

COGNITIVE-DEVELOPMENTAL PERSPECTIVES

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Summary

In Chapter 7, I described three general approaches that cognitive theorists have taken in conceptualizing learning: information processing theory, constructivism, and contextual theories. Our discussion of memory in the last four chapters has drawn primarily from information processing theory, albeit sometimes with a constructivist bent. Information processing theory had some roots in verbal learning research, which, in turn, was influenced by the S-R views of early behaviorists. Yet at the same time that behaviorists were dominating learning research in the early decades of the twentieth century, other researchers examining a somewhat different topic—child development—were coming to very different conclusions about what learning entails. One of these researchers, Swiss developmentalist Jean Piaget, proposed that through interacting with and reflecting on their physical and social worlds, children self-construct increasingly complex understandings and reasoning abilities with age. In making such a proposal, Piaget was a pioneer in *individual constructivism*. Meanwhile, Russian psychologist Lev Vygotsky focused on the importance of society and culture for children's development, laying the groundwork for a contextual view known as *sociocultural theory*.

In this chapter and the next one, we'll look at Piaget's and Vygotsky's theories of learning and cognitive development, as well as at contemporary perspectives that their work has inspired. Our focus in this chapter will be on the views of Piaget and of researchers who have followed in his footsteps. These theories—collectively known as **cognitive-developmental theories**—focus on how thinking processes change, qualitatively, with age and experience. In such perspectives, children typically play an active role in their own development: They seek out new and interesting experiences, try to make sense of what they see and hear, and work actively to reconcile discrepancies between new information and what they've previously believed to be true. In the process of doing these things, children's thinking gradually becomes more abstract and systematic.

PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

In the 1920s, Jean Piaget began a six-decade research program in Switzerland that has had a tremendous influence on contemporary theories of learning and cognitive development. Trained as a biologist, Piaget also had interests in philosophy and was especially curious about the origins of knowledge, a branch of philosophy known as *epistemology*. To discover where knowledge comes from and the forms that it takes as it develops, Piaget and his colleagues undertook a series of studies that offer many unique insights into how children think and learn about the

world around them (e.g., Inhelder & Piaget, 1958; Piaget, 1928, 1952b, 1959, 1970, 1971, 1972, 1980; Piaget & Inhelder, 1969).

Although Piaget's theory dates from the 1920s, its impact on psychological thought in the western hemisphere wasn't widely felt until the 1960s, probably for several reasons. One likely reason is that Piaget, being Swiss, wrote in French, making his early work less accessible to English-speaking psychologists. Although his writings were eventually translated into English, his ideas initially gained widespread prominence and visibility largely through a summary of his early work written by the American psychologist John Flavell (1963).

A second reason that Piaget's research program had only minimal influence at first was his unconventional research methodology. Piaget used what he called the **clinical method**: He gave children a variety of tasks and problems, asking a series of questions about each one. He tailored his interviews to the particular responses children gave, with follow-up questions varying from one child to the next. Such a procedure was radically different from the standardized, tightly controlled conditions typical of behaviorist animal research and was thus unacceptable to many of Piaget's contemporaries in North America.

But perhaps the most critical reason that Piaget's theory didn't immediately become part of the mainstream of psychological thought was its philosophical incompatibility with the behaviorist perspective that dominated the study of learning until the 1960s. Piaget focused on mental events—for example, on logical reasoning processes and the structure of knowledge—at a time when such mentalism was still being rejected by many learning theorists. The cognitivism that began to emerge in the 1960s was more receptive to Piagetian ideas.

Piaget's work is probably so popular today because it's such a global theory of intellectual development, incorporating such diverse topics as language, logical reasoning, moral judgments, and conceptions of time, space, and number. In addition, Piaget's unique studies with children—often involving cleverly designed problem situations—reveal a great deal about the nature of children's thought.

