DEVELOPMENT AND STAGE THEORIES

Chapters 3 and 4 examine theories related to human development. Development in this context refers to the natural changes that take place in humans over time. There’re various kinds of development; however each is characterized by an orderly progression to increasingly higher levels of complexity. Woolfolk (2007) describes three important points about development:

1. Development occurs in a predictable order. For example, all humans learn to wiggle, then crawl, then walk, and finally to run. This is the order. You can’t master running if you haven’t mastered walking. In the same way, we learn to talk by first making babbling sounds and getting responses, then using one-word utterances, then incomplete sentences (dog run), and finally we begin using complete sentences and start the progression toward mature speech.

2. Development occurs at different rates. Humans are not trains that start at the same time and reach designated places at prescribed times. We develop different traits at different times. Some children learn to talk earlier and some later. Some children learn to walk earlier and some later. Humans are not standardized products.

3. Development occurs gradually over time. Children don’t wake up one day with the ability to speak, read, or ride a bike. The ability to do these things happens slowly and incrementally and they are dependent on many small changes.

Stage theories describe development as occurring in distinctly different phases. That is, each new stage is different than the previous one. Advancement to a higher stage is based on the completion of tasks at a lower stage. The stage theories described in this chapter address the areas of cognitive development. Chapter 4 examines social or personal development and Chapter 5 focuses on moral development. Each of the theories has a number of detractors; however, three important reminders about theories: First, they are a way of connecting a set of data dots or explaining facts. Second, no theory is ever complete or all encompassing. And third, because each human being is unique, theories related to human beings should be used to understand behavior, not to predict behavior.

PIAGET’S THEORY OF COGNITIVE DEVELOPMENT

Swiss Psychologist Jean Piaget’s (1896-1980) theory of children’s cognitive development has had tremendous impact on the field of education. Before Piaget, people thought children’s brains functioned much the same as adults. They just needed to be filled with raw knowledge and experience in order to function in an adult manner. Piaget rejected this, saying that our brains and mental functioning develops through a series of universal stages. We think in distinctly different ways at each stage.

Piaget’s Stages of Cognitive Development

According to Piaget, changes in thinking are a result of developmental processes that occur naturally as our brains develop. All children, he said, go through four stages:
Sensorimotor stage (birth to approximately age two). Children’s early cognitive development is largely controlled by their senses and their ability to move – hence the label sensorimotor. An important cognitive milestone at this stage is object permanence, that is, the realization that something not immediately available to one’s senses, still exists. Children gradually develop the ability to form mental representations of sensory objects (mother’s face, doll, pet dog) that they can carry in their developing memory and can access as needed. This new cognitive function is known as representational thinking. As this ability grows, children begin to realize that if you put a doll behind your back it still exists. Likewise, Children’s ability to move and thereby to view the world from different perspectives enhances their cognitive development. The greater their ability to move, the greater their ability to see the world from different perspectives: front and back, above and below, near and far. This ability to move allows them to seek out hidden objects whose representations now exist in memory.

A second major accomplishment at the sensorimotor stage is the ability to carry out goal-directed actions. This is the ability to contemplate and carry out more than one action in order to reach a goal. For example, if a child cannot open a cardboard box to get to a cookie, he or she might seek some sort of tool to open the lid or tear the box.

Preoperational stage (approximately age two to seven). Piaget described an operation as an action carried out through logical thinking. Having acquired representational thinking (see above), preoperational thinking is the stage just before children are able to use formalized logic. Here vocabularies (i.e., mental or symbolic representations of objects, actions or relationships) generally expand from 200 to around 2,000 or more words. Although children are learning language and language rules, they do not yet understand logical relationships and they cannot mentally manipulate information. This stage is marked by irreversible thinking, that is, the ability to think in one only direction (they can not reverse an operation). For example, they may know that 2+1=3, but they cannot use reverse logic to understand that 3-2=1. Preoperational children are also highly egocentric in that they have a hard time taking another person’s point of view. They still see the world only in terms of themselves.

