Physical and Cognitive Development during Early Childhood

CHAPTER 6

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Focusing Questions

- What pathway does physical growth normally take during early childhood?
- What is normal or abnormal about early childhood sleep?
- How is poverty related to children's health?
- When do children achieve bladder control?
- What motor skills do children acquire during the preschool years?
- How does children's growth affect parents and other adults?
- What are the special features and strengths of preschoolers' thinking?
- How does the language of preschool children differ from that of older children?
- What social and cultural factors account for variations in preschoolers' language and speech?
- What constitutes good early childhood education?

"Kitty run!" says Zöe, age three. She is pointing to the neighborhood cat.

"Yes," replies her father. "She's chasing a bird."

Zöe nods and says, "Bird fly away. Is a bad kitty?" and looks to her father for confirmation.

"It's OK this time," says her father. "The bird flew away soon enough."

At this, Zöe walks off to find the cat, curious to learn what else it might do.

Chapter Outline

Two features of this incident are especially noteworthy: Zöe's language and her mobility. Little more than a year ago, neither could have occurred. As a preschooler, however, she is developing the ability to deal with her world in symbols, in this case through oral language. She is also developing new physical skills that serve her interests and abilities; for example, she can walk up to the cat simply to learn more about it.

In this chapter, we look in detail at physical and cognitive development during early childhood. Many of the examples will suggest relationships between the two domains, as well as their impact on the third domain of psychosocial development. Furthermore, as we will see in the chapters on development during adulthood, the physical and cognitive changes among preschoolers influence the development of the adults who care for them. The fact that preschoolers sleep less than they did as infants, for example, is the beginning of a lifelong trend that will affect both child and parents, creating new options for each. For the child, staying awake longer facilitates attending school; for parents, the child's attending school makes adult-focused activities, such as a job or a hobby, easier to arrange than before their children began school. Parents who are ready for the growth and changes in their preschoolers but do not feel pressured to hurry those changes will likely influence their children's development in many positive ways. The changes will also set the stage for even more indirect forms of parenting typical of later phases of childhood and adolescence, discussed in Chapters 8 and 10.

PHYSICAL DEVELOPMENT

Influences on Normal Physical Development

Physical growth during the preschool years is relatively easy to measure and gives a clear idea of how children normally develop during this period. Table 6.1 and Figure 6.1 show the two most familiar measurements of growth, standing height and weight. At age two, an average child in North America measures about thirty-three or thirty-four inches tall, or about two feet, ten inches. Three years later, at age five, he or she measures approximately forty-three inches, or about one-third more than before. The typical child weighs twenty-seven to twenty-eight pounds by age two but about forty-one pounds by age five. Meanwhile, other measurements change in less obvious ways. The child's head grows about one inch in circumference during these years, and body fat decreases as a proportion of total bodily tissue.

For a preschool child who is reasonably healthy and happy, physical growth is remarkably smooth and predictable, especially compared to many cognitive and social developments. Overall, physical growth contains no discrete stages, plateaus, or qualitative changes such as those Piaget proposed for cognitive development. At the same time, however, important differences develop among individual children and among groups of children. Often the differences simply create interesting physical variety among children, but

TABLE 6.1 Average Height and Weight during Early Childhood

	Girls		Boys	
Age (Years)	*Height (inches)*	*Weight (pounds)*	*Height (inches)*	*Weight (pounds)*
2	33.5	26.5	34.1	28.6
3	37.0	30.9	37.4	31.7
4	39.8	35.0	40.2	35.3
5	42.3	39.7	42.9	40.8

Source: Centers for Disease Control and Prevention (2000).

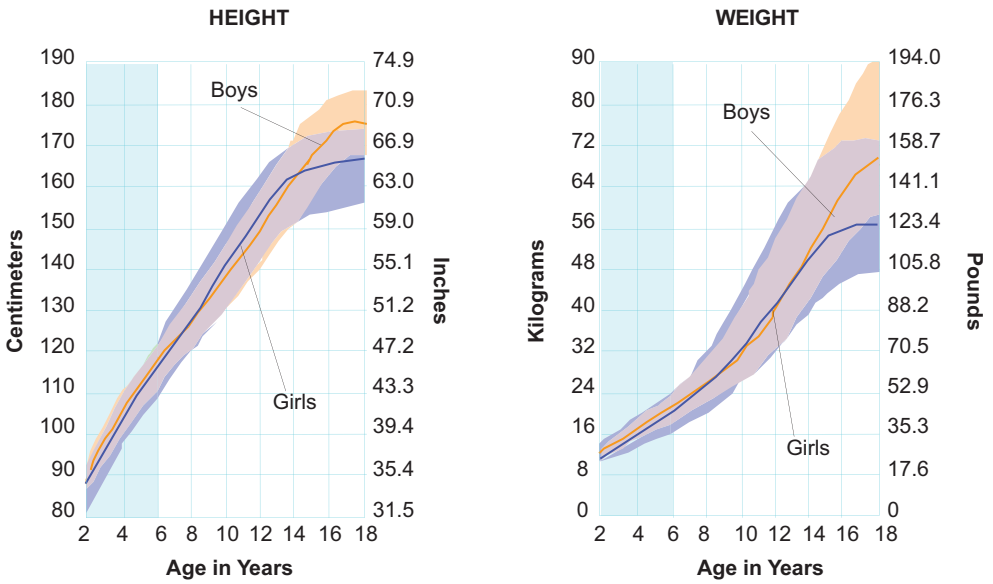

FIGURE 6.1 Growth in Height and Weight from Two to Eighteen Years

sometimes they do more than affect appearance. Being larger (or smaller) than usual, for example, can make a child stronger (or less strong) than others of the same age, and therefore more (or less) able to master certain sports or other physical activities. Size can also affect how parents and other adults respond to the child; larger children may seem older and be treated as such, whether or not they are psychologically ready. For both reasons, a child might gain (or lose) self-confidence, and even gain (or lose) popularity among peers.

The overall smoothness of growth means that childhood height and weight can predict adult height and weight to a significant extent, although not perfectly. A four-year-old who is above average in height tends to end up above average as an adult. Nevertheless, correlation between childhood height and adult height is imperfect because of individual differences in nutrition and health and, most of all, in the timing of puberty. In particular, children who experience puberty later than average tend to grow taller than children who experience it early (Sanfilippo et al., 1994; Yousefi et al., 2013)—a source of diversity that we say more about in Chapter 10 in connection with adolescence and its impact.

Genetic Background

Most dimensions of growth are influenced substantially by heredity. Tall parents tend to have tall children, and short parents usually have short children. Weight shows similar patterns, although it can be influenced strongly by habits of exercise and diet.

Races and ethnic groups around the world also differ slightly in average growth patterns (Eveleth & Tanner, 1990), and general trends demonstrate that children born in countries with low to middle income are more likely to be low birth weight (5.5 pounds or less) and to exhibit slower growth throughout childhood (Adair et al., 2013). Children from Asian groups, such as Chinese and Japanese children, tend to be shorter than European and North American children are. The latter, in turn, tend to be shorter than children from African countries. Shape differs among these groups as well, although the differences do not always become obvious until adolescence. Asian children tend to develop shorter legs and arms relative to their torsos, and relatively broad hips. African children do just the opposite: they tend to develop relatively long limbs and narrow hips. Keep in mind, though, that these differences are only average

As a result of improvements in nutrition and health care, children in industrialized nations are often taller than in earlier times. But there are important variations among societies—even among industrialized ones—that apparently are influenced genetically.

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tendencies. Racial and ethnic groups tend to overlap in size and shape much more than they differ (that is what makes us all human!). From the point of view of parents, teachers, and other professionals, the most important physical differences among children are individual ones: there are large and small children in every racial and ethnic group, among both boys and girls, and in every community (Doherty, 1996). If you are responsible for children as individuals, recognizing their individual differences is likely to be your priority.

Nutritional Needs during the Preschool Years

For a time, a young preschooler (such as a three-year-old) may eat less than he or she did as a toddler and become much more selective about foods as well. Michael, the son of one of the authors, ate every meal voraciously as a two-year-old; a year later, he rarely finished a meal, even though he was significantly taller and heavier by then. Elizabeth, his sister, followed a similar but more pronounced pattern. As a toddler, she ate most foods except ice cream ("Too sweet," she said!), but as a young preschooler, she sometimes hardly ate—though she did decide then that she liked ice cream. Later, their appetites returned. As a nineteen-year-old, Michael routinely ate about twice as much as other members of the family did. Elizabeth, at sixteen, was no longer a picky eater—and became especially enthusiastic about ice cream.

Parents may worry about such changes, but in fact, they are normal and result from the slowing down of growth after infancy. Preschool children simply do not need as many calories per unit of their body weight as they did immediately after birth. They do need variety in their foods, however, just as adults do, to ensure adequate overall nutrition. Given preschoolers' newfound selectiveness about eating, providing the variety needed for good nutrition sometimes can be a challenge to parents and other caregivers.

How can one ensure healthy variety in a preschool child's diet? Experts generally discourage coercion ("Eat your vegetables because I say so!") because it teaches children to associate undesired foods with unpleasant social experiences (Endres & Rockwell, 1993; Ventura & Worobey, 2013). They also discourage using sweet foods and drinks as a reward for eating undesired foods ("If you eat your vegetables, then you can have your ice cream") because it implicitly overvalues the sweets and undervalues the undesired food still further. For children who are particularly picky and who do not like to try new foods, sticker rewards for trying new foods have been successful (Corsini et al., 2013). In addition, providing many opportunities for children to try foods, even vegetables the children "don't like," in conjunction with nonfood reinforcement like a sticker increases liking for those vegetables (Fildes et al., 2014). The best strategy seems to be casual, repeated exposure to the food without insisting that the child eat it (Andrien, 1994). Getting children involved in age-appropriate food preparation, such as tearing and washing lettuce, cleaning and breaking apart cauliflower or broccoli, and weighing pasta, was linked to children eating more overall, including vegetables (van der Horst et al., 2014). Observations of children's eating habits confirm what parents often suspect as well: children's food preferences are influenced by the adult models around them. In the long term, preschoolers tend to like the same foods as their parents and other important adults. More generally, as we will see in the Chapter 12 discussion of physical development in early adulthood, they practice many of their parents' other health behaviors (such as exercise) as well.

Sleep during Early Childhood

As noted in Chapter 4, sleep bouts consolidate throughout infancy so by the time children reach early childhood, they should obtain between ten and thirteen hours per day with most of their sleep at night and a nap during the day (Bathory & Tomopoulos, 2017; National Sleep Foundation, 2020). Young children should have a relaxing bedtime routine, which should not include light-emitting devices such as tablets or televisions. Because most children have a natural tendency to awaken early, preschool children should have a relatively early bedtime, around 7:00 or 8:00 p.m. to ensure they obtain enough sleep. Especially among children who are recently toilet trained, liquids should be limited in the hours before bedtime to avoid overnight accidents. Unlike adults who act groggy and

grouchy when tired, young children who do not get enough sleep often have trouble paying attention and are hyper—symptoms of attention deficit-hyperactivity disorder (National Sleep Foundation, 2020). Research has also demonstrated that preschool children who get insufficient sleep due to insomnia are worse at planning, engaging in self-control, and completing tasks measuring working memory (Bruni et al., 2020). As we will see, this is particularly worrisome because early childhood is a key time for developing these critical cognitive skills. Additionally, a recent systematic review of studies investigating preschool children demonstrated that white children were more likely to go to bed early, have more regular bedtimes, and get more sleep than most children belonging to other racial and ethnic groups, compounding other disadvantages among these children (Smith et al., 2019).

The structure of sleep changes during preschool as well. Young children have distinct phases of sleep like adults, which they cycle through about every ninety minutes: stage 1, stage 2, and slow wave sleep, which together make up non-REM (NREM) sleep, and rapid-eye-movement sleep (REM). Over the course of childhood, the proportion of sleep spent in REM and NREM sleep changes with children spending proportionally less time in REM and more time in NREM (Bathory & Tomopoulos, 2017). The purpose of each stage of sleep is still becoming understood, but both REM and NREM are critical for memory and memory consolidation (Bathory & Tomopoulos, 2017). Rates of growth hormone increase during sleep, which also positively impacts the immune system (Dement, 1999; Walker, 2017). In short, across the lifespan, obtaining sufficient, good quality sleep will improve mood, cognitive abilities, and physical health.

Though childhood sleep tends to be relatively problem-free, parents should be aware of a few common sleep disorders, particularly because pediatricians sometimes do not get much training in sleep disorders due to rigorous training in other areas (Bathory & Tomopoulos, 2017). One of the most common problems reported by parents is sleep onset defiance in which children will delay bedtime with tantrums, requests of parents, and simply refusals to go to bed. The primary treatment for this behavior is operant conditioning—training children by training parents to ignore unwanted behaviors (e.g., tantrums, repeatedly placing the child back in bed without reinforcing attention) and rewarding desired behaviors (e.g., sticker charts, getting extra time with a favored activity). Nightmares, frightening anxiety dreams that occur during REM, are common throughout childhood and into adulthood. One thing that differentiates nightmares from night terrors is that with nightmares, children can be soothed and will also recall the dream. Unless nightmares are frequent, persistent, or related to daytime behavioral problems, they are not a major concern. One relatively uncommon sleep disorder that is increasing in frequency among children is obstructive sleep apnea (OSA). Children should not snore unless they are experiencing congestion with an illness. Snoring is one of many symptoms of sleep apnea, which is a disorder that occurs when breathing is impaired or stops. The most common treatment for sleep apnea among children is having their tonsils and adenoid glands removed and/or developing a plan for weight control (Wei et al., 2005). If a child regularly snores, their pediatrician should be informed. A summary of other more common sleep disorders can be found in Table 6.2. It is important to note that with any sleep difficulty or disorder, the following advice is often provided: have a regular bedtime and wake time to provide ample opportunity for sleep; have a relaxing bedtime routine with low light; avoid caffeine; have a room that is cool, quiet, dark, and comfortable; and be sure to exercise regularly. It is also important to consult with a pediatrician if a child exhibits any of these sleep problems or disorders, because some may share symptoms with other health problems, may be indicators of additional health problems, or may exacerbate the symptoms of other issues, as is the case with autism spectrum disorder (Souders et al., 2017).

