18MPS15E-EDUCATIONAL PSYCHOLOGY

UNIT-2 COGNITIVE DEVELOPMENT AND LANGUAGE

The term development in its most general psychological sense refers to certain changes that occur in human beings (or animals) between conception and death. The term is not applied to all changes, but rather to those that appear inorderly ways and remain for a reasonably long period of time. A temporary change caused by a brief illness, for example, is not considered a part of development. Human development can be divided into a number of different aspects. Physical development, as you might guess, deals with changes in the body. Personal development is the term generally used for changes in an individual's personality. Social development refers to changes in the way an individual relates to others. And cognitive development refers to changes in thinking, reasoning, and decision making.

Many changes during development are simply matters of growth and maturation. Maturation refers to changes that occur naturally and spontaneously and that are, to a large extent, genetically programmed. Such changes emerge over time and are relatively unaffected by environment, except in cases of malnutrition or severe illness. Much of a person's physical development falls into this category. Other changes are brought about through learning, as individuals interact with their environment. Such changes make up a large part of a person's social development. But what about the development of thinking and personality? Most psychologists agree that in these areas, both maturation and interaction with the environment (or *nature* and *nurture*, as they are sometimes called) are important, but they disagree about the amount of emphasis to place on each one. Nature versus nurture is one of three continuing discussions in theories of development.

Three Questions Across the Theories

Because there are many different approaches to research and theory, there are some continuing debates about key questions surrounding development.

WHAT IS THE SOURCE OF DEVELOPMENT? NATURE VERSUS NURTURE.

Which is more important in development, the "nature" of an individual (heredity, genes, biological processes, maturation, etc.) or the "nurture" of environmental contexts (education, parenting, culture, social policies, etc.)? This debate has raged for at least 2,000 years and has accumulated many labels along the way, including "heredity versus environment," "biology versus culture," "maturation versus learning," and "innate versus acquired abilities." In earlier centuries, philosophers, poets, religious leaders, and politicians argued the question. Today scientists bring new tools to the discussion as they can map genes or trace the effects of drugs on brain activity, for example (Gottlieb, Wahlsten, & Lickliter,

2006). Even in scientific explanations, the pendulum has swung back and forth between nature and nurture (Cairns & Cairns, 2006; Overton, 2006).

Today the environment is seen as critical to development, but so are biological factors and individual differences. In fact, some psychologists assert that behaviors are determined 100% by biology and 100% by environment—they can't be separated (P. H. Miller, 2011). Current views emphasize complex coactions (joint actions) of nature and nurture. For example, a child born with a very easy going, calm disposition will likely elicit different reactions from parents, playmates, and teachers than a child who is often upset and difficult to soothe; this shows that individuals are active in constructing their own environments. But environments shape individuals as well—if not, what good would education be? So today, the *either/or* debates about nature and nurture are of less interest to educational and developmental psychologists. As a pioneering developmental psychologist said over 100 years ago, the more exciting questions involve understanding how "both causes work together" (Baldwin, 1895, p. 77).

General Principles of Development

Although there is disagreement about exactly how development takes place, there are a few general principles almost all theorists would support.

1. ***People develop at different rates***. In your own classroom, you will have a whole range of examples of different developmental rates. Some students will be larger, better coordinated, or more mature in their thinking and social relationships. Others will be much slower to mature in these areas. Except in rare cases of very rapid or very slow development, such differences are normal and should be expected in any large group of students.
2. ***Development is relatively orderly***. People develop abilities in a logical order. In infancy, they sit before they walk, babble before they talk, and see the world through their own eyes before they can begin to imagine how others see it. In school, they will master addition before algebra, Harry Potter before Shakespeare, and so on. But "orderly" does not necessarily mean linear or predictable—people might advance, stay the same for a period of time, or even go backward.
3. ***Development takes place gradually***. Very rarely do changes appear overnight. A student who cannot manipulate a pencil or answer a hypothetical question may well develop this ability, but the change is likely to take time.

General Principles

What are three questions about development and three general principles? For decades, psychologists and the public have debated whether development is shaped more by nature or nurture, whether change is a continuous process or

involves qualitative differences or stages, and whether there are critical times for the development of certain abilities. We know today that these simple either/or distinctions cannot capture the complexities of human development where coactions and interactions are the rule. Theorists generally agree that people develop at different rates, that development is an orderly process, and that development takes place gradually.