A major learning task that occurs near the end of this stage is conservation. This is where children begin to understand that even though the appearance or characteristics of an object may change, the amount or volume stays the same. They realize, for example, that if you have two equal balls of cookie dough and flatten one, the two balls still contain the same amount. Or, if you break one ball of cookie dough into four big pieces and a similar ball into 20 little pieces they still contain the same amount. Or, even though one row of 20 M&Ms is spaced close together and another row of 20 M&Ms is spaced further apart, they still contain the same number. Children generally achieve this realization around age 6 or 7.
Concrete operational stage (approximately age seven to eleven). This stage is marked by the start of logical thinking. For example, irreversible thinking begins to give way to reversible thinking. That is, children are now able to understand that 3-2 = 1 is the reverse of 2+1 = 3. However, all thinking must be very concrete and based in the present. When introducing numbers and the concepts of addition and subtraction, children in preschool through grade one should be given chips, buttons or other concrete counters to see and manipulate. Likewise, all science instruction should be as hands-on and active as possible (learning by doing vs. learning by listening, watching, or reading).

Children at this stage are also beginning to understand if/then thinking. If X happens then Y will happen. For example, if I put too many block on the pile, then it will tip over. If the tinfoil boat has high sides, then it will hold more pennies. If a bug has six legs, then it is an insect. However, when learning to think in logical sequences, the objects of thought or some physical representation of them should always be present. This is the very beginning of their system of logical thinking.

A particular type of thinking that develops at this stage is classification. In the previous (preoperational) stage, children could group objects only according to one attribute (color, size, etc) at a time. Concrete-operational children, however, are able to group things based on a number of different attributes. For example, given a description of felines, they can put tigers, panthers, and house cats in one group, and foxes, wolves, and pugs in another group. However, children at this stage are still unable to think abstractly. For example, given a list of storybook and movie characters, children at this stage would have hard time putting them in a group according to which are evil and which are good. They would also have a hard time deciding which actions represent free speech or which rules illustrate democracy and which do not. This is because children at this stage are still highly dependent on perceptual differences in classifying objectives or experiences.

Formal operational (approximately age eleven on). At this stage children begin to acquire the ability to think abstractly, that is, to develop and manipulate symbols and to generalize to similar situations. For example, they are able to make the following mental operations: If A>B and B>C then A>C. Or, make analogies such as: big is to little as slow is to (a) wide, (b) turtle, or (c) fast. Or even, create abstract metaphors: Math class was a big puddle of mud. And, given a set of facts, they are able to make inferences. For example: in the movie, The Wizard of Oz (MGM 1939), Dorothy slapped Lion, defied the Wizard of Oz, and set off to steal the Witch’s broom. What can does this say about Dorothy? Or, the Wicked Witch of the West showed no remorse over the death of her sister, the Wicked Witch of the East. Why do you think? What does this tell us about her? Or even, what do you think happened in Oz after Dorothy left?

Children also develop the ability to use more advanced deductive thinking (Sherlock Holmes thinking) and inductive thinking (looking at a field and inducing order on it by categorizing or creating groups), and hypothetical (if-then) thinking. Learning these types of formal operational thinking can be enhanced through
the use of thinking skill lessons (Johnson, 2000). A thinking skill is a cognitive process broken down into steps and taught explicitly. Figure 3.2 shows examples of three cognitive processes broken down into their subsequent steps. (Teaching thinking skills will be addressed in Book II of *A Short Guide to Educational Psychology*.)

![Image](image-url)

**Figure 3.2. Examples of thinking skills.**

<table>
<thead>
<tr>
<th><strong>Creating Groups:</strong> (inductive analysis) Impose order on a field by identifying and grouping common themes or patterns.</th>
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</thead>
<tbody>
<tr>
<td><strong>Thinking Frame</strong></td>
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<tr>
<td>1. Look at the whole.</td>
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<tr>
<td>2. Identify reoccurring items, themes, or patterns.</td>
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<tr>
<td>3. Arrange into groups.</td>
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<tr>
<td>4. Describe the whole in terms of groups.</td>
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<tr>
<th><strong>Compare and Contrast:</strong> Find similarities and differences between/among two or more items.</th>
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<tbody>
<tr>
<td><strong>Thinking Frame</strong></td>
</tr>
<tr>
<td>1. Look at all items.</td>
</tr>
<tr>
<td>2. Find the similarities.</td>
</tr>
<tr>
<td>3. Find the differences.</td>
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<tr>
<td>4. Conclude and describe.</td>
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<tr>
<th><strong>Inferring:</strong> Go beyond the available information to identify what may reasonably be true.</th>
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<tr>
<td><strong>Thinking Frame</strong></td>
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<tr>
<td>1. Identify what is known.</td>
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<tr>
<td>2. Identify similar situations or important knowledge.</td>
</tr>
<tr>
<td>3. Make a reasonable guess based on 1 and 2.</td>
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**Other Basic Piagetian Concepts**