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a neurodevelopmental disorder in which a child experiences many psychosocial, behavioral, communication difficulties. Pediatricians regularly begin screening for symptoms of ASD at well-child visits as early as nine months, though many children are not diagnosed until after the age of two (Centers for Disease

TABLE 6.2 Common Sleep Disorders during Early Childhood

Disorder	Description	Treatments
Night Terrors	Child may scream, cry, call out, thrash around, be fearful, and agitated during an episode. Afterward, the child will not recall the event.	Night terrors often subside as children get older; caregiver(s) should stay calm; ensure the child does not get injured; make sure children are getting enough sleep.
Somniloquy (Sleep Talking)	Verbal outbursts, talking, yelling, mumbling, coherent or incoherent speech	Somniloquy is very common during childhood and is not dangerous. It may be disruptive to those sleeping nearby or room-sharing.
Somnambulism (Sleep Walking)	Key symptoms are moving and being ambulatory during NREM sleep, which varies in complexity and clumsiness. Urinating in inappropriate areas is not uncommon. Children may try to leave the home during an episode.	Somnambulism decreases significantly as children enter puberty; the primary goal is to make sure the sleep walker does not injure themselves, so alarm systems may be beneficial; guide the individual back to bed.
Enuresis (Bed Wetting)	Bed wetting is not considered clinically problematic until children are five or six years though it is often embarrassing for children.	A physician needs to rule out medical causes such as urinary tract problems, infections, or diabetes; some medications are used for treatment.
Bruxism (Tooth Grinding)	Grinding or clenching teeth during sleep, which can wear down teeth or cause headaches.	Some children will outgrow bruxism, but it might be related to other health problems; mouth guards and orthodontic devices; stress management.

Sources: Mayo Clinic, 2017; National Sleep Foundation, 2020; Rosen & Mahowald, 2005; Sheldon, 2005a, 2005b; Wei et al., 2005.

Control and Prevention [CDC], 2020b). Early symptoms include children demonstrating a lack of eye contact, disinterest in social or physical interactions with others, language delays, repetitive behaviors, and not being tolerant of changes in routine (CDC, 2020b). Causes of ASD include both genetic differences and environmental causes (Landrigan, 2010; Won et al., 2013), but vaccines are not a cause of ASD (Committee to Review Adverse Effects of Vaccines, 2012). Nearly 2 percent of children in the United States have been diagnosed with ASD, and boys are about four times as likely to be diagnosed (Maenner et al., 2020). However, it is likely that ASD is underdiagnosed among girls because they are able to mask some of the common social difficulties often used for diagnosis (Dean et al., 2017). Early screenings and diagnosis are important for beginning treatment for ASD, which often focuses on improving symptoms with behavioral modification treatments (Masi et al., 2017). Children of all socioeconomic statuses are at risk of ASD, but some children with minority status and low socioeconomic status have delays in diagnosis (Ferguson & Vigil, 2019; Maenner et al., 2020).

The Connection between Health and Poverty

In settings of middle and high socioeconomic status, preschool children as a group are among the healthiest human beings alive, though not as healthy as they will become in childhood, adolescence, and young adulthood. They experience comparatively few major illnesses as long as they get enough of the right things to eat and as long as their parents have reasonable access to modern medical care. As parents often note, preschoolers do experience frequent minor illnesses: various respiratory infections, ear infections, and stomach flus. These typically strike a young child several times per year, which is three or four times as often as for adults and about twice as often as for school-age children (Engels, 1993). Though children generally are more likely to contract viral illnesses, the novel coronavirus 2019 (COVID-19) seems to be less severe among children compared to adults, though the reasons for this are as yet unclear (Brodin, 2020; Carsetti et al., 2020). But generally, for well-fed children whose families have access to medical care, these

What Do You Think?

How do you suppose parents evaluate their child's height and weight? Explore this problem by asking two or three parents how satisfied they are with their child's height and weight. Do you think parents' feelings have any relationship to the actual size of their child?

illnesses rarely prove serious or life threatening. Colds and flu do cause worry, as well as create challenges for working parents in arranging childcare.

But this optimistic picture of preschoolers' health may be misleading. Since 1997, when the Children's Health Insurance Program (CHIP), which provides low- or no-cost insurance to children whose families make too much to qualify for Medicaid but cannot afford insurance, passed, rates of uninsured children have decreased significantly. This trend stabilized with the passage of the Affordable Care Act (ACA), so that in 2018, only 5.5 percent of children lack health insurance coverage (Berchick & Mykyta, 2019). However, most states that have not accepted the Medicaid expansion of the ACA have uninsured child rates of 10 percent or higher (Berchick & Mykyta, 2019; Kenney et al., 2014). Young children from these families are substantially less healthy than are those from middle- and high-SES families. Low-SES preschoolers contract 25 to 50 percent more minor illnesses than do preschoolers as a whole, and they are more often malnourished and face food insecurity, meaning that they chronically lack the quantity and quality of food to thrive, as well as essential vitamins, iron, and protein (American Academy of Pediatrics, 1993; McCurdy et al., 2012; Wilkinson, 1996). Children growing up at or near the poverty level are also substantially more likely to be overweight or obese (McCurdy et al., 2012).

Whether in North America or around the world, minor illnesses combined with malnutrition or undernutrition put children's health at risk for additional illnesses, both minor and major. Malnutrition and the associated increased infection risk are responsible for about half of all child deaths in the world, primarily in sub-Saharan Africa and Asia (Walson & Berkley, 2018). Beyond the mortality risk, malnutrition also contributes to delays in social, language, and cognitive development, possibly because it leads to lack of energy and lack of interest in new experiences. In one study based in Kenya, Africa, even a temporary food shortage (due to a few months of local drought) impaired children's health and school performance two years later (McDonald et al., 1994). An intervention in which nutritional supplementation was provided prenatally and throughout the first two years of life demonstrated better motor skills and cognitive functioning, and surprisingly some of these benefits persisted until adolescence and beyond, particularly among children who received higher levels of protein in their supplementation (DiGirolamo et al., 2020).

Though many children in technologically advanced countries receive a sufficient number of calories each day, the quality of those calories and other macro- and micronutrients such as protein and vitamins is insufficient. These children are also considered malnourished or undernourished.

How can we counteract these problems? In general, strategies can focus either on individuals and their particular communities or on systematic reorganization of the health care system and food security systems as a whole. Among individually oriented strategies, an important one is to educate children and families about health and nutrition. For example, pamphlets can be distributed in schools or medical clinics, and public health professionals can make presentations in classrooms, community clubs, or churches. However, these efforts work best when they are multifaceted, including education in combination with improving access to high-quality food and health care. The "Focusing On" feature proposes additional alternatives.

Educational activities can be effective if they build on the knowledge of health and nutrition low-SES parents and their children already have and avoid assuming the public is completely ignorant about these matters. Good programs also improve individuals' self-efficacy about engaging in health-promoting behaviors, and as noted earlier, work best

What Do You Think?

Suppose you are a teacher or caregiver at a childcare center, and one of your children often seems hungry throughout the day. How could you tell whether the child is undernourished or simply has a big appetite? Compare your strategies for answering this question with those of a classmate.

when public policy (like changes to the health care system or expanding programs such as the Supplemental Nutrition Assistance Program) makes engaging in health-promoting behaviors easier. In this sort of situation, it is helpful to organize intervention programs aimed at providing parents and children with the knowledge they need. However, such programs must respect the culture and economic situations of the families, which usually influence food preferences in major ways. Put simply, certain foods acquire symbolic meanings (such as turkey for American Thanksgiving or having dates and milk to break fast during Ramadan), regardless of their precise nutritional value. Other foods may never be tried, no matter how worthwhile they are nutritionally, because they cost too much or seem too strange or foreign to a particular family or cultural group.

Bladder Control

Sometime during the preschool years, to parents' great relief, most children acquire control of their bladder. The process includes many false starts and accidents. Most commonly, daytime control comes before nighttime control, generally beginning between the ages of two and three with an average age of about thirty-two months (Bloom et al., 1993; Oster, 2019). However, between 35 and 40 percent of children are potty-trained at three years or after (Oster, 2019). Most children are reliably toilet trained by the age of four (Jansson, et al., 2005), although individual children vary widely and somewhat unpredictably. Some pediatricians believe this fact implies that children decide when they wish to begin exercising control, perhaps to begin feeling more grown up. In the early stages of toilet training, therefore, reminders and parent-led visits to the toilet may make little difference to most toddlers. Nonetheless, they may help in the long term as a form of behavioral conditioning: a child comes to associate seeing and sitting on the toilet with the relief of emptying a full bladder, as well as with the praise parents confer on the child for successes.

Some children who display daytime bladder control will experience stool toileting refusal (Oster, 2019; Taubman, 1997). In one study of 482 children, 22 percent of children refused to use the toilet during bowel movements for at least one month (Taubman, 1997). The primary concern with stool toileting refusal is that it may lead to constipation and discomfort or even stool impaction (Oster, 2019; Taubman, 1997). However other research has suggested that having constipation or uncomfortable bowel movements is one cause of stool toileting refusal (Blum et al., 2004). For most children in Taubman's study, no intervention was needed, and the children eventually became fully toilet trained within several months of exhibiting bladder control (1997).

In the long run, successful bladder control depends on both physical growth and the child's own motivation.
Source: Yaoinlove/Shutterstock.com.

Nighttime bladder control often takes much longer to achieve than daytime control. About one-half of all three-year-olds still wet their beds at least some of the time, and about 15 to 20 percent of five-year-olds do the same (American Psychiatric Association, 1994; Oster, 2019). Most pediatricians are not concerned about nighttime bladder issues until children reach the age of six (Oster, 2019).

Focusing On . . .

Reforming Children's Health Care

In all societies, the health care system provides less help to poor families than to well-off ones. Low-SES mothers receive less medical attention during pregnancy, causing health problems in themselves or their fetuses to be overlooked, and are more likely to give birth to a low birth-weight infant (Krans & Davis, 2014). Infants of low-income mothers are less likely to receive checkups from a doctor and less likely to be seen by a doctor if they get sick (Bury, 1997; Wilkinson, 1996; Wolf et al., 2018). However, children who have access to Medicaid and the Children's Health Insurance Program (CHIP), described next, are much more likely to get checkups and to see health professionals early in an illness, though those rates still lag behind higher SES families with private insurance (Rudowitz et al., 2014; Wolf et al., 2018).

Why does access to health care depend so heavily on personal income? In the United States, medical services for the poor are paid through Medicaid, a federally sponsored insurance program created in the 1960s. As of 2018, more than 36 million children were enrolled in Medicaid (Medicaid, 2018). It pays for some basic health services, such as taking a child with an ear ache to a general practitioner, but it reimburses the doctor only up to a certain point. Doctors who charge more price themselves out of the market for low-SES families, which have significantly fewer doctors and clinics to choose from but children who experience more illnesses than do children from higher-SES families (Fitzgerald et al., 1994). In 1997, the Children's Health Insurance Program (CHIP) was created, which assists states in providing insurance to children whose families cannot afford insurance but make too much money for Medicaid eligibility. As of 2018, nearly ten million children in the United States were enrolled in CHIP (Medicaid, 2018).

Though there have been significant strides in improving access to health care for children and adults alike, many children still lack access to health care. In some states, uninsured rates for children are over 11 percent with Latinx, Native American, Native Alaskan, and indigenous children particularly impacted, due in part to significant cuts to Medicaid, delays in funding CHIP leading to confusion and lack of awareness of eligibility on behalf of families, and repeated attempts to repeal the Affordable Care Act, including much less outreach for enrollment since 2106 (Alker & Roygardner, 2019; Rudowitz et al., 2014).

How can society and concerned individuals reduce these economically based inequalities in health care? Numerous reforms have been proposed centering on one of three ideas: community involvement, prevention, and reorganization of services. Reforms that focus on community involvement seek to reduce the psychological and geographical distance between medical staff and the people they serve. Some hospitals and cities have established small community health clinics in areas of greatest need (the inner city). They hire medical staff who establish rapport with the parents and children who seek help, recruit local community members to serve on their governing and advisory boards, and charge low fees based on families' ability to pay.

Reforms that focus on primary prevention seek to keep disease from striking in the first place. These actions often deal with relatively healthy children (who have not gotten sick yet) and the conditions that make illness likely rather than illness itself. Lead poisoning is a good example: community health experts often cite lead as one of the most hazardous health threats to preschool children (Tesman & Hills, 1994). Lead accumulates in the body and eventually damages the nervous system and can cause death. People pick it up accidentally from many sources, but the most prominent culprit is the interior wall paint used in about 75 percent of all homes and apartments built before 1980. Because there is no cure for lead poisoning, prevention strategies have dominated the response of the health care profession: educating parents to the dangers, pressing for legislation outlawing lead-based paints (and lead-based gasoline), removing leaded paint in some homes, checking/remediating local water systems when tap water tests high for lead content, and checking children for lead exposure at their twelve-month well-child visit.

Reforms that focus on reorganization generally involve more self-conscious planning of medical services. Immunization and health-screening programs based in schools, for example, allow programs to reach a higher percentage of children than programs in community health clinics (Behrman, 1993; Behrman & Stacey, 1997; Jacob et al., 2016). "Front-line" professionals often can improve access dramatically without compromising quality of care: most childhood illnesses, for example, can be treated effectively by a nurse as long as the nurse knows when a particular illness deserves referral to the doctor and appropriate specialized services are indeed available.

What Do You Think?

1. Look back on your own elementary school hearing or eye tests from the point of view of the teachers and nurses. Can you see any limitations to "mass screening," as well as advantages to it?
2. Is there a case to be made for *limiting* health care to the poor? What would it be? And what might be the long-term implications of limiting health care?

What Do You Think?

Imagine how you would talk to a parent who was concerned about the child's bed wetting at night. What would you say? If you or your instructor can arrange it, try acting out a meeting to discuss bed wetting between a concerned parent and a childcare center worker or director.

The timing of nighttime control depends on several factors, such as how deeply children sleep, how large their bladders are, and how recently they consumed liquids before bedtime. It also depends on anxiety level; worried children tend to wet their beds more often than relaxed children do. Unfortunately, parents sometimes contribute to young children's anxieties by becoming overly frustrated about changing wet sheets night after night.

Achieving bladder control reflects the large advances children make during the preschool years in controlling their bodies in general. It also reflects parents' accumulated efforts to encourage physical self-control for their children. The combined result is that children of this age can begin focusing on what they actually want to do with their bodies.

Motor Skill Development

As young children grow, they become more skilled at performing basic physical actions. Often a two-year-old can walk only with considerable effort; hence the term *toddler.* But a five-year-old can walk comfortably in a variety of ways: forward and backward, quickly and slowly, skipping and galloping. A five-year-old also can do other vigorous things that were impossible a few years earlier. Running, jumping, and climbing all occur with increasing smoothness and variety. Children can carry out certain actions that require accuracy, such as balancing on one foot, catching a ball reliably, or drawing a picture.

In this section, we examine in more detail how children reach milestones such as these. Because family conditions vary a great deal, we will make certain assumptions. In particular, we will assume children have no significant fears of being active—that they have a reasonably (but not excessively) daring attitude toward trying out new motor skills, they are in good health, and their physical growth has evolved more or less optimally. These assumptions do not hold for all children or families, as we note later in this section, but they make a good starting point for understanding motor development.

Fundamental Motor Skills

Healthy preschool children obviously have moved well beyond the confines of reflex action, which constituted the first motor skills of infancy. From ages two to about five, they experiment with the simple voluntary actions that adults use extensively for their normal activities, such as walking, running, and jumping (Kalverboer et al., 1993). For older children, these actions usually are the means to other ends. For very young children, they lie very much in the foreground and frequently are goals in themselves. Table 6.3 summarizes some of these activities.