What can we learn from neuroscience? One overarching idea is that teachers and students should transform the notion of learning from "using your brain" to "changing your brain"—embrace the amazing plasticity of the brain (Dubinsky et al., 2013). Here are some general teaching implications drawn from Driscoll (2005), Dubinsky and colleagues (2013), Murphy and Benton (2010), Sprenger (2010), and Wolfe (2010):

1. Human capabilities—intelligence, communication, problem solving, and so on—emerge from each person's unique synaptic activity overlaid on his or her genetically endowed brain anatomy; nature and nurture are in constant activity together. The brain can place some limits on learning in the form of genetic brain anomalies in neural wiring or structure, but learning can occur through alternate pathways in the brain (as Nico and Brooke demonstrate). So, there are multiple ways both to teach and to learn a skill, depending on the student.
2. Many cognitive functions are differentiated; they are associated with different parts of the brain. So, learners are likely to have preferred modes of processing (e.g., visual or verbal) as well as varying capabilities in these modes. Using a range of modalities for instruction and activities that draw on different senses may support learning—for example, using maps and songs to teach geography. Assessment should be differentiated, too.
3. The brain is relatively plastic, so enriched, active environments and flexible instructional strategies are likely to support cognitive development in young children and learning in adults.
4. Some learning disorders may have a neurological basis; neurological testing may assist in diagnosing and treating these disorders, as well as in evaluating the effects of various treatments.
5. The brain can change, but it takes time, so teachers must be consistent, patient, and compassionate in teaching and reteaching in different ways, as Nico's and Brooke's parents and teachers could tell you.
6. Learning from real-life problems and concrete experiences helps students construct knowledge and also gives them multiple pathways for learning and retrieving information.
7. The brain seeks meaningful patterns and connections with existing networks, so teachers should tie new information to what students already understand and help them form new connections. Information that is not linked to existing knowledge will be easily forgotten.

8. It takes a long time to build and consolidate knowledge. Numerous visits in different contexts over time (not all at once) help to form strong, multiple connections.
9. Large, general concepts should be emphasized over small specific facts so students can build enduring, useful knowledge categories and associations that are not constantly changing.
10. Stories should be used in teaching. Stories engage many areas of the brain—memories, experiences, feelings, and beliefs. Stories also are organized and have a sequence—beginning, middle, end—so they are easier to remember than unrelated or unorganized information.
11. Helping students understand how activity (practice, problem solving, making connections, inquiry, etc.) changes their brain and how emotions and stress affect attention and memory can be motivating, leading to greater self-efficacy and self-regulated learning (we talk more about this in Chapter 11). One important message to students is that they are responsible for doing what it takes to change their own brains; you have to work (and play) to learn.

For the rest of the chapter, we turn from the brain and cognitive development to examine several major theories of cognitive development, the first offered by a biologist turned psychologist, Jean Piaget.

PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

Swiss psychologist Jean Piaget was a real prodigy. In fact, in his teens, he published so many scientific papers on mollusks (marine animals such as oysters, clams, octopuses, snails, and squid) that he was offered a job as the curator of the mollusk collection at the Museum of Natural History in Geneva. He told the museum officials that he wanted to finish high school first. For a while, Piaget worked in Alfred Binet's laboratory in Paris developing intelligence tests for children. The reasons children gave for their wrong answers fascinated him, and this prompted him to study the thinking behind their answers. This question intrigued him for the rest of his life (Green & Piel, 2010). He continued to write until his death at the age of 84 (P. H. Miller, 2011). During his long career, Piaget devised a model describing how humans go about making sense of their world by gathering and organizing information (Piaget, 1954, 1963, 1970a, 1970b).

We will examine Piaget's ideas closely, because they provide an explanation of the development of thinking from infancy to adulthood. According to Piaget (1954), certain ways of thinking that are quite simple for an adult, such as the Pittsburgh question in *Stop & Think*, are not so simple for a child. For example, do you remember the 9-year-old child at the beginning of the chapter who was asked if he could be a Genevan? He answered, *"No, that's not possible. I'm already Swiss. I can't also be Genevan"* (Piaget, 1965/1995, p. 252). Imagine teaching this student geography. The student has trouble with classifying one

concept (Geneva) as a subset of another (Switzerland). There are other differences between adult and child thinking. Children's concepts of time may be different from your own. They may think, for example, that they will some day catch up to a sibling in age, or they may confuse the past and the future. Let's examine why.