**Natural scientists.** Children are natural scientists. They have an innate curiosity about the world and come to know about it by testing and trying things. Like a scientist doing experiments and conducting research, children try to make sense of their environment. For example, a young child will poke at a caterpillar on the sidewalk to see what happens and will try to handle nearly any reachable object. Within reason this natural desire to explore should be encouraged, especially at the sensorimotor and preoperational levels where children are coming to know physical reality.
**Organization.** Organization is the natural, ongoing process of organizing information into mental file cabinets which Piaget called schemata -- others refer to schemes or schema (singular form). We use these mental file cabinets (schemata) to make sense of new information (see Chapter 13). For example, Bobby has a schema related to frogs based on his experiences of trying to catch frogs in the pond in back of his house. When it is time to learn about frogs in his 2nd grade science class, he is able to understand this information quickly and accurately because his frog schema is already fairly well developed. As we learn more, our schemata become more organized and complex and, in turn, our thinking becomes more sophisticated. Since we use our existing schemata to interpret new information, the larger our schematic filing system (i.e., our knowledge base) the more we are able to learn.

**Adaptation.** Adaptation is the natural tendency to adapt to one’s environment using assimilation and accommodation. Assimilation occurs when we encounter new information that corresponds with our existing schemata. For example, in his 2nd grade science class, Bobby learns that frogs hibernate during the winter. This new information fits within and expands his current frog schema. Assimilation occurs as this new information is used to expand his existing schema.

Accommodation occurs when we encounter new information that either does not fit current schemata or where no schema related to this new information currently exists. For example, as Bobby gets older he learns that animals today look much different than they did a million years ago. He encounters the theory of evolution for the first time. This conflicts with his current thinking and creates a state of cognitive dissonance or disequilibrium. Accommodation occurs when Bobby creates a new schema that incorporates this new information. In this case Bobby had to restructure some basic beliefs.

**Equilibration.** Equilibration is the motivating force behind all learning. Simply put, it is the constant striving for balance between new information and existing schemata. Because of our innate curiosity we constantly encounter new information or phenomena. Encountering novel information or phenomena creates disequilibrium, a very dissatisfying mental state that people seek to alter either by 1) processing new information and putting it into an existing schema (assimilation) or 2) by creating new accommodating schema. After the new information has been assimilated or accommodated we again begin to search for new interests and phenomena to investigate, and the cycle of learning continues.

**Change in thinking.** According to Piaget, changes in our thinking occur because of internal changes in the way our brains grow and mature. Thus Piaget believed that thinking develops from inside out, that is, from physical changes in the developing brain and its related cognitive functions. What follows is another theory of cognitive development that focuses mostly on the external influences to cognitive development.

**VYGOTSKY**

Lev Vygotsky’s sociocultural theory states that thinking develops from outside in. As children interact with others, as they hear the words around them, and as they observe the interactions of others they internalize language patterns. These gradually evolve into thought patterns or ways of thinking. The same thing happens as children are immersed in a particular culture with its vast array of symbols, values, and ways of viewing reality. Through this immersion they gradually take on the thought patterns of their culture. Thus, children’s social and cultural interactions shape and help to develop their thinking. (Hence, the name: sociocultural
You may notice that young children often repeat everything you say. This is an important part of their cognitive development. According to Vygotsky, thinking begins on a social level and is then internalized. So what you say to young children and how you say it is important.

**Three Stages of Speech Development**

According to Vygotsky, language drives the development of children’s thinking. Any thinking function of a child appears first within the child’s external or social plane and then on the internal or thinking plane. He described three stages of speech development

- **First stage: social or external speech.** At this stage (birth to approximately age three), thinking is not related to speech at all. Instead, thinking is primarily in the form of images, emotions, and impressions. Speech only occurs on the external or social level to express a desire (“Cookie!”) or to convey simple emotions such as shouting or crying. At this stage, speech is merely a tool to make things happen in the external world.