Walking and Running From a child's point of view, walking may seem absurd at first: it requires purposely losing balance, then regaining balance rapidly enough to keep from falling (Rose & Gamble, 1993). As older infants, children still must pay attention to these facts, even after a full year or so of practice. Each step is an effort in itself. Children watch each foot in turn as it launches (or lurches) forward; they may pause after each step before attempting the next. By their second or third birthday, however, their steps become more regular and their feet get closer together (Adolph et al., 2012). Stride, the distance between feet in a typical step, remains considerably shorter than that of a typical adult. This makes short distances easy to walk but long distances hard to navigate for a few more years.

Jumping At first, a jump is more like a fast stretch: the child reaches for the sky rapidly, but her feet fail to leave the ground. Sometime around her second birthday, one foot, or

TABLE 6.3 Milestones in Preschool Motor Development

Approximate Age	Gross Motor Skill	Fine Motor Skill
2.5–3.5 years	Walks well; runs in straight line; jumps in air with both feet	Copies a circle; scribbles; can use eating utensils; stacks a few small blocks
3.5–4.5 years	Has a walking stride 80 percent that of adult; runs at one-third adult speed; throws and catches large ball, but is stiff-armed	Buttons with large buttons; copies simple shapes; makes simple representational drawings
4.5–5.5 years	Balances on one foot; runs far without falling; can "swim" in water for short distance	Uses scissors; draws people; copies simple letters and numbers; builds complex structures with blocks

Note: The ages given above are approximate, and skills vary with the life experiences available to individual children and with the situations in which the skills are displayed.

Source: Kalverboer et al. (1993).

even both feet, may finally leave the ground. Such early successes may be delayed, however, because the child may thrust her arms backward to help herself take off, as though trying to push herself off the floor. Later, perhaps around age three, she shifts to a more efficient arm movement—reaching forward and upward as she jumps—which creates a useful upward momentum.

Success in these actions depends partly on the type of jump the child is attempting. Jumping down a step is easier than jumping across a flat distance, and a flat or broad jump is easier than a jump up a step. By age five or so, most children can broad-jump across a few feet, although variations among individuals are substantial.

Throwing and Catching For infants and toddlers, first throws may consist of simply waving an object, releasing it suddenly, and watching it take off. Once intentional throwing begins, however, children actually adopt more stereotyped methods initially, using a general forward lurch, regardless of the ball's size or weight. As skill develops, children vary their movements according to the size of the ball. Catching proceeds through analogous phases, from stereotyped, passive extension of arms to flexible movement of hands in a last-minute response to the oncoming ball.

Fine Motor Coordination: The Case of Drawing Skills

Not all motor activities of young children involve the strength, agility, and balance of their whole bodies. Many require the coordination of small movements but not strength. Tying shoelaces calls for such **fine motor coordination**; so do washing hands, buttoning and zipping clothing, eating with a spoon, and turning a doorknob.

fine motor coordination Ability to carry out smoothly small movements that involve precise timing but not strength.

One especially widespread fine motor skill among young children is drawing. In North American culture, at least, virtually every young child tries using crayons, pens, or pencils at some time and often tries other artistic media as well. The scribbles or drawings that result probably serve a number of purposes. At times, they may be used mainly for sensory exploration; a child may want to get the feel of paintbrushes or felt-tip pens. At other times, drawings may express thoughts or feelings; a child may suggest this possibility by commenting, "It's a horse, and it's angry." Children's drawings also probably reflect their knowledge of the world, even though they may not yet have the fine motor skills they need to convey their knowledge fully. In other words, children's drawings reveal not only fine motor coordination but also their self-concepts, emotional and social attitudes, and cognitive development.

Drawing shows two overlapping phases of development during early childhood. From about two and a half to four years of age, children focus on developing nonrepresentational skills, such as scribbling and purposeful drawing of simple shapes and designs. Sometime around age three or four, they begin attempting to represent objects (Adi-Japha et al., 1998;

Coles, 1992). Yet, although representational drawings usually follow nonrepresentational ones, the two types stimulate each other simultaneously. Children often describe their early scribbles as though they referred to real things, and their practice at portraying real objects helps them to further develop their nonrepresentational skills (Coates & Coates, 2006).

Prerepresentational Drawing Around the end of infancy, children begin to scribble. A two-year-old experiments with whatever pen, crayon, or pencil is available, almost regardless of its color or type, behaving like an infant and like a child. As with an infant, efforts focus primarily on the activity itself: on the motions and sensations of handling a pen or pencil. But like an older child, the two-year-old often cares about the outcome of these activities: "That's a mommy," he says of his drawing, whether it looks much like one or not. Contrary to a popular view of children's art, even very young children are concerned not only with the process of drawing but with the product as well (Broughton et al., 1996).

A child's interest in the results of her drawing shows up in the patterns she imposes on even her earliest scribbles. Sometimes, she fills up particular parts of the page quite intentionally—the whole left side, say, or the complete middle third. And she often emphasizes particular categories of strokes: lots of straight diagonals or many counterclockwise loops. Different children select different types of motions for emphasis, so the motions are less like universal stages than like elements of a personal style.

Representational Drawing While preschool children improve their scribbling skills, they also develop an interest in representing people, objects, and events in their drawings. This interest often far precedes their ability to do so. A three-year-old may assign meanings to scribbles or blobs in his drawing; one blob may be "Mama," and another may be "our house." Events may happen to these blobs, too: Mama may be "going to the store" or "mowing." During the early childhood years, and for a long time thereafter, the child's visual representations are limited by comparatively rudimentary fine motor skills. Apparently, children know more, visually speaking, than their hands can portray with pens or brushes. Only as children reach school age do their drawings of people become relatively realistic.

What happens to drawing skills beyond the preschool years depends on a child's experiences and on the encouragement (or lack thereof) received from others. Drawings in later years become even more realistic—more "photographic" or draftsmanlike in style. But not all children stay with art in the long term, due to the combined influence of competing academic interests, the priorities of friends, or even dislike of a teacher. We will discuss these types of influence again in Chapter 9 in connection with social and motivational changes during middle childhood.

Skills that require fine motor coordination—like creating this drawing—develop through identifiable steps or stages. At first, children tend to make random marks or scribbles; later, they coordinate these into patterns; still later, they coordinate patterns into representations of objects that become increasingly recognizable by parents and teachers.

Source: lara-sh/Shutterstock.com.

Gender Differences in Physical Development

As is true during infancy, preschool boys and girls develop at almost exactly the same average rates. This applies to practically any motor skill of which young children are capable, and it applies to both gross and fine motor skills. Any preschool classroom, therefore, is likely to contain children of both sexes who can run very well and children of both sexes who can paint well or tie their shoelaces without help. This is especially true among younger preschool children (age three or four).

By the time children begin kindergarten (usually at age five), slight gender differences in physical development and motor skills appear, with boys tending to be (slightly) bigger, stronger, and faster (Kalverboer et al., 1993) and with better ball skills, while girls demonstrate better manual dexterity (Junaid & Fellowes, 2006). Yet these differences are noticeable only as averages and only by basing

the averages on very large numbers of children. Despite the slight differences, therefore, more than 95 percent of children are more skillful and bigger than some members of *both* sexes, and less skillful and smaller than certain others of both sexes.

By the time children start school, a few children in any community are bigger, stronger, and faster than *any* other children, and most of them are boys. Furthermore, these few individuals may get much more than their share of attention because of their superior physical skills. This contributes to the (mistaken) impression that boys are larger and more skillful than girls *in general.* In this way (among many others) are stereotypes born. The differences in motor skills might be more accurately called *gender* differences than *sex* differences because they probably derive partly from the social roles boys and girls begin learning early in the preschool years. Part of the role differences includes how preschool children spend their time. Preschool boys do spend more time than girls in active and rough-and-tumble play, and girls spend more time doing quiet activities such as drawing or playing with stuffed animals due to the types of opportunities provided to them and encouraged of them. Children of both sexes, furthermore, reinforce or support one another more for engaging in gender-typed activities, behavioral shaping that is often less flexible for boys than for girls (Davies, 1991; Kite et al., 2008). These differences may create the twin impressions that boys are less capable of fine motor skills and that girls are physically weaker, or at least are less inclined toward gross motor activity.

Variations in Motor Skill Development

Although the preceding sections may have implied that young children acquire motor skills at highly similar rates, in reality they show considerable variability in both fundamental and fine motor skill development. At age three, some children already can walk fast and catch a ball skillfully, but others are still having trouble with both tasks. At age five, some children can use scissors skillfully to cut out shapes for kindergarten art projects, but others still find scissors difficult or even mystifying. Whatever the motor skill, individual children will vary at it.

Like other human differences, these probably result from variations in experience, motivation, and biological endowment. Because of family background or preschool educational experiences, some children may be encouraged more than usual toward active play. Not surprisingly, they develop the skills for active play—like running, jumping, or throwing—sooner than children who experience less encouragement for active play. Weight also plays a role. Children who are overweight or obese lag behind their normal-weight peers in gross motor skills—a gap that grows over time (D'Hondt et al., 2013). Research has demonstrated that children whose parents engage in more physical activity, particularly if that activity is with their children, are more active, skilled, and healthy (Hinkley et al., 2008; Loprinzi & Trost, 2010; Spurrier et al., 2008).

Experience also plays a large role in drawing or other fine-motor activities. Some children receive more encouragement and opportunity than others. Early successes and reinforcement breed satisfaction with the emerging skills and encourage the development of motivation to refine the initial skills further. Before long, as we saw earlier in the case of gender differences in motor skill development, small initial differences in opportunity and skill become larger differences in skill and motivation.

Biological and genetic background probably also plays a role in motor skill development, although for most children it is hard to sort out how strong these influences are. The most obvious evidence for biological influence—as well as for the questionability of its importance—is the experiences of children with physical disabilities. A child born with cerebral palsy (a group of disorders of the nervous system that impair motor

On the average, boys and girls develop motor skills at almost the same rate during the preschool years. But marked differences emerge among individuals within each sex, even at this age.

Source: Rawpixel.com/Shutterstock.com.

What Do You Think?

Suppose you are a childcare center worker, and one of your four-year-olds seems to be especially clumsy at throwing and catching a ball. Should you do something about this, and if so, what should you do? Consult with a classmate for a second opinion. Would you feel the same way if the child seemed clumsy or "uninspired" at drawing?

coordination and posture) may not learn to walk, jump, throw, or draw at the same times or to the same extent as a child who never experiences this condition. Yet contrary to common stereotypes of children with disabilities, the motor development of a child with cerebral palsy is *not* determined solely by the impairment; it is also determined by the child's opportunities and encouragement to learn new motor skills. The final motor achievements of children with this impairment will show diversity just as will the achievements of peers without cerebral palsy, and some of the diversity will be the result of education, physical therapy, and family involvement, not biology (Bartlett et al., 2018; Smith, 1998).

The Impact of Children's Growth on Adults

Even though physical growth unfolds largely independently of other forms of development in infancy, growth interacts indirectly in a number of ways with a child's social relationships. A child's physical appearance and particular motor skills can affect how adults and older children respond to the child. A family's attitudes, as well as their economic and social circumstances, can affect opportunities for children to acquire physical skills, and constrain opportunities as well.

Effects of Appearance

The new motor skills that preschoolers develop bring new risks and create new safety concerns for parents and other caregivers. What hazards may be waiting for this girl? And how should adults deal with them?

Source: Dmitryp-k/Shutterstock.com.

From birth—and despite the biases from their own parents—children vary in how attractive their faces seem to adults and other children. As a rule, some individuals look younger than others of the same age. In general, having a young-looking face depends on having large features and a large forehead; that is, facial features should be wide-set and located relatively low on the front of the skull. Even slight changes in these proportions—just a fraction of an inch—can make an adult seem many years older or younger, an infant seem six months older or younger, or a preschooler seem one or two years older or younger.

In general, younger-looking children are also rated as more attractive than older-looking children by both adults and peers, and adults tend to expect more mature behaviors from older-looking children (Parsons et al., 2011). This coincidence of stereotypes—of youthfulness and attractiveness—may contribute to differences in how parents and other adults respond to preschoolers as individuals. Parents and other caregivers need to be made aware of these possibilities, even if differences in response stem partly from innate human reactions to infantile (or babylike) appearance.

Effects of Motor Skills

Consider the changes in size that preschool children experience. A two-year-old often is still small enough to be handled. When necessary, parents can pick up and move a child from one place to another, physically removing the child from danger, and carrying the child (at least partway) if a distance is too far. By age five, a child often has outgrown these physical interactions, not only figuratively but literally. Parents or other adults may still lift and cuddle the child sometimes in play or in an emergency, but they probably are beginning to avoid doing so on a regular basis. To a significant extent, the child may now simply be too bulky

and tall. More and more rarely can parents save the child from danger by picking the child up or by speeding the child along a long hallway by carrying the child piggyback. Parents must somehow get children to do these things for themselves.

Usually, of course, parents succeed at this task. By age five, a child can think and talk about their own actions much more than before, and these improvements help guide their own actions. The handling that used to be literal now becomes mostly figurative. Now *handling* means negotiating and discussing with the child rather than lifting or carting them around.

Improvements in motor skills also change the agenda for a child's daily activities. A two-year-old may spend a good part of the day experimenting with fundamental skills: walking from one room to another, tearing toilet paper to shreds, or taking pots and pans out of a cupboard. These activities often are embedded in an active social and cognitive life: the child may smile (or frown) at parents while playing and may "talk" about what they are doing as well. But the motor aspects of these activities absorb a significant part of the child's attention throughout the day. The child may return repeatedly to a staircase, for instance, as though compelled to get the hang of climbing it; no reward needs to lie at the top step except the satisfaction of a job well done.

A two-year-old's parents therefore must spend a lot of time ensuring that the child comes to no physical harm during motor explorations. They must make sure the child does not fall down the stairs, tumble into the toilet bowl, or discover a sharp knife among the pots. Their role as safety experts can dominate their contacts with the child, particularly if the child is active. Table 6.4 lists common accidents, remedies, and preventions.

By the end of early childhood, minute-to-minute physical surveillance recedes in importance, even though, of course, a concern about safety remains. Rules about dangers make their appearance ("Don't climb on that fence; it's too high"), along with the hope that a five-year-old can remember and follow the rules at least some of the time. The shift toward rules also results from increasing confidence in the child's motor skills. Now parents are apt to believe their child can go up and down stairs without stumbling very often—and they are usually right.

During the preschool period, many parents discover a special need for patience in their dealings with their children. Simple actions such as tying shoelaces or putting on socks may take longer than before, simply because children now insist on doing many of these things themselves. For similar reasons, walking to the store may now take longer; a three- or four-year-old may prefer to push the stroller rather than ride in it, thus slowing everyone down. And preschoolers may have their own agenda on a walk, such as noticing little rocks on the sidewalk or airplanes in the sky, which differ from parents' goals. On good days, these behaviors offer some of the joys of raising children, but on bad days, they often irritate even the most patient of parents.