Key Ideas in Piaget's Theory

Central to Piaget's theory are the following principles and concepts:

- ♦ *Children are active and motivated learners.* Piaget proposed that children are naturally curious about their world and actively seek out information to help them make sense of it (e.g., Piaget, 1952b). Rather than simply responding to the stimuli they encounter, children manipulate those stimuli and observe the effects of their actions. For example, consider Piaget's observation of his son Laurent at 16 months of age:

Laurent is seated before a table and I place a bread crust in front of him, out of reach. Also, to the right of the child I place a stick about 25 cm. long. At first Laurent tries to grasp the bread without paying attention to the instrument, and then he gives up. I then put the stick between him and the bread. . . . Laurent again looks at the bread, without moving, looks very briefly at the stick, then suddenly grasps it and directs it toward the bread. But he grasped it toward the middle and not at one of its ends so that it is too short to attain the objective. Laurent then puts it down and resumes stretching out his hand toward the bread. Then, without spending much time on this movement, he takes up the stick again, this time at one of its ends . . . and draws the bread to him.

An hour later I place a toy in front of Laurent (out of his reach) and a new stick next to him. He does not even try to catch the objective with his hand; he immediately grasps the stick and draws the toy to him. (Piaget, 1952b, p. 335)

In this situation, Laurent is obviously experimenting with aspects of his environment to see what outcomes he can achieve. In Piaget's view, much of children's cognitive development is the result of such efforts to make sense of the world.

- ♦ *Children organize what they learn from their experiences.* Children don't just amass the things they learn into a collection of isolated facts. Instead they pull their experiences together into an integrated view of how the world operates. For example, by observing that food, toys, and other objects always fall down (never up) when released, children begin to construct a basic understanding of gravity. As they interact with family pets, visit zoos, look at picture books, and so on, they develop an increasingly complex understanding of animals. Piaget depicted learning as a very *constructive* process: Children create (rather than simply absorb) their knowledge about the world.

In Piaget's terminology, the things that children learn and can do are organized as **schemes**, groups of similar actions or thoughts that are used repeatedly in response to the environment. Initially, children's schemes are largely behavioral in nature, but over time they become increasingly mental and, eventually, abstract. For example, an infant might have a scheme for grasping and apply this scheme in grabbing everything from bottles to rubber ducks. A teenager may have certain schemes related to logical thinking that might be applied to reasoning about a variety of social, political, or moral issues.

Piaget proposed that children use newly acquired schemes over and over in both familiar and novel situations. As children develop, new schemes emerge, and existing schemes are repeatedly practiced, occasionally modified, and sometimes integrated with one another into **cognitive structures**. A good deal of Piaget's theory focused on the development of the cognitive structures that govern logical reasoning—structures that Piaget called **operations**.

- ♦ *Interaction with the physical environment is critical for learning and cognitive development.* In the process of interacting with their environment, growing children develop and modify their schemes. For example, in the earlier anecdote involving Piaget's son Laurent, we see a toddler actively manipulating parts of his physical environment—more specifically, manipulating the stick and bread—and presumably learning that some objects can be used as tools to obtain other objects. By exploring and manipulating the world around them—by conducting many little experiments with objects and substances—children learn the nature of such physical characteristics as volume and weight, discover principles related to force and gravity, acquire a better understanding of cause-and-effect relationships, and so on. In Piaget's view, then, children act as young scientists, although without the benefit of sophisticated scientific reasoning processes that adult scientists use (more on this point later).

- ♦ *Interaction with other people is equally critical for learning and development.* Although Piaget believed that children's knowledge and understandings of the world are largely self-constructed, nevertheless they have much to learn from interacting with others. For example, as you'll discover shortly, preschoolers often have difficulty seeing the world from anyone's perspective but their own. Through social interactions, both positive (e.g., conversations) and negative (e.g., conflicts over such issues as sharing and fair play), young children gradually come to realize that

¹Don't confuse Piaget's schemes with the schemas described in Chapter 9, although both concepts reflect ways of organizing things that are learned. In fact, Piaget himself made a distinction between a *scheme* and a *schema* (plural for the latter is *schemata*), and he used *schema* in a different sense than contemporary cognitivists do (e.g., see Piaget, 1970, p. 705).

different people see things differently and that their own view of the world isn't necessarily a completely accurate or logical one. Elementary school children may begin to recognize logical inconsistencies in what they say and do when someone else points out the inconsistencies. And through discussions with peers or adults about social and political issues, high school students may slowly modify their newly emerging idealism about how their fellow human beings should behave.