Influences on Development

Cognitive development is much more than the addition of new facts and ideas to an existing store of information. According to Piaget, our thinking processes change radically, though slowly, from birth to maturity because we constantly strive to make sense of the world. Piaget identified four factors—biological maturation, activity, social experiences, and equilibration—that interact to influence changes in thinking (Piaget, 1970a). Let's briefly examine the first three factors. We'll return to a discussion of equilibration in the next section.

One of the most important influences on the way we make sense of the world is **maturation**, the unfolding of the biological changes that are genetically programmed. Parents and teachers have little impact on this aspect of cognitive development, except to be sure that children get the nourishment and care they need to be healthy.

Activity is another influence. With physical maturation comes the increasing ability to act on the environment and learn from it. When a young child's coordination is reasonably developed, for example, the child can discover principles about balance by experimenting with a seesaw. Thus, as we act on the environment—as we explore, test, observe, and eventually organize information—we are likely to alter our thinking processes at the same time. As we develop, we are also interacting with the people around us.

According to Piaget, our cognitive development is influenced by ***social transmission,* or learning from others**. Without social transmission, we would need to reinvent all the knowledge already offered by our culture. The amount people can learn from social transmission varies according to their stage of cognitive development. Maturation, activity, and social transmission all work together to influence cognitive development. How do we respond to these influences?

Basic Tendencies in Thinking

As a result of his early research in biology, Piaget concluded that all species inherit two basic tendencies, or "invariant functions." The first of these tendencies is toward organization—the combining, arranging, recombining, and rearranging of behaviors and thoughts into coherent systems. The second tendency is toward adaptation, or adjusting to the environment.

ORGANIZATION. People are born with a tendency to organize their thinking processes into psychological structures. These psychological structures are our systems for understanding and interacting with the world. Simple structures are continually combined and coordinated to become more sophisticated and thus more effective. Very young infants, for example, can either look at an object or grasp it when it comes in contact with their hands. They cannot coordinate looking and grasping at the same time. As they develop, however, infants organize these two separate behavioral structures into a coordinated higher-level structure of looking at, reaching for, and grasping the object. They can, of course, still use each structure separately (Flavell, Miller, & Miller, 2002; P. H. Miller, 2011). Piaget gave a special name to these structures: schemes. In his theory, schemes are the basic building blocks of thinking. They are organized systems of actions or thought that allow us to mentally represent or "think about" the objects and events in our world. Schemes can be very small and specific, for example, the sucking-through-a-straw scheme or the recognizing-a-rose scheme. Or they can be larger and more general, for example, the drinking scheme or the gardening scheme. As a person's thinking processes become more organized and new schemes develop, behavior also becomes more sophisticated and better suited to the environment.

ADAPTATION. In addition to the tendency to organize psychological structures, people also inherit the tendency to adapt to their environment. Two basic processes are involved in adaptation: assimilation and accommodation.
Assimilation takes place when we use our existing schemes to make sense of events in our world. Assimilation involves trying to understand something new by fitting it into what we already know. At times, we may have to distort the new information to make it fit. For example, the first time many children see a raccoon, they call it a "kitty." They try to match the new experience with an existing scheme for identifying animals.

Accommodation occurs when we must change existing schemes to respond to a new situation. If we cannot make new data fit any existing schemes, then we must develop more appropriate structures. We adjust our thinking to fit the new information, instead of adjusting the information to fit our thinking. Children demonstrate accommodation when they add the scheme for recognizing raccoons to their other systems for identifying animals.

People adapt to their increasingly complex environments by using existing schemes whenever these schemes work (assimilation) and by modifying and adding to their schemes when something new is needed (accommodation). In fact, both processes are required most of the time. Even using an established pattern such as sucking through a straw requires some accommodation if the straw is of a different size or length than the type you are used to. If you have tried drinking

juice from box packages, you know that you have to add a new skill to your sucking-through-a-straw scheme: don't squeeze the box or you will shoot juice through the straw, straight up into the air and into your lap. Whenever new experiences are assimilated into an existing scheme, the scheme is enlarged and changed somewhat, so assimilation involves some accommodation (Mascolo & Fischer, 2005).

There are also times when neither assimilation nor accommodation is used. If people encounter something that is too unfamiliar, they may ignore it. Experience is filtered to fit the kind of thinking a person is doing at a given time. For example, if you overhear a conversation in a foreign language, you probably will not try to make sense of the exchange unless you have some knowledge of the language.

