human interaction. A "smart baby" app or video will never do as much to foster brain development as the sound, sight, and feeling that comes along with interactive, attentive, and responsive parenting (Hirsh-Pasek, Golinkoff, & Eyer, 2003). During this prime time of learning, parents can introduce the "language" of faith to their child by involving the child in the exercise of their own faith. Praying together, reading stories, and singing songs can all be used to teach a child the language and culture of belief. This principle was given to the ancient Hebrews in Deuteronomy 6:6-7 (NIV): “These commandments that I give you today are to be on your hearts. Impress them on your children. Talk about them when you sit at home and when you walk along the road, when you lie down and when you get up.”
Attachment Theory and Faith Development

The attachment bond formed between parents and an infant is a powerful one. The fact that the impact of this bond extends far beyond infancy is fairly well established. What is less clear is whether there is a connection between attachment and one’s relationship with God. Some say that a secure attachment bond between an individual and his or her parent(s) will serve as a pattern for a later secure attachment to God. Some say that individuals who fail to form a secure attachment bond in infancy or childhood will find a healing substitute in a later attachment to God. Can both positions be correct? Research tends to indicate that both could indeed be correct (Granqvist, 2010). As noted, this is a difficult topic to research, but inquiry is ongoing.

Is it possible to begin the process of spiritual formation in infancy (or even in utero)? While empirical evidence may be lacking, practical experience and knowledge point to the fact that it is never too early to begin this important work.

4.5 Summary and Resources

Summary

Human growth and development in the first 2 years of life is nothing short of miraculous. The brain develops in both size and function, setting the stage for a lifetime of thinking, directing, feeling, and processing. The body also increases in size and ability. Proper nutrition plays a key role in this process as does the establishment of healthy habits. Changes in cognition take place as well. While many once thought that little happened cognitively in the minds of infants, we are beginning to make surprising discoveries about how infants think. Social interaction plays a key role in a child’s development as we find that children grow best in relationship with attentive, responsive caregivers. The final developmental domain examined is the spiritual development of the infant. Parents should consider this area of development, caring for the soul of the child just as they do the physical, mental, and emotional needs of the child.

Key Ideas

- During the first years of life, the vast majority of brain development occurs through the development of neurons.
- The brain is divided into two distinct hemispheres. When viewing the brain from above, this gives the impression that the brain is made up of a right half and a left half.
- At birth, an infant’s brain is roughly two-thirds the size, but only one-fourth the volume, of his or her adult brain. By age 2 years,
the child's brain will be roughly 75% of the volume of his or her adult brain.

• As a child’s overall size increases, parts of the body grow at different rates.

• The sequence of motor development is basically the same no matter where a child grows up in the world.

• The principles of cognitive development are founded upon the various ways in which individuals construct their knowledge of the world around them.

• The pioneering Swiss psychologist Jean Piaget (1896–1980) championed the idea that infants come to understand their world through action.

• Piaget believed that the schemes that are developed during infancy are quickly altered via assimilation and accommodation.

• Piaget argued that the first stage of cognitive development lasted from birth to around age 2 years. He labeled this the sensorimotor stage.

• Attention is defined as the focusing of mental resources.

• There are four different types of attention: selective, divided, sustained, and executive.

• Attention during the first 12 months of life is dominated by an orientating/investigative process.

• Childhood language acquisition has typically been explained through biological, environmental, and interactionist theoretical perspectives.

• The biological perspective is rooted in the premise that children from all across the world acquire language in extraordinarily similar ways.

• As a theoretical construct, support for Chomsky’s language acquisition device is buoyed by the universality of human language abilities, the regularity of the early production of sounds, and the fundamental sequence of language development that is seen among children speaking any language.

• Skinner (1957) detailed the process of learning as a function of reinforcement and conditioning, and early behaviorists argued that language acquisition follows the same principles outlined by these fundamental concepts.

• The interactionist theoretical perspective maintains that neither the biological nor the environmental perspective accounts for language acquisition in its entirety, and it argues that the full acquisition of language requires both biological processes and experience.

• Children develop language according to an invariant sequence of steps or stages.

• There are several different types of gestures that infants engage in.

• There are not many ways to measure an infant’s potential IQ, but there are nonverbal cues.
Taking infants and toddlers on everyday outings can provide ample opportunities for learning as parents talk about shapes, colors, temperatures, and types of foods with their children.

- Emotional development occurs throughout the human lifespan.
- Infants display a wide spectrum of emotion.
- Attachment is a powerful force in the development of a child.
- Very young infants show an amazing ability to make moral judgments.
- Several factors could impact the spiritual development of infants. These include implicit memories, attentive/responsive caregiving, exposure to the language and practice of faith, and the establishment of secure attachment relationships.

**Critical Thinking Questions**

1. What type of game could you play with infants to test whether they had object permanence? What would they do if they did have that skill? How do you know that this game is cognitively appropriate for that child? Make sure that you are backing up your answer to this question with at least one scholarly source.

2. Do you think that Chomsky’s language acquisition device is a useful construct? Why or why not? Provide scholarly support for your opinion.

3. What would you tell someone who believes that an infant is not able to communicate until they are able to produce words?

4. You overhear your neighbor telling her friend that her son, who is 20 months old, is a genius because he only knew about 50 words 2 months ago and now he is saying over 200 words. Do you agree that this child is extremely advanced in his language skills? Why or why not?