Effects of Differences in Families

A child's growth has a different impact on adults depending on the priorities of parents and on the circumstances of the family and community to which the child belongs. What seems like a risky behavior to one parent (e.g., climbing up on a large boulder) may seem like constructive skill building to another, with consequent differences in encouragement or prohibitions for the child. What seems like a healthy amount of weight for a child to one parent may seem skinny (or plump) to another, with consequent differences in parents' unconscious appraisals of the child's attractiveness.

But settings and circumstances matter as well. In families with many children and few adults, child minding may become the responsibility of older siblings as much as (or more than) of adults. In extended families—those with nonparental relatives living at home or nearby—child minding may become partly the responsibility of other adult relatives. If parents work (or if a single parent works), relatives or other "caregivers for hire" take on some of the caregiving responsibility. All of these circumstances alter the settings in which preschoolers grow and the relationships that become prominent during early childhood. Some settings may provide the child with safer places for physical exploration than

TABLE 6.4 Common Accidents, Remedies, and Preventions among Preschoolers

Accidents	What to Do	How to Prevent
Drowning	Unless you are trained in water safety, extend a stick or other device. Use heart massage and mouth-to-mouth breathing when and as long as needed.	Have locked fencing around pools. Teach children to swim as early in life as possible. Supervise children's swim sessions closely. Have children stay in shallow water. Have children wear personal flotation devices near water.
Choking on small objects	If a child is still breathing, do not attempt to remove object; see a doctor instead. If breathing stops, firmly strike child twice on small of back. If this does not help, grab child from behind, put your fist just under his or her ribs, and pull upward sharply several times.	Do not allow children to put small objects in their mouths. Teach them to eat slowly, taking small bites. Forbid vigorous play with objects or food in mouth.
Cuts with serious bleeding	Raise cut above level of heart; apply pressure with cloth or bandage. If necessary, apply pressure to main arteries of limbs.	Remove sharp objects from play areas. Insist on shoes wherever ground or floor may contain sharp objects. Supervise children's use of knives.
Fractures	Keep injured limb immobile; see a doctor.	Discourage climbing and exploring in dangerous places, such as trees and construction sites. Allow bicycles only in safe areas and with helmets and/or braces.
Burns	Pour cold water over burned area; keep it clean; then cover with *sterile* bandage. See a doctor if burn is extensive.	Keep matches out of reach of children. Keep children well away from fires and hot stoves.
Poisons	On skin or eye, flush with plenty of water. If in stomach, phone poison control center doctor for instructions. Induce vomiting only for selected substances.	Keep dangerous substances out of reach of children. Throw away poisons when no longer needed. Keep syrup of ipecac in home to induce vomiting, but use *only* if advised by doctor.
Animal bites	Clean and cover with bandage; see a doctor.	Train children when and how to approach all pets and animals. Teach them caution in approaching unfamiliar animals. Be aware of animal's body language such as dogs yawning or licking lips, which demonstrate that the animal is uncomfortable.
Insect bites	Remove stinger, if possible. Cover with paste of bicarbonate of soda (for bees) or a few drops of vinegar (for wasps and hornets).	Encourage children to recognize and avoid insects that sting, as well as their nests. Encourage children to remain calm in the presence of stinging insects.
Poisonous plants (e.g., poison ivy)	Remove affected clothing. Wash affected skin with strong alkali soap as soon as possible.	Teach children to recognize toxic plants. Avoid areas where poisonous plants grow.

Source: Adapted from O'Keefe (1998).

do other settings, resulting in fewer worries about safety expressed by caregivers. Some families may include so many children that differences in a particular child's physical appearance make little difference simply because caregivers are distributing their attention widely among many children or activities. Individual parents may or may not be aware that alternatives to their particular childcare arrangements exist, and because they often have not participated in the alternatives, they may find them hard to appreciate. But the range of childcare arrangements is very real, as is the range of opportunities they offer to young children (Cannella, 1997).

What Do You Think?

How did your own parents' work schedules, the number of children in your family, and family finances influence the joy or irritation they experienced? Did the *number* of parents raising you (one or more than one) make a difference?

COGNITIVE DEVELOPMENT

In addition to their physical changes, preschool children develop new abilities to represent objects and experiences. They begin to notice, for example, that their particular way of viewing the objects across a room differs from the perspective of a family member already sitting on the other side. They begin to distinguish between appearances and reality; that is, when you cover a doll with a costume, it still is "really" the same doll. Preschoolers also become able to communicate these new understandings to others. The changes are in thinking, or *cognition,* and are called *cognitive development.*

Thinking among Preschoolers

Much of the research on cognitive development owes its intellectual roots to the observations and theorizing of Jean Piaget. During the 1960s and 1970s, considerable effort went toward testing his ideas about cognitive development. Overall, the research led first to modifications of, and in some cases, challenges to, Piaget's major proposals, such as the existence of comprehensive cognitive stages that unfold in a predictable order or the idea that thinking is really an individual activity rather than a social one. To put these later findings in proper context, however, we must first keep in mind Piaget's key ideas about the changes young children experience during the preschool years.

Piaget's Preoperational Stage

At about age two, according to Piaget, children enter a new stage in their cognitive development (Piaget, 1963; Wadsworth, 1996). Infancy has left them with several important accomplishments, such as the belief that objects have a permanent existence and the capacity to set and follow simple goals, such as emptying all the clothes from every drawer in the house. Infancy has also left them with the knowledge that all of their senses register the same world; now a child knows that hearing his mother in the next room means that he will probably see her soon and that seeing her probably also means he will hear from her.

The **preoperational stage**, roughly ages two through seven, extends and transforms these skills. During this stage, children become increasingly proficient at using *symbols*—words or actions that stand for other things. During this period, they also extend their belief in object permanence to include *identities,* or constancies, of many types: a candle remains the same even as it grows shorter from burning, and a plant growing on the windowsill remains the same plant, even though its growth changes its appearance from day to day.

preoperational stage
In Piaget's theory, the stage of cognition characterized by increasing use of symbolic thinking but not yet by logical groupings of concepts.

Preoperational children also sense many *functional relationships,* or variations in their environments that normally occur together. Preschool children usually know that the hungrier they are, the more they will want to eat; the bigger they are, the stronger they tend to be; and the faster they walk, the sooner they will arrive somewhere. Of course, they still do not know the precise functions or relationships in these examples—exactly how *much* faster they will arrive if they walk a particular distance more quickly—but they do know that a relationship exists.

These are all cognitive strengths of preschool children, and they mark cognitive advances over infancy. But as the *pre* in the term *preoperational* implies, Piaget's original theorizing actually focused on the limitations of young children's thinking relative to that of school-age children. The term *operations* referred to mental actions that allow a child to reason about events he or she experiences. Piaget's observations suggested that from age two to seven,

The play of preschoolers often relies on their growing abilities to represent objects and events symbolically. A cardboard box becomes a ship, and the patio becomes the deep blue sea for this little boy.

Source: LittleDogKorat/Shutterstock.com.

children often confuse their own points of view with those of other people, cannot classify objects and events logically, and often are misled by single features of their experiences. As later sections of this chapter point out, however, more recent research has substantially qualified this perspective; in essence, it has found that children often are more cognitively astute than Piaget realized. Their specific cognitive skills are all based on a key ability that Piaget *did* recognize: the ability to represent experiences symbolically.

Symbolic Thought

As we just noted, *symbols* are words, objects, or behaviors that stand for something else. They take this role not because of their intrinsic properties but because of the intentions of the people who use them. A drinking straw is just a hollow tube and does not become a symbol until a preschooler places it in the middle of a mound of sand and declares it to be a birthday candle. Likewise, the sound /bahks/ lacks symbolic meaning unless we all agree that it refers to a hollow object with corners: *box*.

symbolic thought Mentally using one thing to represent something else.

Probably the most significant cognitive achievement of the preoperational period is the emergence and elaboration of **symbolic thought**, the ability to think by making one object or action stand for another. Throughout their day, two-year-olds use language symbolically, such as when they say "Milk!" to procure a white, drinkable substance from the refrigerator. They also use symbolic thought in make-believe play by pretending to be people or creatures other than themselves. By about the age of three or four, children's symbolic play often combines complex actions (getting down on all fours), objects (using a table napkin for a saddle), language (shouting "Neigh!"), and coordination with others (getting a friend to be a rider).

Symbolic thinking helps preschool children organize and process what they know, and play can lead both to language development and to more complex symbolic play (Carlson & Beck, 2009; Goldman, 1998; Nelson, 1996; Orr & Geva, 2015). Objects and experiences can be recalled more easily if they have names and compared more easily if the child has concepts that can describe their features. Symbols also help children communicate what they know to others, even in situations quite different from the experience itself. Having gone to the store, they can convey this experience to others either in words ("I went shopping") or through pretend play ("Let's play school, and I'll be the teacher."). By its nature, communication fosters social relationships among children, but it also fosters cognitive development by allowing individual children to learn from the experiences of others. More precisely, communication allows individuals to learn from the symbolic representations of others' experiences.

Egocentrism in Preschool Children

egocentrism Inability to distinguish between one's own point of view and that of another person.

Egocentrism refers to the tendency of a person to confuse his or her own point of view and that of another person. The term does not necessarily imply selfishness at the expense of others, but a centering on the self in thinking. Young children often show egocentrism in this sense, but not always. Piaget illustrated their egocentrism by showing children a table on which models of three mountains had been constructed and asking them how a doll would see the three mountains if it sat at various positions around the table. Three-year-olds (the ones in Piaget's preoperational stage) commonly believed the doll saw the layout no differently than they did (Piaget & Inhelder, 1967).

On the other hand, when the task concerns more familiar materials and settings, even preschool children adopt others' spatial perspectives (Steiner, 1987). For example, instead of using Piaget's three-mountain model, suppose we use a "police officer" doll that is searching for a "child" doll and place them among miniature barriers that sometimes obscure the dolls' "view" of each other and sometimes do not. When these procedures are

followed, four-year-olds have relatively little difficulty knowing when the two dolls can "see" each other and when the barriers truly are "in the way." However, in another study researchers provided photographs of toys from different perspectives to children and then asked those children which image could have been taken from a particular vantage point (Frick et al., 2014). When the layout of the image was simple, six-year-olds could engage in perspective taking, but with more complex images, even eight-year-olds sometimes showed difficulty selecting the correct picture (Frick et al., 2014).

In oral communication, preschoolers also show distinct but incomplete egocentrism. A variety of studies have documented that preschoolers often explain tasks rather poorly to others, even though their language and understanding are otherwise skillful enough to explain them better (Nelson, 1996). Copying a simple diagram according to instructions from a preschooler can prove next to impossible, no matter how sensitive the listener is. On the other hand, preschool children do show awareness of the needs of a listener. They explain a drawing more clearly, for example, to a listener who is blindfolded, apparently because the blindfold emphasizes the listener's need for more complete information.

In these studies, young children show both similarity to and difference from the adults they will become. All of us, young or old, show egocentrism at times; indeed, our own thinking is often the only framework on which we can base our actions and conversations with others, at least initially. As we mature, though, we learn more about others' thoughts, views, and feelings, as well as more about how to express ourselves more precisely. In these ways, we (hopefully!) differ from four-year-olds.

Theory of Mind

In Chapter 4, we discussed how infants' mimicry and their beginning to understand others' intentions form the foundation of theory of mind. During early childhood, the ability to appreciate the intentions, thoughts, and beliefs of others becomes more complex. As noted previously, between the age of two and three, most children begin to understand the perceptions of others, such as knowing that they can see something that someone else cannot based on perspective, and they can comprehend that others might have desires that are discrepant from their own, such as when they prefer a cookie even though a sibling prefers a cheese stick for a snack (Gopnik et al., 1994).

Between three and four years, children reliably recognize when someone does not perceive something (for example, knowing that a sibling does not know there is ice cream in the freezer if they have not seen it), or when others perceive something incorrectly (for example, if a sibling says dad was wearing a red shirt this morning when they know he was wearing a pink shirt) (Gopnik et al., 1994). However, as noted earlier in this chapter, on more complex tasks of perspective taking, some children as old as seven or eight will still demonstrate egocentrism in their responses (Frick et al., 2014). Eventually, around the age of four, children also begin to understand that someone might believe something that is incorrect, known as a false belief (Gopnik et al., 1994). This belief is traditionally tested by showing one child a container, such as a box of crackers, asking what they believe is inside, then revealing that there are actually paperclips inside. Next, a second child enters the room, and the first child is asked what this new child will think is in the box. Children with understanding of false belief will realize that the second child does not have their unique knowledge and will say that there are crackers in the box.

It is important to note that the tasks typically used to measure children's theory of mind depend on the ability to speak and respond to questions. More recent research that has used visual gaze rather than verbal explanation has suggested that understanding of false beliefs may actually begin during infancy (Scott & Baillargeon, 2017). Moreover, development of false belief understanding is likely influenced by socioeconomic status; the presence of siblings close in age; and whether parents discuss their mental states, beliefs, memories, and thoughts with their children (Devine & Hughes, 2018). These insights into the inner workings of others' cognitions and beliefs become more nuanced and complex throughout middle childhood and adolescence, as we will see.

Other Aspects of Children's Conceptual Development

Along with their symbolic skills, preschool children develop specific cognitive skills. They become able to classify objects, and by the end of the early childhood period, some can even attend to changes in objects involving more than one feature at a time. They move beyond rote counting to a meaningful understanding of the concept of *number.* They also acquire an intuitive sense of the differences among fundamentally different types of concepts, such as the difference between a living dog and a toy robot made to act like a dog.

classification Grouping of objects according to standards or criteria.

Classification Skills **Classification** refers to the placement of objects in groups or categories according to some specific standards or criteria. Young preschool children, even those just three years old, can reliably classify objects that differ in just one dimension, or feature, especially if that dimension presents fairly obvious contrasts. Given a collection of pennies and nickels, a preschooler usually can sort them by color, which is their most obvious dimension of difference. Given a boxful of silverware, a young child might sort the items by type: knives, forks, and spoons. Or she might group dishes by how they are used in real life, putting each cup with one saucer rather than separating all the cups from all the saucers. These simple groupings represent cognitive advances over infancy.

reversibility Ability to return mentally to earlier steps in a problem.