EQUILIBRATION. According to Piaget, organizing, assimilating, and accommodating can be viewed as a kind of complex balancing act. In his theory, the actual changes in thinking take place through the process of equilibration—the act of searching for a balance. Piaget assumed that people continually test the adequacy of their thinking processes in order to achieve that balance. Briefly, the process of equilibration works like this: If we apply a particular scheme to an event or situation and the scheme works, then equilibrium exists. If the scheme does not produce a satisfying result, then disequilibrium exists, and we become uncomfortable. This motivates us to keep searching for a solution through assimilation and accommodation, and thus our thinking changes and moves ahead. Of course, the level of disequilibrium must be just right or optimal—too little and we aren't interested in changing, too much and we may be discouraged or anxious and not change.

A Definition of Development

What are the different kinds of development? Human development can be divided into physical development (changes in the body), personal development (changes in an individual's personality), social development (changes in the way an individual relates to others), and cognitive development (changes in thinking).

Four Stages of Cognitive Development

Now we turn to the actual differences that Piaget hypothesized for children as they grow. Piaget believed that all people pass through the same four stages in exactly the same order. The stages are generally associated with specific ages, as shown in Table 2.2, but these are only general guidelines, not labels for all children of a certain age. Piaget noted that individuals may go through long periods of transition between stages and that a person may show characteristics of one stage in one situation, but traits of a higher or lower stage in other situations. Therefore, remember that knowing a student's age is never a guarantee you will know how the child thinks (Orlando & Machado, 1996).

Sensorimotor (0–2 years)
Learns through reflexes, senses, and movement—actions on the environment. Begins to imitate others and remember events; shifts to symbolic thinking. Comes to understand that objects do not cease to exist when they are out of sight—object permanence. Moves from reflexive actions to intentional activity.

Preoperational
Begins about the time the child starts talking, to about 7 years old Develops language and begins to use symbols to represent objects. Has difficulty with past and future—thinks in the present. Can think through operations logically in one direction. Has difficulties understanding the point of view of another person.

Concrete Operational
Begins about first grade, to early adolescence, around 11 years old Can think logically about concrete (hands-on) problems. Understands conservation and organizes things into categories and in series. Can reverse thinking to mentally "undo" actions. Understands past, present, and future.

Formal Operational
Adolescence to adulthood Can think hypothetically and deductively. Thinking becomes more scientific. Solves abstract problems in logical fashion. Can consider multiple perspectives and develops concerns about social issues, personal identity, and justice.

VYGOTSKY'S SOCIOCULTURAL PERSPECTIVE

THE ROLE OF LEARNING AND DEVELOPMENT.

Piaget defined *development* as the active construction of knowledge and *learning* as the passive formation of associations (Siegler, 2000). development has to come before learning—the child had to be cognitively "ready" to learn. He said that "learning is subordinated to development and not vice-versa" (Piaget, 1964, p. 17). Students can memorize, for example, that Geneva is in Switzerland, but still insist that they cannot be Genevan and Swiss at the same time. True understanding will take place only when the child has developed the operation of *class inclusion*—that one category can be included within another. But as we saw earlier, research has not supported Piaget's position on the need for cognitive development to precede learning (Brainerd, 2003).

In contrast, Vygotsky believed that learning is an active process that does not have to wait for readiness. In fact, "properly organized learning results in mental development and sets in motion a variety of developmental processes that would be impossible apart from learning" (Vygotsky, 1978, p. 90). He saw learning as a tool in development; learning pulls development up to higher levels, and social

interaction is a key in learning. In other words, what develops next is what is affected by learning (Bodrova & Leong, 2012; Gredler, 2012; Wink & Putney, 2002). Vygotsky's belief that learning pulls development to higher levels and more advanced thinking means that other people, including teachers, play a significant role in cognitive development. This does not mean that Vygotsky believed memorization is learning. When teachers try to directly communicate their understanding, the result can be a "meaningless acquisition of words" and "mere verbalization" (Vygotsky 1934/1987b, p. 356) that actually hides an understanding vacuum (Gredler, 2012). In Vygotsky's words, the teacher "explains, informs, inquires, corrects, and forces the child to explain"

THE DEVELOPMENT OF LANGUAGE

All children in every culture master the complicated system of their native lan guage, unless severe deprivation or physical problems interfere. This knowledge is remarkable. To have a conversation, children must coordinate sounds, mean ings, words and sequences of words, volume, voice tone, inflection, and turn taking rules. Yet, by about age 4, most children have a vocabulary of thousands of words and knowledge of the grammar rules for basic conversations (Colledge et al., 2002).