♦ *Children adapt to their environment through the processes of assimilation and accommodation.* According to Piaget, children interact with their environment through two unchanging processes (he called them *functions*) known as assimilation and accommodation. **Assimilation** entails responding to and possibly interpreting an object or event in a way that's consistent with an existing scheme. For example, an infant who sees Mama's flashy, dangling earrings may assimilate the earrings to his grasping scheme, clutching and pulling at them in much the same way that he grasps bottles. A second grader who has developed a scheme for adding two apples and three apples to make five apples may apply this scheme to a situation involving the addition of two dollars and three dollars.

Yet sometimes children can't easily respond to a new object or event using existing schemes. In such situations, one of two forms of **accommodation** will occur: Children will either (1) modify an existing scheme to account for the new object or event or else (2) form an entirely new scheme to deal with it. For example, an infant who has learned to crawl must adjust her crawling style when she meets a flight of stairs. And a child who encounters a long, snakelike creature with four legs may, after some research, reject the *snake* scheme—because snakes don't have legs—in favor of a new scheme: *skink*.

Assimilation and accommodation are complementary processes: Assimilation involves modifying one's perception of the environment to fit a scheme, and accommodation involves modifying a scheme to fit the environment. In Piaget's view, the two processes typically go hand in hand, with children responding to new events within the context of their existing knowledge (assimilation) but also modifying their knowledge as a result of those events (accommodation).

As you might guess, *learning* is largely the result of accommodation—that is, of modifying existing schemes or forming new ones. Yet assimilation is almost always a necessary condition for accommodation to occur: You must be able to relate a new experience to what you already know before you can learn from it. As you discovered in Chapter 8, this necessity for overlap between prior knowledge and new information is an important principle not only in Piaget's theory but in contemporary cognitive learning theories as well.

♦ *The process of equilibration promotes progression toward increasingly complex forms of thought.* Piaget suggested that children are sometimes in a state of **equilibrium**. They can comfortably interpret and respond to new events using existing schemes. But this equilibrium doesn't continue indefinitely. As children grow older, they frequently encounter situations for which their current knowledge and skills are inadequate. Such situations create **disequilibrium**, a sort of mental discomfort that spurs them to try to make sense of what they observe. Sometimes the easiest thing to do is simply ignore the perplexing state of affairs. But on other occasions—especially when the same puzzling phenomenon occurs time after time—children may be motivated to revamp their current schemes. By replacing, reorganizing, or better integrating their schemes—in other words, through accommodation—children eventually can better understand and address previously mystifying events. The process of moving from equilibrium to disequilibrium and back to equilibrium again is known as **equilibration**. In Piaget's

view, equilibration and children's intrinsic desire to achieve equilibrium promote the development of more complex levels of thought and knowledge.

- ♦ *Children think in qualitatively different ways at different age levels.* A major feature of Piaget's theory is his description of four distinct stages of cognitive development, each with its own unique patterns of thought. Each stage builds on the accomplishments of any preceding stages, and thus children progress through the four stages in the same, invariant sequence. In his early writings, Piaget suggested that the stages are *universal*—that they describe the cognitive development of children throughout the world.

Piaget speculated that children's progression through the four stages is limited by neurological maturation—that is, by genetically controlled developmental changes in the brain. In other words, a child is capable of moving from one stage to the next only when the brain matures sufficiently to enable the cognitive structures and thought processes associated with the next stage. As we discovered in Chapter 2, the brain continues to develop throughout childhood, adolescence, and early adulthood. Quite possibly, this continuing neurological development, and especially the development of the frontal cortex, may allow growing human beings to think in increasingly sophisticated ways. Although some researchers have found evidence that significant neurological changes do occur at the typical transition ages for progression from one of Piaget's cognitive stages to the next (H. Epstein, 1978; Hudspeth, 1985), whether such changes are specifically related to the cognitive changes that Piaget described is still very much an open question.

As you'll discover later in the chapter, many psychologists question the notion that cognitive development is either as stagelike or as universal as Piaget believed. Nevertheless, Piaget's stages provide helpful insights into the nature of children's thinking at different age levels, and so we'll look at them more closely.

Piaget's Stages of Cognitive Development

Piaget's four stages are summarized in Table 12.1. The age ranges noted in the table are *averages*: Some children reach a stage a bit earlier, others a bit later. Also, children are occasionally in *transition* from one stage to the next, displaying characteristics of two adjacent stages at the same time. You should note, too, that children and adolescents don't always take advantage of their advanced cognitive abilities, and thus they may show considerable variability in ways of thinking in their day-to-day activities (Chapman, 1988; Piaget, 1960). Figure 12.1 depicts the transitional and flexible nature of children's progress through the stages.