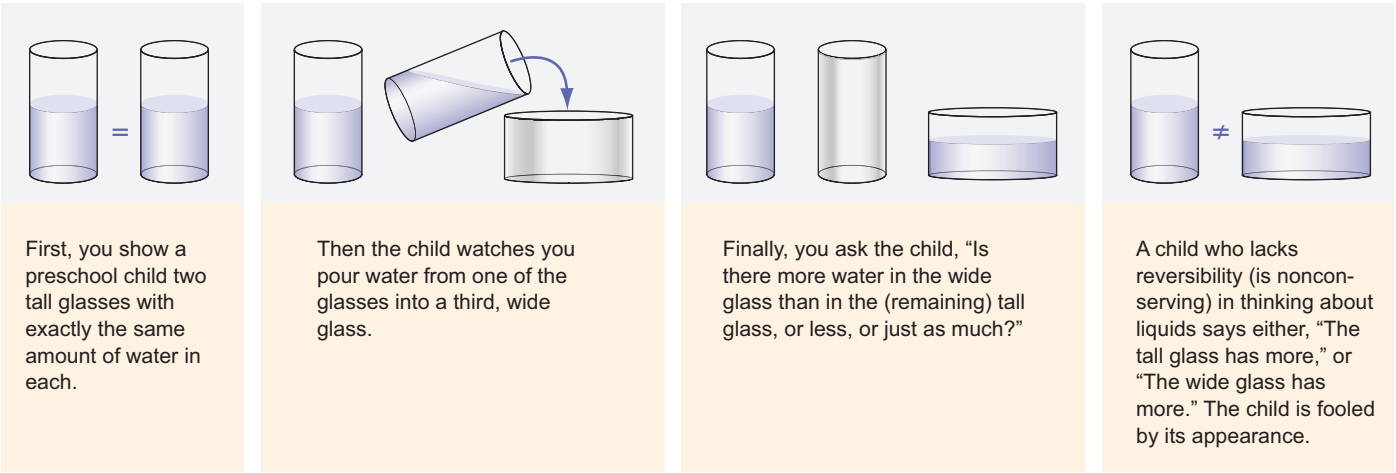
conservation A belief that certain properties (such as quantity) remain constant, despite changes in perceived features, such as dimensions, position, and shape.

Reversibility and Conservation Some classification problems require **reversibility** in thinking, or the ability to undo a problem mentally and go back to its beginning. If you accidentally drop a pile of papers on the floor, you may be annoyed, but you know that in principle the papers are all there: you believe (correctly) that the papers that have scattered can be "unscattered" if you pick them up and sort them into their correct order again. Reversibility, it turns out, contributes to a major cognitive achievement of middle childhood: **conservation**, or the ability to perceive that certain properties of an object remain the same or constant despite changes in the object's appearance. On average, children do not achieve conservation until about age six, though experience plays a role in the mastery of conservation.

To understand reversibility and conservation, consider the task shown in Figure 6.2. First, you show a preschool child two tall glasses with exactly the same amount of water in each. Then the child watches you pour the water from one of the glasses into a third, wide glass. Naturally, the water line in the wide glass will be lower than it was in the tall one. Finally, you ask the child, "Is there more water in the wide glass than in the [remaining] tall glass, or less, or just as much?"

Children younger than five years old typically say that the tall glass has either less or more water than the wide glass, but not that the two glasses are the same. According to Piaget, this happens because the child forgets the identity of the water levels seen only a moment earlier; in this sense, the child is a nonreversible thinker and cannot imagine pouring the water back again to prove the glasses' equality. Instead, the child is limited to current appearances. More often than not, a big difference in appearance leads a child to say that the amount of water changes as a result of its being poured. In Piagetian terms, the child fails to conserve, or to believe in the constancy of the amount of liquid, despite its visible changes (Inhelder & Piaget, 1958). Not until the early school years do conservation and reversibility become firmly established.

In the meantime, tasks that require conservation are affected significantly by how they are presented or described to the child. When given a series of conservation tasks, for example, a child tends to alternate conserving with nonconserving responses (Elbers et al., 1991). Why? Perhaps repeating the question makes some children believe that the experimenter wants them to change their response; after all, why else would she repeat herself? Because most children begin the conservation task by agreeing that the glasses hold equal amounts of water, obliging children may feel compelled to give nonconserving responses against their own better judgment. It seems, therefore, that children may take Piagetian tasks as social events, as well as cognitive ones. Additionally, researchers have demonstrated that if the children are responsible for the manipulation rather than simply observing it, they were much more likely to conserve (Lozada & Carro, 2016).



First, you show a preschool child two tall glasses with exactly the same amount of water in each.

Then the child watches you pour water from one of the glasses into a third, wide glass.

Finally, you ask the child, "Is there more water in the wide glass than in the (remaining) tall glass, or less, or just as much?"

A child who lacks reversibility (is nonconserving) in thinking about liquids says either, "The tall glass has more," or "The wide glass has more." The child is fooled by its appearance.

FIGURE 6.2
Conservation of Liquid Quantity
Does a child believe that liquid quantity remains constant (is "conserved"), despite changes in its shape? The method illustrated here, or some variation of it, is often used to answer this question.

The Concept of Number Like many parents, Piaget correctly noted that children do not fully grasp how the conventional number system works during the first few years of life (Piaget, 1952). Preschoolers may, of course, count, such as when a three-year-old says, "One, two, three, blast off!" before tossing a ball high into the air. But such counting, Piaget argued, lacks understanding; it essentially is a rote activity, though children as young as two or three understand the *magnitude* of numbers, which is demonstrated when a child asks for "more" or "a lot more" when a parent is doling out a treat (Ginsburg et al., 2008). To fully understand the concept of number, a child must comprehend three ideas. The first is that a one-to-one correspondence exists between items in a set and number names. The second is *cardinality,* the idea that the total number of a set corresponds to the last number named when the items are counted. And the third is *ordinality,* the concept that numbers always occur in a particular order (the second item to be counted is always called the "second," for example).

Research stimulated by these ideas about number generally has concluded that Piaget underestimated preschoolers' knowledge of number. Many four-year-olds, and even some three-year-olds, can reliably say the numbers in sequence, at least up to some modest limit such as *five* or *ten.* They also know that different sets of items should be counted with the same sequence of numbers, that each item should be counted only once, and that any set can be counted in more than one order. For this and other reasons, some psychologists have argued that children may have an innate conception of number, or at least that they can learn underlying notions of number from appropriate experiences during infancy (Case, 1998; Ginsburg et al., 2008; Kirschner, 1997). Many children understand cardinality by the age of three to five, and comprehension of cardinality can develop sooner with experience or with interventions targeted at preschoolers, the purpose of which is to ensure children are ready for formal schooling (Paliwal & Baroody, 2018).

Cognition as Social Activity

Variations in cognitive performance occur partly because young children depend on the social context or circumstances to develop new thinking skills. In spite of our stereotypes of thinking as a solitary, independent activity, children learn not only from interacting with objects and the physical environment but also from interacting with adults or others with more experience. Psychologists who study this sort of thinking often call it **situated cognition** and call their perspective **social constructivism** (Kirschner & Whitson, 1997; Rogoff et al., 1993). A parent who is cooking dinner, for example, may invite a four-year-old to help with preparations, during which the child observes and works on a number of cognitive tasks: measuring amounts for ingredients, sequencing the steps in the preparations, attending to the time needed for each task. Interactions about the tasks being pursued in common form a context, or **activity setting**, for learning (Lave, 1997). In an activity

situated cognition Thinking that occurs jointly with others and is embedded in a particular context or activity setting.

social constructivism A theory that views learning as resulting from active dialogue and interaction between an individual and his or her community.

activity settings Group situations in which a shared focus of attention and shared goals facilitates an individual's learning from others in the group.

Much cognitive change occurs because of the mutual development of meaning that happens in the "zone of proximal development," where two people focus on a common activity. In this case, the father stimulates his son to learn about cooking, and the son stimulates the father to learn about the son's growing knowledge and abilities.

Source: wavebreakmedia/Shutterstock.com.

setting, the older or less experienced individuals provide problems and activities, as well as tasks that allow a younger, less experienced person to become a legitimate—though perhaps marginal or peripheral—participant in the situation. When cooking, for example, the parent determines the menu and in other ways sets the agenda for the activity: "We will make X instead of Y tonight." The parent also provides tasks for the apprentice-cook (in this case, the child) to do. The tasks ensure that the child belongs or participates successfully, although they also provide only a marginal role for the child at first, in keeping with his or her immaturity and lack of experience with the challenges of cooking.

Viewed this way, thinking seems far less solitary than Piaget pictured it, and far more social. Children figure things out not by manipulating objects and observing the results of the manipulations but by interacting (in activity settings) with a community of people, including parents, teachers, and peers. In doing so, the young, inexperienced preschooler is able to work on problems or tasks that might prove too difficult to attempt alone; yet the support and guidance of others allow considerable success! The interactions that allow the child to succeed are sometimes called the **zone of proximal development** (or **ZPD**). The concept of the ZPD originated with the Russian psychologist Lev Vygotsky (Newman & Holzman, 1993; Vygotsky, 1978) and has created a lot of interest among developmental psychologists because it suggests ways in which knowledge and thinking skills may originate and evolve. Consider this conversation between a six-year-old girl and her grandfather, while the two sort some scrap lumber piled behind the grandfather's hardware business:

zone of proximal development According to Vygotsky, the level of difficulty at which problems are too hard for children to solve alone but not too hard when given support from adults or more competent peers.

> *Grandfather:* We have to put the spruce here and the pine over there.
>
> *Girl:* Spruce here? (Tosses one piece, but to the wrong pile)
>
> *Grandfather:* No, there. (Moves her piece to the correct pile)
>
> *Girl:* What's this? (Notices letter S scribbled in pencil on a piece)
>
> *Grandfather:* That's for *spruce.* Put it with the spruce.
>
> *Girl:* (Pondering the letter S). Spruce. OK. (Tosses piece correctly) So this is pine? (Looks at a piece with a *P* written on it)
>
> *Grandfather:* Yep. Put it over there. (The two continue sorting for a while. Girl examines each piece for letters. Eventually she finds one with no letter written on it.)
>
> *Girl:* Someone should write the name on this one. (Notices a knothole in the piece) I think it's pine.
>
> *Grandfather:* You're right about that. Here's a pencil. (Tosses her a pencil)
>
> *Girl:* (Writes *P* on the piece of scrap pine.) Know what? I can write *pine*! (Smiles) I bet I can write *spruce,* too.
>
> *Grandfather:* (Looks at the letter *P* she has written.) Yeah, says *pine* all right. You might say it says *pine.*

In this example, the grandfather (and his pile of scrap wood) provided an activity setting in which the girl learned about differences between two woods, spruce and pine, as well as a way to represent the differences with letters. Without his presence and comments, considered *scaffolding* by Vygotsky, she might not have succeeded as well in this task. On the other hand, the grandfather did not simply "teach" the girl how to sort wood or to read the letters *S* and *P,* as a teacher might conventionally do in a classroom. Instead, he provided a task needed in his world (sorting the

scrap wood is part of his business) and a way to involve the girl in the task. The interactions create a zone of proximal development for the girl. When she makes a mistake, the grandfather either simply corrects it matter-of-factly (such as when she tosses a piece in the wrong pile) or revises his own goals temporarily to fit hers (such as when she claims, mistakenly, that she has spelled the whole word *pine* using only its first letter). At the beginning of the task, the girl needs more assistance, or scaffolding. However, as the girl comes to understand and, eventually, become an expert at the task, she needs less scaffolding, or assistance.

As you might suppose, the nature of the ZPD depends on the experiences and circumstances of the child. Parents with "bookish" interests, for example, and the resources and time to provide book-related activity settings will more often provide ZPDs that encourage bookish and school-oriented skills in their children. Those with an outgoing, social disposition will provide ZPDs that encourage interpersonal interest and sensitivity in their children. Yet, reproduction of parents' priorities is not inevitable. Much also depends on how a child interprets an activity setting. An opportunity to learn to play the piano, for example, can be experienced as either attractive or boring, or as either an invitation or burdensome drudgery. What is provided is not necessarily what the child takes up or appropriates (Cobb et al., 1997; Guralnick, 2008).

Neostructuralist Theories of Cognitive Development

As the studies described so far suggest, preschoolers show considerable new strengths in using symbolic thought. They can take others' perspectives to some extent, develop a usable theory of how the human mind works, and distinguish between appearances and reality at least some of the time. Many of Piaget's classic observations on Swiss children have proven true: preschool children do have trouble focusing on two dimensions of an object at once and therefore have difficulty with conservation tasks throughout most of the preschool period. Other Piagetian observations have underestimated children's ability and stimulated research that has led to new ways of thinking about children's capacities. For example, unlike Piaget's claims, preschool children have a partial understanding of number.

Research has complicated our picture of children's cognitive development. Many psychologists have sought to keep Piaget's commitment to stagelike progressions in development and at the same time revise the content or details of those progressions (Case, 1998). Instead of proposing comprehensive, "grand" stages of thinking, as Piaget did, they argue that stages may be much more focused in content. Research based on this premise has, in fact, identified stages of spatial representation, of shapes, of mathematical ability, of patterns, and of interpersonal awareness, among others (Case, 1992; Ginsburg et al., 2008). Each of these skills seems to develop through predictable stages, but do so independently of the other domains. As individuals, children therefore show unique patterns and timing of development across many areas of thinking and skills (Wozniak & Fischer, 1993).

This newer view of cognitive stages is sometimes called **neostructuralist theory**, or *neo-Piagetian theory* because of its roots in the ideas of Piaget. As a result of focusing attention on more specific cognitive achievements, it has also paid more attention to *how,* or by what processes, children acquire new cognitive skills. One neostructuralist line of research explored the process of learning to draw by noting how it consists of the successive

neostructuralist theory
Relates to recent theories of cognition that emphasize the structure or organization of thinking.

What Do You Think?

What do you think parents of young children *believe* about preschoolers' cognitive abilities? What if you asked parents (1) how much their *children* know when *parents* are happy or upset and (2) would their children think that a clay ball was the same "amount" if it were squashed into a pancake shape? Would parents' expectations about these questions coincide with the research described in this section? If possible, interview a real-life parent or two to test your prediction.

coordination of simpler skills (Dennis, 1992). Natalia begins her first year of life able to visually track objects as well as reach for objects. With practice, by the time she reaches age two, Natalia has learned to coordinate these two schemes into a single cognitive skill that enables scribbling. As she continues to practice with this newly consolidated scheme, she begins coordinating it with other, more advanced schemes, such as *comparing* scribbles with the orientation and edges of the paper. When tracking edges of a paper and tracking scribbles eventually become coordinated, Natalia can finally begin controlling lines and curves. Now the stage is set for her first representational drawings, such as stick-figure people.

From the neostructuralist perspective, then, cognitive development during early childhood is not all of one piece when it unfolds but has many components—many forms of thinking, as well as perceptual and language developments. As a result, it is important to understand each piece separately from the others and to combine them to get a well-rounded picture of young children. Therefore, in the next section we look at another major piece of the puzzle of children's thinking: language acquisition.