What Develops? Language and Cultural Differences

More than 6,000 natural languages are spoken worldwide (Tomasello, 2006). In general, cultures develop words for the concepts that are important to them. For example, how many different shades of green can you name? Mint, olive, emerald, teal, sea foam, chrome, turquoise, chartreuse, lime, apple . . . and visual artists can add cobalt titanate green, cinnabar green, phthalo yellow green, viridian green, and many others. English-speaking countries have more than 3,000 words for colors. In contrast, the Himba people of Namibia and a tribe of hunter-gatherer people in Papua New Guinea who speak Berinmo have five words for colors, even though they can recognize many color variations. But whether the terms for color are few or many, children gradually acquire the color categories appropriate for their culture (Roberson, Davidoff, Davies, & Shapiro, 2004).

Languages change over time to reflect changing cultural needs and values. The Shoshoni Native Americans have one word that means, "to make a crunching sound walking on the sand." This word was valuable in the past to communicate about hunting, but today new words describing technical tools have been added to the Shoshoni language, as the group's life moves away from nomadic hunting. To hear hundreds of new 21st-century tool words, listen to techies talk about computers (W. F. Price & Crapo, 2002).

THE PUZZLE OF LANGUAGE. It is likely that many factors—biological, cultural, and experiential—play a role in language development. To master a language, children must be able to (1) read the intentions of others so they can acquire the words, phrases, and concepts of their language and also (2) find patterns in the ways other people use these words and phrases to construct the grammar of their language (Tomasello, 2006). The important point is that children learn language as they develop other cognitive abilities by actively trying to make sense of what they hear and by looking for patterns and making up rules to put together the jigsaw puzzle of language.

In this process, humans may have built-in biases, rules, and constraints about language that restrict the number of possibilities considered. For example, young children seem to have a constraint specifying that a new label refers to a whole object, not just a part. Another built-in bias leads children to assume that the label refers to a class of similar objects. So the child learning about the rabbit is equipped naturally to assume that "rabbit" refers to the whole animal (not just its ears) and that other similar-looking animals are also rabbits (Jaswal & Markman, 2001; Markman, 1992). Reward and correction play a role in helping children learn correct language use, but the child's thinking in putting together the parts of this complicated system is very important (Waxman & Lidz, 2006).

When and How Does Language Develop?

The milestones of language development, ages 2 to 6, in Western cultures, along with ideas for encouraging development.

SOUNDS AND PRONUNCIATION. By about age 5, most children have mastered the sounds of their native language, but a few sounds may remain unconquered. You saw in Chapter 4 that the sounds of the consonants *1, r, y, s, v,* and *z* and the consonant blends use many words but prefer to use the words they can pronounce easily. As children learn to hear differences in the sounds of language, they enjoy rhymes, songs, and general sound silliness. They like stories by Dr. Seuss partly because of the sounds, as evident in the book titles—*All Aboard the Circus McGurkus* or *Wet Pet, Dry Pet, Your Pet, My Pet.* The young son of a friend of mine wanted to name his new baby sister Brontosaurus "just because it's fun to say."

VOCABULARY AND MEANING. As you can see in Table 5.1, children between ages 2 and 3 can use about 450 words (expressive vocabulary) even though they can understand many more (receptive vocabulary). By age 6, children's expressive vocabularies will grow to about 2,600 words, and their receptive vocabularies will be an impressive 20,000-plus words (Otto, 2010). Some researchers estimate that students in the early grades learn up to 20 words a day (P. Bloom, 2002). In the early elementary years, some children may have

trouble with abstract words such as *justice* or *economy*. They also may not understand the subjunctive case ("If I were a butterfly") because they lack the cognitive ability to reason about things that are not true ("But you aren't a butterfly"). They may interpret all statements literally and thus misunderstand sarcasm or metaphor. For example, fables are understood concretely simply as stories instead of as moral lessons. Many children are in their preadolescent years before they are able to distinguish being kidded from being taunted, or before they know that a sarcastic remark is not meant to be taken literally. But by adolescence, students are able to use their developing cognitive abilities to learn abstract word meanings and to use poetic, figurative language (Owens, 2012).

DIVERSITY IN LANGUAGE DEVELOPMENT

Many children learn two languages simultaneously while they are growing up. What does this involve?

Dual-Language Development

If you mastered your own first language, then added a second or third language, you are an example of **additive bilingualism**—you kept your first language and added another. But if you lost your first language when you added a second one, you experienced *subtractive bilingualism* (Norbert, 2005).