Sensorimotor Stage (Birth Until Age 2)

According to Piaget, newborns' behaviors are little more than *reflexes*—biologically built-in responses to particular stimuli (e.g., sucking on a nipple)—that ensure their survival. But in the second month, infants begin to exhibit voluntary behaviors that they repeat over and over, reflecting the development of perception- and behavior-based schemes—hence the label **sensorimotor stage**. Initially infants' voluntary behaviors focus almost exclusively on their own bodies (e.g., they might repeatedly put certain fingers in their mouths), but eventually their behaviors involve surrounding objects as well. For much of the first year, Piaget suggested, behaviors are largely spontaneous and unplanned.

Late in the first year, after repeatedly observing that certain actions lead to certain consequences, infants gradually acquire knowledge of *cause-and-effect* relationships in the world

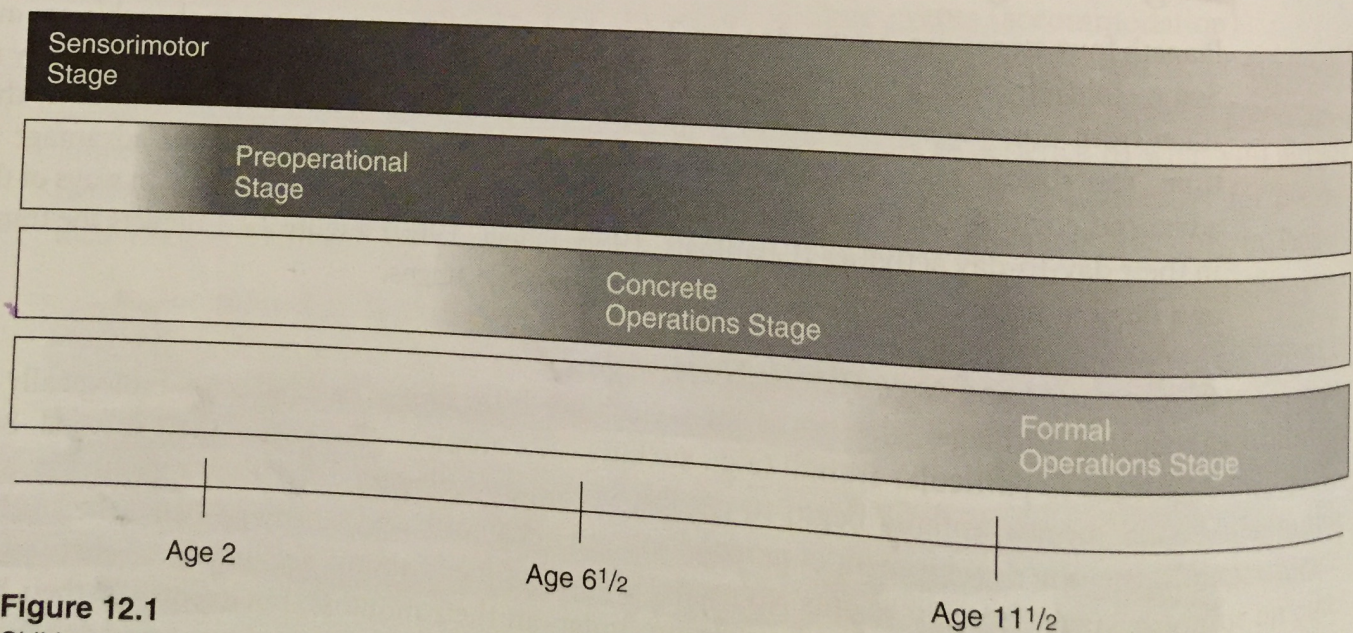
Table 12.1

Piaget's stages of cognitive development

Stage and Age Range	General Description
Sensorimotor Stage (birth until about 2 years old)	Schemes primarily entail perceptions and behaviors. Children's understandings of the world are based largely on their physical interactions with it.
Preoperational Stage (2 until about 6 or 7 years old)	Many schemes now have a symbolic quality, in that children can think and talk about things beyond their immediate experience. Children begin to reason about events, although not always in ways that are "logical" by adult standards.
Concrete Operations Stage (6 or 7 until about 11 or 12 years old)	Children acquire cognitive structures that enable them to reason in logical, adultlike ways about concrete, reality-based situations. They also realize that their own perspectives are not necessarily shared by others.
Formal Operations Stage (11 or 12 through adulthood)	Children can now think logically about abstract, hypothetical, and contrary-to-fact situations. They acquire many capabilities essential for advanced reasoning in mathematics and science.