Language Acquisition in the Preschool Years

For most children, language expands rapidly after infancy. They learn words, form ever-longer sentences, and engage in more-complex dialogue. Fairly early in the preschool years, most children have mastered the basic sounds, or *phonology,* that make their first language meaningful and distinctive. They have also made a good beginning at acquiring a vocabulary of single words. We described both of these achievements in Chapter 4 in connection with infants' cognitive development. Now, during early childhood, children's most striking achievements involve *syntax,* or the way the child organizes utterances, and *pragmatics,* or knowledge about how to adjust utterances to the needs and expectations of different situations and speakers. As it turns out, these twin achievements show both diversity and uniformity across children, and therefore, they raise important questions about language acquisition and how parents and other caregivers can influence it. In this section, we look at these questions, beginning with preschoolers' achievements in the area of syntax.

The Nature of Syntax

syntax Rules for ordering and relating the elements of a language.

The **syntax** of a language is a group of rules for ordering and relating its elements. Linguists call the elements of language *morphemes. Morphemes* are the smallest meaningful units of language; they include words as well as a number of prefixes and suffixes that carry meaning (the /s/ in *houses* or the /re/ in *redo)* and verb-tense modifiers (the /ing/ in *going*).

Syntactic rules operate on morphemes in several ways. Sometimes, they mark important relationships between large classes or groups of words. Consider these two pairs of sentences:

1a. Roberto helped Barbara.	1b. Barbara helped Roberto.
2a. Frank helps Ruije.	2b. Frank helped Ruije.

These sentences differ in meaning because of syntactic rules. In the first pair, a rule about the order, or sequence, of words tells us who is giving the help and who is receiving it: the name preceding the verb is the agent (the helper), and the name following the verb is the recipient (the "helpee"). In the second pair, the morphemes /es/ and /ed/ tell something about when the event occurred; adding /es/ to the end of the word signifies that it is happening now, but adding /ed/ means it happened in the past. These rules, and many similar ones, are understood and used by all competent speakers of the language. Unlike textbook authors, however, the speakers may never state them and may be only barely aware of them.

Unfortunately, for a child learning to talk, some syntactic rules have only a small range of application, and still others have irregular exceptions. Most words, for example, signal pluralization (the existence of more than one) by having an /s/ or /es/ added at the end; *book* means one volume, and *books* means more than one. But a few words use other methods

to signal the plural. *Foot* means one, and *feet,* not *foots,* means more than one; *child* means one and *children* more than one; and *deer* can mean either one animal or several.

Thus, in acquiring syntax, a young child confronts a mixed system of rules. Some apply widely and regularly, and others apply narrowly and exceptionally. Added to these complexities is the fact that the child often hears utterances that are grammatically incomplete or even incorrect. Somehow, they must sort these out from the grammatically acceptable utterances while at the same time trying to sort out the various syntactic rules and the contexts for using them.

Beyond First Words: Semantic and Syntactic Relations

Before age two, children begin linking words when they speak. Initially the words seem to be connected by their *semantic relations,* or the meanings intended for them, rather than by *syntactic relations,* the relations among grammatical classes of words such as nouns, verbs, and adjectives. This is particularly true when the child is still speaking primarily in two-word utterances (sometimes called *duos).* As the mean length of a child's utterances increases to three words and more, syntactic relations become much more noticeable.

Duos and Telegraphic Speech These ideas were documented in a classic set of three case studies of early language acquisition by Roger Brown (1973). When the children Brown observed were still speaking primarily in two-word utterances, their utterances were organized around eight possible semantic relationships; these are listed in Table 6.5, along with examples. The meanings of the utterances were determined by the intended relationships among the words, and the intentions of the preschool speakers often were discernible only by observing the context in which the utterances were made. "Mommy sandwich" could mean "the type of sandwich Mommy usually eats," or "Mommy is eating the sandwich," or "Mommy, give me a sandwich," all depending on the conversational context.

The reason for the ambiguity is that two-word utterances leave out indicators of syntactic relationships. One syntactic indicator is word order: due to word order, "the boy chased the girl" means something different than "the girl chased the boy." Children who still speak in duos do not use word order randomly, but they do tend to be less predictable about it than more linguistically mature children, whose utterances can be several words long. Another indicator of syntactic relationships is inflections, prepositions, and conjunctions. An older child will add *'s* to indicate possession (as in "Mommy's sandwich")

TABLE 6.5 Semantic Relations in Two-Word Utterances

A child's earliest utterances are organized not according to adultlike grammar but according to particular semantic or meaning-oriented relationships such as those listed in this table. Often the intended, underlying relationships are ambiguous and can be discerned only by an attentive, observant adult at the time of the utterance.

Relationship	Example
Agent + action	Baby cry
Action + object	Eat cookie
Agent + object	Marta cookie
Action + locative (location)	Jump stair
Object + locative	Teddy bed
Possessor + possessed	Mommy sandwich
Attribute + object	Big dog
Demonstrative + object	There Daddy

and use words such as *in* and *on* to indicate location (as in "jump on the stair"). Leaving these indicators out makes the speech sound stilted and ambiguous; therefore, it is also called **holographic speech** or *telegraphic speech*—presumably because it sounds like a telegram. Telegraphic speech is characteristic of children's first efforts to combine words (around eighteen months to two years), but it can persist well after children begin using longer, more syntactic utterances some of the time.

holographic speech When a single word is used to communicate a thought, such as when a child says "up" instead of "pick me up."

Regularities and Overgeneralizations After highly individual beginnings, certain aspects of syntax develop in universal and predictable patterns. English-speaking children have a tendency to know more nouns than verbs, a bias that is not as marked among children learning languages such as Korean or Mandarin. In many Asian languages, verbs end sentences, likely making them "stick out" to the children (Hoff, 2008). The present progressive form *-ing* occurs quite early in most children's language, the regular plural morphemes *-s* and *-es* somewhat later, and articles such as *the* and *a* still later (Hoff, 2008; Marcus et al., 1992).

At a slightly older age, most English-speaking children begin using auxiliary verbs to form questions, but they do so without inverting word order, as adults normally do. At first, a child will say, "Why you are cooking?" and only later "Why are you cooking?" This suggests that language acquisition involves more than just copying adult language; after all, adults rarely model incorrect forms. To a certain extent, children's language seems to compromise between the new forms children hear and the old forms they already can produce easily.

Sometimes, in fact, early syntax becomes *too* regular, and children make **overgeneralizations**. Around age three, preschool children often make errors, such as always adding *–ed* to indicate past tense, even when it is not appropriate as in the sentence: "I runned faster than Maddie." The child uses the wrong but more regular form as opposed to the correct but irregular forms of an earlier age. Usually by early school age, they shift back again, although not necessarily because anyone teaches or forces them to do so. Apparently, their overgeneralizations represent efforts to try out new rules of syntax that they have finally noticed.

overgeneralizations When children use common rules of speaking in all situations, even when inappropriate, such as adding *–s* to indicate a plural form such as, "Do you see all the deers?"

The Predisposition to Infer Grammar As these examples suggest, and as research confirms (Marcus et al., 1992), young children seem to infer grammatical relationships, rather than simply copy others' speech. The tendency was first documented about sixty years ago in a research study by Hilda Berko (1958), but it is still used in many current tests of children's language development (Brindle, 2015; McDaniel et al., 1996). Instead of asking children about real words, the experimenter in Berko's classic study showed them pictures of imaginary creatures and actions that had nonsense words as names. With one picture, a child was told, "Here is a wug." Then he was shown two pictures and told, "Here are two of them. Here are two ____." Most children, even those as young as two and a half, completed the sentences with the grammatically correct word, *wugs.* Because they could not possibly have heard the term before, they must have applied a general rule for forming plurals, one that did not depend on copying any language experiences specifically but came from inferring the underlying structure of many experiences taken together. The rule most likely operated unconsciously because these children were very young indeed.

The Limits of Learning Rules Preschoolers' skill at acquiring syntactic rules, however, obscures a seemingly contradictory fact about the acquisition of syntax: much syntax must be learned by rote. As we have pointed out, most children use irregular forms (such as *foot/feet*) correctly before they shift to incorrect but more regular forms. The most reasonable explanation for the change is that they pick up the very first sentence forms simply by copying, word for word, the sentences they hear spoken. Presumably, they copy many regular forms by rote, too, but the very regularity of these forms hides the haphazard, unthinking way in which children acquire them.

Although children eventually rely on rule-governed syntax, they probably still learn a lot of language by rote. Many expressions in a language are *idiomatic,* meaning they bear

no logical relation to normal meanings or syntax. The sentence "How do you do?", for example, usually is not a literal inquiry as to how a person performs a certain action; and the sentence "How goes it?", meaning "How is it going?", does not even follow the usual rules of grammar. Because words and phrases such as these violate the rules of syntax and meaning, children must learn them one at a time.

Mechanisms of Language Acquisition

Exactly how do children learn to speak? For most children, several factors may operate at once. In general, current evidence can best be summarized as follows: language seems to grow through the interaction of an active, thinking child with certain key people and linguistic experiences. The preceding sections describe in part this active, thinking child; the upcoming sections describe some possible key interaction experiences.

Reinforcement A commonsense view, one based essentially on behaviorist principles, is that children learn to speak through reinforcement. According to this idea, a child's caregivers reinforce vocal noises whenever they approximate a genuine word or utterance, and this reinforcement causes the child to vocalize in increasingly correct (or at least adultlike) ways (Skinner, 1957). In the course of babbling, an infant may happen to say "Ma-ma-ma-ma," to which his proud parent smiles and replies cheerfully, "How nice! You said 'Mama'!" The praise reinforces the behavior, so the infant says "Ma-ma-ma-ma" more often after that. After many such experiences, parents begin to reinforce only closer approximations to *mama,* leading finally to a true version of this word. The process would be an example of *shaping,* discussed in Chapter 2 in connection with behavioral/learning theory.

Among preschool children, the same process could occur if parents reinforced correct grammatical forms and ignored or criticized errors or relatively immature utterances. Parents might respond more positively to the sentence "I have three feet" than to the sentence "I have two foots." According to the principles of reinforcement (see Chapter 2), the child would tend not only to use the correct version more often but also to generalize the correct elements of this sentence to other, similar utterances.

Analysis of conversations between parents and children confirms this possibility, at least in indirect form and for the early stages of language acquisition. One study compared parents' responses to simple but grammatical sentences made by their two- and three-year-old children to their responses to ungrammatical utterances (Penner, 1987). Parents did not correct their children's grammar directly, but they were more likely to elaborate on the child's topic if the utterance was a grammatical one.

Imitation and Practice In some sense, children obviously must imitate their native language to acquire it. This is an idea borrowed from the social learning variety of behaviorism. In daily life, though, the process of imitation is subtle and often indirect. Children do not imitate everything they hear, but most copy certain selected utterances, often immediately after hearing them. Sometimes the utterances chosen for imitation involve familiar sentence forms that contain new, untried terms, and sometimes they contain familiar terms cast into new, untried forms. The imitated terms and forms return later in the child's spontaneous speech. At first, these utterances resemble the rote learning mentioned earlier, and they seem to help the child by emphasizing or calling attention to new morphemes and syntax.

Imitation may also help children acquire language by initiating playful practice with new expressions. The child in essence plays around with the new forms she learns and in doing so consolidates her recently acquired knowledge, just as she does in other forms of play, such as those discussed in

Much learning happens through imitation and practice. This girl sees both reading and social skills demonstrated by her fathers and then practices the same skills herself.
Source: Andrey Zhorov/Shutterstock.com.

Chapter 7. Because quite a bit of language play remains unobserved by adults, its extent is hard to judge, but a lot obviously does go on even in children as young as two years (Messer, 1994). Children ages eighteen to thirty months who had older siblings on the autism spectrum demonstrated delays in communication, language, gesturing, and social skills, suggesting that such imitation may be maladaptive as well (Toth et al., 2007).

Innate Predisposition to Acquire Language: LAD

The ease and speed children show in acquiring language have caused some linguists and psychologists to conclude that children have an innate predisposition, or built-in tendency, to learn language (Chomsky, 1994). For convenience, the innate tendency is sometimes called the *language acquisition device,* or *LAD.* According to this viewpoint, LAD functions as a kind of inborn road map to language. It guides the child to choose appropriate syntactic categories as they try to figure out the comparatively confusing examples of real speech that is ordinarily heard. It helps a child find their way through the mazelike structure of language with relatively few major errors instead of having to explore and construct their own language map, as the Piagetian viewpoint implies.

One reason for postulating the LAD is the *poverty of content* in the speech to which most infants and preschoolers are exposed. According to this argument, the language children encounter is too incomplete and full of everyday grammatical errors (too "impoverished") to serve as a satisfactory guide in learning the grammatical structure of the language (Baker, 1995). Parents sometimes speak in incomplete sentences, sometimes make grammatical errors, and sometimes do not speak at all when speaking might prove helpful to a child learning the language. However, children who hear a wider variety of words have larger vocabularies that grow more quickly than children who hear fewer, more simple vocabularies (Hoff, 2008).

Other arguments for LAD are that there are particular areas localized in the left hemisphere of the brain that specialize in processing and producing language. Also, children develop language with the same sequence and the same general timing regardless of native language, including sign language. Additionally, preschool children do not simply copy their parents' language directly, yet they seem to figure out and use many of its basic syntactic relationships remarkably well. Berko's "wug" experiment discussed earlier illustrates this ability dramatically. In forming plurals they have never heard spoken before, children seem to demonstrate a grammatical skill that is more innate than learned.

The Limits of LAD Although this evidence suggests that children have a built-in ability to acquire language, it does not show that experience plays no role at all. Preschoolers hear others speak and respond to others verbally. Children's experiences also affect the version of language they acquire, even when they supposedly grow up in the same language community. Children vary in the vocabulary they learn and in the grammar they use; even by age three or four, children often do not define grammatical categories as abstractly as adults do or necessarily in the same way other children do. Most preschoolers eventually revise their grammatical categories to coincide with conventional adult grammar, thus obscuring their individuality. But as we will see in Chapter 8, large differences persist in older children's styles of communicating, even after they have mastered the basic structure of language.

All things considered, the fairest conclusion we can draw is a moderate one: that children are both predisposed to acquire language and in need of particular experiences with it. Skill with language is neither given at birth nor divorced entirely from cognitive development or social development. A special talent for language may be given to all children, and crucial experiences for developing that talent may happen to occur rather frequently among infants as they grow up. However, it is important to note that not all infants or preschoolers have the same opportunities for such experiences, as we will see. For example, research has demonstrated that children who come from lower SES households tend to hear fewer words and have blunted academic achievement (Golinkoff et al., 2015; Pace et al., 2017).

Parent-Child Interactions

Certain kinds of verbal interactions apparently help children acquire language sooner and better. Parents can help by speaking in relatively short sentences to their preschoolers and using more concrete nouns than pronouns, though this also depends on whether the task or topic at hand calls for concrete or abstract ideas (Hoff-Ginsberg, 1997). For children under the age of eighteen months, parents can make sure that they respond to children's speech with information that relates to what the child is doing or experiencing (Hoff, 2008). In fact, interventions focused on this type of caregiver speech about what the child is doing or focused on has been found to improve language abilities in at-risk children through the first eighteen months of life (McGillion et al., 2017). In the following pair of comments, the first helps a child learn language more than the second does:

> *Parent 1:* Take your shoes off. Then put your shoes in the closet. Then come kiss Mama goodnight.
>
> *Parent 2:* After you take off your shoes and put them in the closet, come kiss me goodnight.