If family members and the community value a child's first language, he or she is more likely to keep that language when a second one is learned. But if a child experiences discrimination against the first language, he or she may leave the first language behind as proficiency is gained in a new language (Hamers & Blanc, 2000; Montrul, 2010). Immigrants are more likely to experience discrimination and therefore "subtract" their first language.

If they are exposed to two languages from birth, bilingual children (children who speak two languages) reach the language milestones in both languages on the same schedule as monolingual children (children learning only one language). Initially, bilingual children may have a larger vocabulary in the language that they are learning from the person with whom they spend the most time or have the closest bond, so a child who stays home all day with a Chinese-speaking parent will likely use more Chinese words. But over time, these children can become fully and equally bilingual if the dual-language exposure

1. begins early in life (before age 5);
2. occurs across a wide and rich range of contexts; and
3. is systematic, consistent, and sustained in the home and community (Petitto, 2009; Rojas & Iglesias, 2013).

Another requirement is that the second language must provide more than 25% of the child's language input; with less exposure, the child is unlikely to learn the second language (Pearson, Fernandez, Lewedeg, & Oller, 1997; Topping, Dekhinet, & Zeedyk, 2011). Bilingual children may mix vocabularies of the two languages when they speak, but this is not necessarily a sign that they are confused, because their bilingual parents often intentionally mix vocabularies as well, selecting the word that best expresses their intent (Creese, 2009). So, with consistent and sustained engagement in two languages, children can be fully bilingual.

Recent research on the brain and bilingualism shows that people who learn tlanguages before about age 5 process both languages in the same way as those who learn only one language and use the same parts of their brains (mostly in the left hemisphere). In contrast, people who learn a second language later have to use both hemispheres of their brain as well as the frontal lobe and working memory. They have to apply more cognitive effort. As Laura-Ann Petitto (2009) notes, "*Later* bilingual exposure does *change* the typical pattern of the brain's neural organization for language processing, but early bilingual exposure does not" (p. 191).

SECOND-LANGUAGE LEARNING. What if you didn't learn two languages as you were growing up? When and how should you learn a second language? To answer that question, you have to remember the distinction between critical periods for learning (if learning doesn't happen then, it never will) and sensitive periods, times when we are especially responsive to learning. There is no critical period that limits the possibility of language learning by adults (Marinova-Todd, Marshall, & Snow, 2000). In fact, older children go through the stages of language learning faster than young children. Adults have more learning strategies and greater knowledge of language in general to bring to bear in mastering a second language (Diaz-Rico & Weed, 2002). But recent research on the brain and bilingualism suggests "*there is most definitely a 'sensitive period' for optimal bilingual language and reading exposure and mastery.* Age of first bilingual exposure predicts how strong a reader a bilingual child can and will become in each of their two languages" (Petitto, 2009, p. 192).

Even though there is no *critical* period for learning a language, there appears to be a critical period for learning accurate language pronunciation. The earlier people learn a second language, the more their pronunciation is near native. This is because from birth to about 4 months, infants can discriminate all the basic sound building blocks from any of the world's 6,000 or so languages. But after about 14 months they lose this capability and hone in on the sounds of the language they are learning.

For children learning two languages at once, however, this developmental window seems to stay open longer, so these children can continue to differentiate sounds past 14 months (Petitto, 2009). After adolescence it is almost impossible to learn a new language without speaking with an accent (P. J. Anderson & Graham, 1994). Even if a child overhears a language, without actually learning it formally, this can improve later learning. After studying college students learning Spanish, Terry Au and colleagues concluded that "Although waiting until adulthood to learn a language almost guarantees a bad accent, having overheard the target language during childhood seems to lessen this predicament substantially" (T. K. Au, Knightly, Jun, & Oh, 2002, p. 242). So the best time to acquire two languages on your own through exposure (and to learn native pronunciation for both languages) is early childhood (T. K. Au, Oh, Knightly, Jun, & Romo, 2008).

BENEFITS OF BILINGUALISM. There is no cognitive penalty for children who learn and speak two languages. In fact, there are benefits. Higher degrees of bilingualism are correlated with increased cognitive abilities in such areas as concept formation, creativity, theory of mind, cognitive flexibility, attention and executive functioning, and understanding that printed words are symbols for language (Kempert, Saalbach, & Hardy, 2011). In addition, bilingual children have more advanced *metalinguistic* understanding of how language works; for example, they are more likely to notice grammar errors. Even more impressive, children from monolingual English-speaking families who attended bilingual schools and learned Spanish had better phoneme awareness and reading comprehension than their peers who were educated in an English-only program. Looking