5. You are working with a parent who is concerned about his infant’s intelligence. What activities can you suggest he do at home to help engage the child?

6. Which do you think plays a bigger role in a child's intelligence, genetics or the home environment? Why do you think that? Support your answer with scholarly research.

7. You overhear a friend talking to her husband about their 8-month-old son. She tells her husband that it does not matter at what age they enroll the baby in child care; he is too little to know who is caring for him. Do you agree or disagree with your friend? Support your answer with scientific research.

8. Do you think that temperament is essentially predetermined at birth or do you think it is affected by the environment? Make sure you use at least one scholarly article to support your answer.

9. Give at least one example of when you have seen a child display secure, avoidant, ambivalent, or disorganized attachment to a parent or other caregiver. What did this look like? Explain why you believe the child showed that particular pattern of attachment.
10. What would you tell someone who wants to know how putting a child into child care affects the child’s attachment to his or her parents? Make sure you ground your answer in research.

11. *How might both secure and insecure attachment foster one’s relationship with God? If both can play a part, do early attachment relationships really matter when considering spiritual formation?

12. If parents fill their child’s mind at an early age with spiritual information based only on their belief system, then how is this different from “brain washing”? Shouldn’t everyone have the opportunity to make his or her own decisions in matters of faith?*

Key Terms

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

ambivalent/resistant A type of attachment that is defined by the most intense emotion. Children exhibiting this type of attachment are typically upset when their mother leaves, yet show ambivalence when she returns by alternating between clinging to her and pushing her away.

aphasia A loss or impairment with regard to language processing.

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

attachment An enduring emotional bond between one person or animal and another.

avoidant attachment The type of attachment in which infants are not too distressed when the mother leaves, they are able to play alone without being upset when the mother is gone, and they will ignore the mother upon her return.

axon Part of the neuron that sends messages or signals away from the neuron.

babbling The first vocalizing that sounds like human speech.

cephalocaudal trend The part of the prenatal period when the head develops more rapidly than the lower part of the body.

cognition The active construction of thought.

dendrite Part of the neuron that receives information from other neurons.

disorganized-disoriented attachment The process by which an infant seems to be confused or disoriented in terms of a caregiver’s departure and arrival.

divided attention The ability to concentrate on more than one activity at the same time.
**echolalia** The automatic repetition of sounds of words.

**emotion** The intensity and valence of an experience as it pertains to an individual.

**ethological theory of attachment** A theory of attachment that recognizes the infant’s emotional ties to the caregiver as an evoked response that promotes survival.

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

**explicit memory** The conscious memory of facts and experiences.

**frontal lobes** The part of the brain that is often associated with executive function, which involves a range of controlled processes that are related to flexible and goal-directed behavior.

**goodness of fit** The match between a child’s temperament and the environmental demands with which the child must cope.

**growth spurt** A period of very rapid growth in both height and weight.

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

**hippocampus** An area of the brain that is critically important in terms of memory.

**implicit memory** Memory with conscious recollection.

**infant-directed speech (IDS or “motherese”)** A convention of communication whereby a caregiver speaks more slowly and in a higher pitch than normal, using simple words and sentences.

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

**labeling** The intentional naming of objects.

**language acquisition device** The innate tendency among all individuals to acquire language.

**lateralization** The specialized function held by particular neurons, depending upon which side of the brain they occupy.

**memory** The retention of information over a period of time.

**moral development** The gradual changes seen in individuals in how they determine right and wrong, which is evidenced by their thoughts, behaviors, and feelings.

**myelin sheath** A layer of fat cells found in most axons that increases the efficiency and speed of communication between neurons.

**nativists** Language researchers who believe that biological processes and innate mechanisms direct language development.

**neural plasticity** The brain’s ability to change as a result of experiences, as part of normal
developmental processes, and in rebounding from injury.

**neurons** Specific nerve cells located in the brain that store and transmit information.

**neurotransmitters** The chemicals that relay messages from one neuron to another neuron via the synapse.

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

**occipital lobes** Parts of the brain that are primarily associated with visual processing.

**parietal lobes** Parts of the brain that play an important role in monitoring one’s spatial location.

**prefrontal cortex** The front portion of the brain, comprising the two frontal lobes.

**proximodistal trend** Growth processes that proceed from “near to far”—from the center of the body outward.

**schemes** Mental representations based upon actions that organize knowledge.

**securely attached** When infants mildly protest the mother’s departure, seek interaction when she returns, and are readily comforted by her.

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

**separation anxiety** A fear and distress reaction displayed by infants when their primary caregiver leaves their side.

**Shaken Baby Syndrome** A severe form of child abuse that results from the violent shaking of an infant, which can lead to brain damage, long-term disabilities, and death.

**social referencing** The reliance on others in an effort to make sense of events or circumstances.

**social smile** A smile that occurs in response to a human’s voice or face.

**stranger anxiety** An emotional reaction marked by caution and wariness when an infant encounters an unfamiliar person.

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

**synapses** Microscopic gaps or spaces between individual neurons, where information is exchanged.

**synaptic pruning** The process that occurs when neurons are not stimulated; they lose their synaptic connections, resulting in a neuron no longer being committed to a particular connection.
temperament The patterns of arousal and emotionality that are a consistent and enduring characteristic of an individual.

universal grammar The notion that all of the world's languages share a similar, underlying structure.

temporal lobes Parts of the brain that are usually associated with memory.