As we noted in Chapter 4, the simplified style of the first set of comments is one aspect of a version of language called **infant-directed speech**, or sometimes "motherese." Another aspect of this version is the use of a high-pitched, happy voice, often paired with facial expressions that are exaggerated (Golinkoff et al., 2015). Infant-directed speech is used intuitively by adults with young children and even by older children with younger children (Messer, 1994).

infant-directed speech The style or register of speech used by adults and older children when talking with a one- or two-year-old infant.

One of the most helpful kinds of verbal interactions is *recasting* a child's utterances: repeating or reflecting back what the child says, but in slightly altered form. For instance:

> *Child:* More milk.
>
> *Parent:* You want more milk, do you?

Recasting helps because it highlights slight differences among ways of expressing an idea. In doing so, it may make the child more aware of how she expresses her idea—its form or organization—as well as call attention to the idea itself.

Most of the techniques for stimulating language development provide young preschoolers with a framework of language that simultaneously invites them to try new, unfamiliar language forms and simplifies and clarifies other aspects of language. Some psychologists call this framework *scaffolding* (Bruner, 1996; Reeder, 1996): like real scaffolds used in building construction, parents' language scaffolds provide a temporary structure within which young children can build their own language structures. As such, it functions much like Vygotsky's zone of proximal development mentioned earlier: helpful scaffolding changes and grows in response to the child's continuing development, always building a bit beyond the child's current independent abilities but never very far beyond. These and similar findings have been translated into curricula for education of young children, particularly for those learning English as a second or third language (Proctor et al., 2007) and even of infants (Spodek & Saracho, 1993). Fortunately, the most useful methods of interaction often are those that parents and teachers use intuitively anyway; training for them therefore really consists of emphasizing and refining their use.

What Do You Think?

Suppose that you were asked to speak to a parent group, and a parent complained about her four-year-old's use of poor grammar. What advice could you give to this parent? Rehearse your comments with a classmate to determine how appropriate they are.

Language Variations

Not surprisingly, parents vary in how they talk to their children, and these differences may influence the version of language children acquire as they grow up. It is unclear, however, how language variations affect other aspects of children's development, such as thinking ability. Let's consider three other sources of language variation: gender, socioeconomic status (SES), and hearing ability.

Gender Differences in Language

Within any one community, girls learn nearly the same syntax boys do, but they acquire very different pragmatics, or discourse patterns. Overall, the differences reflect society's gender stereotypes. For example, girls phrase requests indirectly more often than boys do; girls more often say, "Could you give that to me?" instead of "Give me that." Also, they more frequently expand on comments made by others, rather than initiating their own. These differences appear especially in mixed-gender groups and are noticeable not only among adults but also among children as soon as they are old enough to engage in conversation (Coates, 1993; Coates, 2015).

The genders reinforce their language differences with certain nonverbal gestures and mannerisms. Girls and women tend to maintain more eye contact than boys and men do; they blink their eyelids at more irregular intervals and tend to nod their heads as they listen (Arliss, 1991). Boys and men use eye contact less in ordinary conversation, blink at regular intervals, and rarely nod their heads when listening.

Gender differences in discourse patterns may contribute to gender segregation: members of each gender may feel that members of the other gender do not really understand them, that they do not "speak the same language." Boys and girls therefore begin drifting apart during the preschool years, almost as soon as they begin using language (Ramsey, 1995), possibly due in part to acquiring language. The emerging segregation, in turn, reinforces gender differences in language patterns (Fagot, 1994). Boys reinforce one another for their assertive discourse style, and girls and their (mostly female) teachers reinforce one another for their "considerate" style. In the end, then, cognitive development supports social development, and social development supports cognitive development.

Socioeconomic Differences in Language

Most research has found low-SES children to be less skilled in using formal, school-like language than middle- or high-SES children (Golinkoff et al., 2015; Heath et al., 1991; Pace et al., 2017). Research also shows that low-SES children are up to a year behind their higher-SES peers by the age of four, due in part to the infrequency with which they hear adults with large vocabularies speak (Hoff, 2008). In practice, this means low-SES children perform less well in verbal test situations, but outside of those situations, their language differences are less clear-cut. These facts have created controversy about the importance of socioeconomic differences in language development.

What is the significance of socioeconomic differences in tests of language development? Some psychologists point out that most tests of language skills favor middle-SES versions of English in both vocabulary and style of *discourse,* or conversational patterns (Gopaul-McNicol & Thomas-Presswood, 1998; Miramontes et al., 1997), and that several popular verbal intelligence scales confound actual verbal ability with socioeconomic status (Chapman et al., 2014). This bias is due to the content selected for individual test questions and to the ways tests are normally conducted. A question on one of these tests might ask children to describe a dishwasher, but few low-SES families own this appliance. Other questions might draw on experiences that only middle-SES children usually enjoy, such as trips on airplanes or visits to museums.

Perhaps most important, middle-SES families use styles of discourse that include many "test" questions or questions to which parents already know the answers. At the dinner table, parents may ask their preschooler, "What letter does your name begin with?" even though they already know the answer and their child knows that they know. Exchanges

such as these probably prepare young children for similar exchanges on genuine tests by making testing situations seem more natural and homelike.

In contrast, low-SES children more often lack prior experience with "test" question exchanges. They can give relatively elaborate answers to true questions such as "What did you do yesterday morning?" when the adult really does not know the answer. But they tend to fall silent when they suspect the adult already can answer the question (for example, "What are the names of the days of the week?"). Their silence is unfortunate because rhetorical, or "test," questions become especially common when preschoolers enter school and because active participation in questioning and answering helps preschoolers' learning substantially.

Language of Deaf and Hard of Hearing Children

Children with hearing impairments often do not develop oral language skills as fully as other children do, but they are quite capable of acquiring a language of gestures, which for American English is called **American Sign Language (ASL)**. In fact, language development in ASL children provides much of the reason for considering ASL a true language, one as useful for communication as any verbal language, such as English.

American Sign Language (ASL) System of nonverbal gesturing that is used by many people in the United States who are deaf or hard of hearing and that functions as a language.

How can this be so? Signing consists of subtle gestures of the fingers and hands made near the face. In general, each gesture functions like a morpheme. For example, holding the fingers together gently (which signers call a "tapered *O*") can mean either *home* or *flower,* depending on whether it is placed near the cheek or under the nose. Other sign-morphemes affect the syntax of expressions: gestural equivalents of *-ing* and *-ed.* Individual signs are linked according to syntactic rules, just as in English. After some practice, signers can "speak" (or gesture) as quickly and effortlessly as people who use English can.

What happens to infants and young children with hearing impairments who grow up learning ASL from their parents as their first language? Studies show they experience the same steps in signing development that speaking children do in language development. At about the age when infants babble, signing children begin "babbling" with their hands, making gestures that strongly resemble genuine ASL signs but that signers recognize as gestural "nonsense" (Marschark, 1993). As with verbal babbling, signing infants apparently engage in gestural babbles playfully when waking up in the morning or going to sleep at night.

When signing infants reach ages two and three, they experience a phase of one-word signing similar to the holophrases often observed among speaking children. They also experience two-word, telegraphic signing. As with speech, their signs at this point often omit important syntactic gestures and do not follow the usual conventions of word order (or, in this case, signing order) (Bellugi et al., 1993; Goldin-Meadow, 2008). Signing vocabulary increases rapidly during the early preschool period, in amounts comparable to the increases speaking children experience. Even the kinds of words acquired parallel those speaking children acquire; signing preschoolers tend to learn signs for dynamic, moving objects first, as is true for speaking children. The "Working With" interview with preschool teacher Carolyn Eaton describes some of these developments.

Still another reason to consider ASL a true language comes from observations of hearing preschoolers whose parents purposely used both English and ASL during the period when the children normally acquired language (Prinz & Prinz, 1979). During their preschool years, these children became thoroughly bilingual, using ASL and English interchangeably. Especially significant, however, were their patterns of language development, which essentially paralleled those shown by conventionally bilingual children. A clear example concerned vocabulary. Like verbal bilinguals, these children first acquired a single vocabulary that intermingled elements from both ASL and English but included few direct translations. If children understood and used the sign for "tree," they would

Sign language has the qualities of oral language, including grammar, subtlety, and expressiveness. This mother and child are communicating about the child's day at school. Unfortunately, in hearing communities (such as classrooms), it can be hard to appreciate the capacities of sign language.
Source: fizkes/Shutterstock.com.

WORKING WITH Carolyn Eaton, Preschool Teacher

Introducing Sign Language to Young Children

Carolyn Eaton teaches in a nursery school that serves only children who are deaf or hard of hearing. Everyone in the school communicates in American Sign Language (ASL): teachers, the children themselves, and (as much as possible) the parents. When they start the program, the children and parents often know very little ASL.

Kelvin: *How do they acquire this new language? Carolyn talked about some of the ways.*

Carolyn: In a lot of ways, the program really looks like any other nursery program, though maybe one with a lot of language emphasis. We always have a theme for the week. That's how we organize the vocabulary, the signs.

Kelvin: *Can you give an example of a theme?*

Carolyn: Last week's theme was "The Three Little Pigs." I told the story in ASL and read a picture book—one of the children had to hold it because I needed two hands to sign with. I emphasized key signs, like the ones for pig and three and the signs for brick, and straw, and house. I invited the children to make those signs with me when I came to them in the story.

Kelvin: *Do you do other things related to the week's theme?*

Carolyn: We'd have other conversations—in ASL, of course—about pigs and animals. And about trusting strangers, for that matter—that's in that story too! We might act out the story at some point, with signs instead of words. It depends partly on the vocabulary and fluency of the children.

Kelvin: *Is it harder to understand preschoolers' signing than adults'?*

Carolyn: It varies with the child, just like oral language. Most three- and four-year-olds tend to use less complex sign vocabulary and simpler expressions than adults. I found it hard at first to simplify my signing appropriately, the way you simplify oral language for young hearing children. There's a signing equivalent of "motherese" that you have to learn, or you won't be understood.

Kelvin: *I noticed a parent today in the class signing to the kids. Does that happen a lot?*

Carolyn: We have a parent volunteer just about every day. Because not all parents can volunteer, we have the kids take home a page each day that describes what's going on in the class and shows drawings of the signs we're currently emphasizing. We encourage the parents to learn

(*continued*)

be unlikely to understand and use the spoken word *tree.* The children eventually acquired translations and thus finally possessed duplicate vocabularies. But acquiring duplicate terms took several years, just as it does with verbally bilingual children. Moreover, this is why it is important for infants who are born unable to hear or are hard of hearing to be exposed to both signed and verbal language, particularly if they might be eligible and choose to have a cochlear implant; they need to have the foundation for both languages in order to improve fluidity in both languages (Lavine et al., 2016).

Language Deficits or Language Differences?

Although we have presented gender differences, socioeconomic differences, and American Sign Language as variations on language development that are equally worthy, society as a whole does not always agree with this assessment. In certain situations, each variation tends to be considered unsatisfactory, and the speaker (or, for ASL, the signer) may be considered deficient in linguistic or cognitive ability. The discourse patterns associated with females are often considered less satisfactory for learning and discussing mathematics, for example, than the discourse patterns associated with males (Walkerdine, 1997). In school, therefore, some girls are more likely to be judged less competent in math than they really are. Students with a language background other than English, whether it is Spanish, ASL, Arabic, or something else, are at risk for being considered "unintelligent" simply because they cannot communicate fluently in the particular land of language—white middle-class oral and written English—that historically has dominated schooling at all levels. Language biases pose a challenge for anyone who works with children professionally

WORKING WITH Carolyn Eaton, Preschool Teacher

Introducing Sign Language to Young Children *continued*

them and use them at home. We also run two signing classes for the families of the preschoolers to help them communicate with their signing child.

Kelvin: *Is it hard for them to learn?*

Carolyn: Like everything else, people vary a lot. Some start learning immediately as soon as they learn that their child will always be deaf, and they're fluent by the time the child is a toddler. Others still haven't learned by the time the child is in grade school.

Personally, I think it has a lot to do with how accepting the parents are of the child's hearing impairment. If they're still grieving over the child's loss, they make less progress at ASL.

Kelvin: *Your program does seem language oriented—ASL oriented, that is.*

Carolyn: It really is, though we also deal with all the other stuff that happens to children—friendships among peers, for example. Did you see that argument between two kids that was going on just as you were arriving today?

Kelvin: *It looked fierce, judging by the children's faces. What was it about?*

Carolyn: Well, Billy wrecked a roadway that two other kids had made in the sand table. They were upset, signed Billy to get lost, and that got Billy upset. That's when I stepped in.

Kelvin: *I noticed how intently you were looking at Billy when you gave him a "talking to."*

Carolyn: I sure was—but in all ASL conversations, not just scoldings, you have to look to see the signs. You get good at reading people's moods that way too, especially if you learn signing as early as these children did.

What Do You Think?

1. Judging by Carolyn's comments, how does the acquisition of ASL resemble the acquisition of oral language? How does it differ?
2. Among speech-language pathologists and Deaf people generally, there has been heated debate about whether to emphasize ASL experiences, even if they sometimes segregate children from the hearing community, or to emphasize oral language experiences, even if hearing-impaired children have trouble acquiring them. How might you decide between these alternatives? Compare your thoughts on this issue with one or two classmates' thoughts.

(Gopaul-McNicol & Thomas-Presswood, 1998). However, as we will see in Chapter 8, where we look further at bilingualism and its effects, there are ways to overcome language biases and to honor the diversity and talents of all children.

Early Childhood Education

Developing cognitive skills influence an important experience for many preschool children: early childhood education. Programs for three- and four-year-olds take many forms. Look at these experiences:

- Juan goes to *family day care* for three full days each week. His care occurs in his caregiver's home, with only four other children.
- Denzel goes to a *childcare center* full time, five days a week. The center consists of two rooms modified from a church basement. About twenty children attend the center and are cared for by four adults.
- Srilakshmi goes to a part-time *nursery school* four mornings per week. There are twelve children and two adults.

Early Education and Cognitive Theories of Development

As with the diversity of these childcare arrangements, there is diversity in the developmental perspectives guiding the arrangements. Some programs draw heavily on Piaget's ideas about cognitive development, especially the notion that children construct knowledge by

What Do You Think?