around them. At this point, they begin to engage in **goal-directed behavior**, acting in ways they know will bring about desired results. At about the same time, they acquire **object permanence**, an understanding that physical objects continue to exist even when out of sight.

Piaget believed that for much of the sensorimotor period, children's thinking is restricted to objects in their immediate environment. But in the latter half of the second year, children develop

**Figure 12.1**

Children gain abilities associated with more advanced Piagetian stages slowly over time, and they don't necessarily leave behind the characteristics associated with previous stages.

Adapted from CHILD DEVELOPMENT AND EDUCATION 4/E by T. M. McDevitt & J. E. Ormrod, 2010, p. 199, Upper Saddle River, NJ: Pearson Education. Adapted with permission.

symbolic thought, an ability to represent and think about objects and events in terms of internal, mental entities, or *symbols*. They may “experiment” with objects in their minds, first predicting what will happen if they do something to an object and then putting their plans into action. They may also recall and imitate behaviors they’ve seen other people exhibit—for instance, pretending to “talk” on a toy telephone. Such symbolic thinking marks the beginning of true thought as Piaget defined it.²

Preoperational Stage (Age 2 Until Age 6 or 7)

The ability to represent objects and events mentally (symbolic thought) gives children in the **preoperational stage** a more extended view of the world than they had during the sensorimotor stage. One key source of symbols is language, which virtually explodes during the early part of the preoperational stage. The words in children’s rapidly increasing vocabularies provide labels for newly developed mental schemes and serve as symbols that enable children to think about objects and events at distant places and times. Furthermore, language enables children to communicate their thoughts and receive information from other people in ways that weren’t possible during the sensorimotor stage.

With the emergence of symbolic thought, then, young children are no longer restricted to the here-and-now and so can think and act far more flexibly than they did previously. They can now recall past events and envision future ones, and they begin to tie their experiences together into an increasingly complex understanding of the world.

Yet preoperational thinking has definite limitations, especially as compared to the concrete operational thinking that emerges later. For example, young children tend to confuse psychological phenomena (e.g., thoughts and emotions) with physical reality, a confusion manifested by such actions as attributing feelings to inanimate objects and insisting that monsters and bogeymen lurk under the bed. They also tend to exhibit **egocentrism**, an inability to view situations from another person’s perspective.³ Young children may have trouble understanding how a thoughtless remark might have hurt someone else’s feelings. And they may say things without considering the perspective of the listener—for instance, leaving out critical details as they tell a story and giving a fragmented version that a listener can’t possibly understand. Here we see one reason why, in Piaget’s view, social interaction is so important for development. Only by getting repeated feedback from other people can children learn that their thoughts and feelings are unique to them—that their own perception of the world isn’t necessarily shared by others.

When we consider adult forms of logical reasoning, preoperational children’s thinking doesn’t measure up. An example is difficulty with **class inclusion**, an ability to simultaneously classify an object as belonging both to a particular category and to one of its subcategories. Piaget provided an illustration in an interview that reflects the *clinical method* mentioned earlier. An

²The changes I’ve described in this section reflect six substages of the sensorimotor stage. For a detailed discussion of these substages, see Piaget’s *The Origins of Intelligence in Children* (1952b) or Flavell’s *The Developmental Psychology of Jean Piaget* (1963).

³Don’t confuse Piaget’s definition of *egocentrism* with its more commonly used meaning. When we describe a person as being *egocentric* in everyday speech, we usually mean that the person is concerned only about his or her own needs and desires; hence, the term refers to a personality characteristic. In Piaget’s theory, however, an egocentric child has a cognitive limitation, not a personality flaw: The child doesn’t yet have the ability to look at the world from other people’s perspectives.