How do you think early childhood teachers should respond to language variety in preschoolers? Should they encourage it, discourage it, or simply accept it? This is an important issue in education and would make for a lively debate in class!

interacting with the environment actively (Marlowe, 1998). They provide sensorimotor activities, such as sand and water play, as a basis for fostering preoperational activities such as make-believe play. Other programs organize cognitive activities around structured materials, which teachers guide children to use in particular ways. Nurseries and centers inspired by Maria Montessori (Cuffaro, 1991; Montessori, 1964; Lillard, 2012) may give children sets of cylinders graded by size and designed to fit snugly into a set of size-graded holes in a board. A child experiments with the cylinders and holes to discover the best way to fit them.

Still other early education programs borrow from Vygotsky's views of cognition as originating in social and cultural activities. These programs emphasize cooperative problem-solving activities and *emergent literacy,* a way of introducing reading and writing by situating it in everyday, valued experiences (Morrow, 1996). For example, instead of teaching children to recognize letters or familiar words at a special time each day, the early childhood teacher might simply provide a classroom rich in print materials and encourage children to initiate learning with the teacher. Some Head Start programs also have found success including well-organized age-appropriate activities centered around science, technology, engineering, and math (STEM) skills (Aldemir & Kermani, 2017).

Effectiveness of Early Childhood Education

Evaluations of early childhood programs suggest that a wide range of approaches, including those just mentioned, are about equally effective in promoting overall cognitive growth, although the choice of curriculum does seem to influence *the pattern* of skills children acquire (Aldemir & Kermani, 2017; Lillard, 2012; Schweinhart et al., 1993).

Three factors seem to underlie successful early childhood programs, whatever their format and curriculum. First, the staff members of successful programs regard themselves as competent observers of children's educational needs and as being capable of making important decisions in tailoring a curriculum to particular children. Second, the vast majority of successful programs and teachers view an early childhood curriculum as an integrated whole, rather than as consisting of independent subject areas or skills. Singing a song, for example, is not just "music"; it also fosters language development, motor skills (if the children dance along), arithmetic (through counting and rhythm), and social studies (if the words are about people and life in the community).

Third, successful early childhood programs involve parents, either directly as volunteers in the classroom or indirectly as advisers on governing boards, in certain school activities, or in additional services that support families. The federally sponsored program of early education called *Head Start,* for example, owes much of its effectiveness to parent involvement, which benefits both the children and parents involved (Ames, 1997; Ansari & Gershoff, 2016; Love et al., 2008). To get federal funding, local centers are required to create parent advisory boards to guide policy and practice at the centers. They are also encouraged to provide other family support services, such as parent support groups and dental screening for children.

Cultural Diversity and Best Practice in Early Education

A careful look at successful programs for young children raises an important question: are there "best" ways to support children's learning despite the cultural and individual diversity among children? A major professional association for early childhood education, the National Association for the Education of Young Children (NAEYC), argues that

TABLE 6.6 Developmentally Appropriate Practices with Preschoolers

Principle	Examples
Caregivers provide ample space for active play.	Program has access to outdoor space or gymnasium with climbing apparatus, tricycles, etc.
Caregivers allow children choices in activities.	Classroom has several learning centers: dramatic play (dress-up), block building, books and reading area, art area, etc.
Caregivers provide long periods of uninterrupted time.	Group transitions (e.g., from indoor to outdoor activities) are kept to a minimum. Activities tend to begin and end individually.
Activities and materials are relevant to children's experiences.	Books are gender fair and culture fair, represent children with different abilities, and represent various family structures. Various cultural holidays are noted and celebrated through appropriate activities in class.
Caregivers ensure that the environment is safe and free of hazards.	Climbing apparatus has soft mats underneath (if indoors) or soft sand (if outdoors). Furniture is sturdy. Sharp objects (knives, scissors) are supervised carefully when used.

Source: Adapted from Bredekamp & Copple (1997).

there are and has described its recommendations in detail in an influential book called *Developmentally Appropriate Practice: Birth to Age Eight* (Bredekamp & Copple, 1997; Copple & Bredekamp, 2009; Gestwicki, 1995). **Developmentally appropriate practices** are ways of assisting children's learning that are consistent with children's developmental needs and abilities. Table 6.6 lists a few of the practices recommended by the NAEYC as they relate to the preschool years.

developmentally appropriate practice Methods and goals of teaching considered optimal for young children, given current knowledge of child development.

The NAEYC recommendations seem reasonable in many ways. Who can object, for example, to providing children with choices for their preschool play or to supporting their dialogues and initiatives with comments from the teacher or caregiver? Yet cross-cultural comparisons of early childhood programs complicate the picture somewhat by revealing that some practices in early education in North America are really culture bound rather than universally beneficial to children.

In Japan, for example, early childhood programs are more likely to value large-group activities (such as singing or putting on a skit) in the belief that such activities develop commitment to the child's community—in this case, the community of the classroom (Kotloff, 1993). The time given to large-group activities, however, probably would seem excessive to some preschool educators in North America, where the development of individual initiative is more highly valued.

In Italy, early childhood programs emphasize involvement of parents much more heavily than do most North American programs (Edwards & Kutaka, 2015). They also place children in permanent groups from their entrance at age three until they leave the program for public school at age six. Over recent decades, societal changes, such as higher divorce rates, increasing numbers of women working outside the home, and economic difficulties, have challenged the early childhood care systems, but Italian culture persists in supporting these programs (Edwards & Kutaka, 2015).

These comparisons suggest that the best practices in early education may need to take account of cultural differences and values regarding children's development (Mallory &

What Do You Think?

Is early childhood education a "social" or a "cognitive" activity? Decide what you think about this question. Then, if you can, talk about it with one or two experienced teachers of young children. How does your opinion compare to theirs?

New, 1994). For programs in ethnically diverse societies such as the United States, this means more than including songs and brief mentions of the holidays of various cultural groups. The central values and attitudes of cultural groups served by a particular center or nursery school must find their way into the daily activities of the program. Particular centers, therefore, will experience cultural diversity in different ways.

As the "A Multicultural View" feature shows, in these culturally diverse programs, cognition, or thinking, can take on diverse meanings. Educators who work with young children therefore need to do more than understand preschool cognition: they also need to

A Multicultural View

Parents' Beliefs about Intelligence: A Cross-Cultural Perspective

In our society, parents mean particular things when they refer to children's *intelligence:* they are usually talking about a child's verbal skills and reasoning abilities, especially as they occur in school or school-like tasks. This view of intelligence is so deeply grounded in our culture that an entire psychological field has developed to measure it, complete with standardized "intelligence" tests and experts to help teachers and parents interpret the tests.

But not all societies think of intelligence in this way. The Kipsigis in East Africa frame the idea of intelligence rather differently, placing it more explicitly in its social context (Harkrtess & Super, 1992). They speak of a child being *ng'om,* meaning not only verbally skilled and sociable but also responsible to others. A child who is *ng'om* is quick to learn household tasks, for example, but also reliable about doing them without being reminded. The Kipsigis recognize, in principle, that a child can have verbal skill in the abstract. In practice, however, they regard such an isolated or abstract skill as a unique ability that requires a special term to describe it: *ng'om en sukul,* or "smart in school." Furthermore, *ng'om* is a quality shown only by preschoolers; neither an infant nor an adult can be *ng'om* because she or he is not expected to be responsible to others in the same way preschoolers are.

Such a socially embedded notion of intelligence differs radically from the usual North American idea. In our society, parents are likely to distinguish clearly between a child's sense of responsibility to others and his or her intelligence (Goodnow, 1996). They may consider the former desirable but not an intrinsic part of intelligence as such. When interviewed about the qualities shown by preschoolers, parents of preschoolers tend to name relatively "cognitive" features: an intelligent child is inquisitive, curious, imaginative, self-reliant, and able to play independently (Harkness & Super, 1992). These features of intelligence take individual autonomy for granted rather than social harmony: being intelligent is something you do by or on behalf of yourself, not with or on behalf of others.

These cultural differences begin to make sense if we consider the settings in which Kipsigis and North American parents and preschoolers live. A Kipsigis preschooler typically is part of an extended family. There are likely to be children of all ages close at hand, related to one another in largely complex ways; older children typically care for younger children from an early age; and children's chores are likely to take on "real" economic importance as children get older. Such a setting seems sure to reward children for showing responsibility to others.

In our own society, a preschooler is likely to live with a small family; relatively few or even no immediate relatives may be close at hand; parents expect that school will figure prominently in the preschooler's future; and parents themselves are likely to be working for a living. This sort of setting favors children who can "teach themselves" to a certain extent, that is, play with and learn from materials on their own. It also favors children who orient themselves toward school-like activities—toward number and memory games, for example, and books and letters. An "intelligent" child is one who can do these things, which have much less to do with responsibility to others than is the case for a Kipsigis child. Cultural differences such as these can pose problems for many preschoolers in our own society when they finally enter school. Historically, modern schooling has encouraged the culturally conventional definitions of intelligence as individual activity and those of cognitive activity as separate from the daily needs of the community. Students generally "do their own work" and focus on tasks (such as a set of math problems) that are created specifically for school settings.

When these assumptions do not fit the cultural expectations of particular children or their families, however, teachers are challenged to modify them. Teachers must then find other ways for children to "be intelligent"—ways that involve greater responsibility to others, for example, and greater concern for the real needs of the child's community (Gopaul-McNicol & Thomas-Presswood, 1998). Though it takes effort, there are ways to accomplish these changes in teaching philosophy; some of these changes are discussed in Chapter 8 in connection with bilingualism and the influence of school in the middle years.

explore how it might be understood and used by particular children and communities with specific social relationships and values. The next chapter turns to these important topics.

From Preschooler to Child

The physical and cognitive changes we have talked about in this chapter create new relationships with parents and other caregivers, who in turn stimulate further changes. Preschoolers' new motor skills may stimulate adults to encourage various talents actively and with more focus than before. Once catching and throwing make their appearance, playing ball becomes a possibility; once scribbling stabilizes, skillful and interesting drawing seems just around the corner. And so parents and other interested adults encourage children toward these new skills, among others. Sometimes, the teaching and learning seem easier now, too, because adults no longer have to monitor a child's every move and can concentrate increasingly on the goals of movements. Just a few years before, "one false step" might have meant a child would literally fall. But now, this term has become only a metaphor for mistakes in general, not for physical mishaps specifically.

The cognitive developments of early childhood are equally influential on relationships. New cognitive abilities create new individuality in children. In spite of differences in temperament among infants, it is not they but preschoolers who have more identifiable personalities. By age four or five, conversations become possible; moods can be expressed not only through gestures and body language but also through words; and a child's lasting interests become more obvious to those who know the child. All of these changes create new meanings for the idea of parenting. Attending to physical needs begins to recede in importance (though not completely), and attending to psychological needs comes more to the fore. As parents shift their relationship to accommodate these changes, they are more likely to remember their own childhoods once again, and with renewed vividness. The memories can be good, bad, traumatic, or mixed; but whatever they are like, they force reassessment of parents' *own* personal histories and identities, and their relationships with their *own* parents, the preschooler's grandparents. We saw aspects of these changes in Chapter 5's discussion of attachment formation, and we will explore them further. We come to them first in Chapter 8, which describes where preschoolers' new physical growth and cognitive skills lead them during middle childhood. We come to them again in Chapter 13, which discusses the impact of parenting on parents in more detail. First, though, we must complete the portrait of young children by discussing the development of their social relationships and their emotional growth in the next chapter.

Chapter Summary

- **What pathway does physical growth normally take during early childhood?** Between the ages of two and five, growth slows down and children take on more adultlike bodily proportions. Usually growth is rather smooth during the preschool period, though genetic, social, and nutritional differences can affect growth to some extent. Children's appetites often are smaller in the preschool years than in infancy, and children become more selective about what they eat.

- **What is normal or abnormal about early childhood sleep?** Preschoolers need between ten and thirteen hours of sleep, and should have regular bedtimes and calming bedtime routines. Insufficient or poor quality sleep impacts children's physical, cognitive, and social development and may look similar to attention problems or hyperactivity during the daytime hours. Though most children have good sleep, some sleep problems such as bed wetting, night terrors, and sleep walking are rather common and tend to reduce significantly as children get older.

- **How is poverty related to children's health?** The general health of a child is associated with the economic resources of the child's family, with higher-SES preschoolers tending to be healthier than lower-SES preschoolers. A number of possible causes for the association exist, including greater access to health care among well-off families.\

- **When do children achieve bladder control?** Children tend to achieve daytime bladder control early in the preschool period. Nighttime bladder control tends to come later in the period.

- **What motor skills do children acquire during the preschool years?** Preschoolers acquire and refine many fundamental motor skills, including walking, jumping, throwing, and catching. Fine motor skills such as drawing also emerge during this period, progressing from prerepresentational to representational drawings. Children vary in motor skill development because of both their biological endowment and their experiences.
- **How does children's growth affect parents and other adults?** Preschoolers' changing facial features, size, and motor skills influence parents' responses and methods of childrearing to some extent. Because of differences in circumstances, families respond uniquely to differences in children's growth.
- **What are the special features and strengths of preschoolers' thinking?** Several explanations of preschoolers' thinking exist. According to Piaget, preschoolers' thinking is preoperational, or characterized by emerging skills with symbolic representation. Preoperational thinking is also characterized by egocentrism, the assumption that your own point of view is shared by others, and by rudimentary skill with classification, reversibility, conservation, and number. Children's theory of mind becomes more broad and nuanced throughout early childhood. Preschoolers' cognitive development demonstrates social constructivism, the idea that thinking develops through shared, interactive activities. When activity settings are shared with more skilled or knowledgeable others, a zone of proximal development occurs that allows and encourages a child to learn and perform beyond what he or she could do alone. Another explanation is offered by neostructuralist theories of cognitive development, which use Piaget's belief in stages but focus on changes in relatively specific cognitive skills.
- **How does the language of preschool children differ from that of older children?** During the preschool years, children make major strides in acquiring the syntax, or grammar, of their native language. Young children's first word combinations are related by semantics and omit syntactic relationships. When syntax does appear, it is sometimes marked by errors of overgeneralization. Infants and preschoolers are reinforced, though only indirectly, for using correct syntax in their early utterances. Children probably acquire some syntax through imitation and practice of language models. The ease of language acquisition despite the poverty of the content of speech that children hear may mean that children possess an innate language acquisition device, or LAD. Parents assist children's language acquisition by recasting the children's utterances, providing expansions or scaffolding that support children's speech, and using a special style of talk called *infant-directed speech*.
- **What social and cultural factors account for variations in preschoolers' language and speech?** Language varies between girls and boys in ways that support gender stereotypes. It also varies according to socioeconomic class in ways that prepare middle-SES children better than low-SES children for school settings. The variations raise issues about when and whether particular children's language is deficient or merely different from the norm.
- **What constitutes good early childhood education?** Early childhood education programs take a variety of forms, many of which have been influenced by theories of cognitive development. Three factors characterize successful programs: a staff oriented toward observing the children, an integrated view of the curriculum, and significant involvement of parents in the program. Cultural diversity challenges early childhood educators to identify teaching practices that are not only developmentally appropriate but also culturally appropriate.

Key Terms

activity settings (p. 199)
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