- **Second stage: egocentric speech.** At this stage (approximately ages three to seven), children think out loud or talk to themselves as they are doing something. For example, if Pat made a mistake as he was tying his shoe he might say, “Bad Pat.” Called egocentric speech, it is used to guide behavior and help solve problems. It is an important part of the transition to inner speech and more sophisticated thinking.

- **Third stage: inner speech.** Inner speech is soundless speech or thought. Here speech becomes internalized and is used to guide thinking and behavior. This eventually leads to higher levels and more complex types of thinking.

**Developing Higher Mental Functions**

According to Vygotsky, humans start out life with a set of lower mental functions that are genetically inherited. These involve things such as reflexes, attention, and perception (see Figure 3.3). These functions are controlled in large part by the environment. In other words, cognition is generally limited to a human’s response and reaction to environmental stimuli. As children hear language around them, as they interact with other humans and their culture, these lower functions develop and eventually evolve into higher functions.
Zone of Proximal Development and Scaffolding

The zone of proximal development (ZPD) is the level between children’s independent level and frustration level where they can perform a task if someone (teacher or parent) helps them (see Figure 3.4). The independent level is the level at which children can perform a task independently. For example, Sally can read at the 5th grade level. Any reading material at the 5th grade level or below would be at her independent level. The frustration level is the level at which children cannot perform the task even with a teacher’s help. For example, if Sally were given 8th grade reading material, even with a teacher’s help, she would have a hard time comprehending what she was reading. The zone of proximal development is between these levels. If the teacher provides some sort of help, in the form of scaffolding, the student can succeed. For example, if Sally’s teacher gave her a chapter to read in a science text that was at the 6th grade level, and pre-taught important concepts and vocabulary words and gave her an outline of what was in the chapter, Sally would be able to successfully read the chapter.
Scaffolding in an educational context is the strategy of providing some sort of structure or support so students can complete a task that is a little above their independent level (within the ZPD). Four examples are provided below to help you understand this concept.

**EXAMPLES of SCAFFOLDING**

- **Mr. Smith** is teaching his students to use context clues to recognize unfamiliar words when they read. Since this is a brand new task, he creates sentences with key words missing, but includes the first and last letter of the missing word. This provides his students just enough structure to complete the task. As they get better at this he is eventually able to drop the last letter, and then eventually the first letter so that students are just using the context of the sentence without letter cues.

- **Ms. Jones** is teaching double-digit addition to her second-grade math students. Her students understand the concept of addition, but they get a little mixed up when they have to line up the numbers. She writes the problem like this on the board: 23+35= ___. She uses the scaffold in Figure 3.2 to help her students understand where the numbers line up. As students grasp the concept she uses less structure.

- **Coach Johnson** is teaching his wrestlers a complicated wrestling move that involves many different steps. First he demonstrate the move so they can see what it looks like; however, providing just a verbal explanation would frustrate about 80 percent of them. Instead, he breaks the move into four steps and verbally guides them through each step together. (“Step one, put your foot on the outside of your opponent’s foot. Step two, grab the ankle, etc. . . .”) He takes them through the move several times, gradually speeding up as he sees that they get it. Finally, Coach Johnson is able to say, “Practice five of them on your own with your wrestling buddy.”

- **Ms. Hanson** is teaching long division to her students. Just like Coach Johnson above, she demonstrates the strategy first, then hands out scratch paper (thinking paper), and verbally guides her students through each step as she also completes the problem on the board. (“Step one, set up the division column and with your numbers. Step two, see how many times the dividing number [denominator] goes into the number being divided [numerator] . . .”)

Scaffolding and the zone of proximal development are important concepts for success in any sort of teaching, whether it is in music, athletics, drama, forensics, business, math, or any other curriculum area. You find out where students are at and then get out a little in front of them with some supports to help them succeed. It can apply to teaching a skill but also to teaching concepts.
Summary of Key Ideas

- According to Piaget children think differently than adults not because they have a smaller store of knowledge and experience to draw on but because their less developed brains are incapable of carrying out the more abstract (symbolic) thinking functions of adults. They simply perceive the world in qualitatively different ways.
- Piaget divided cognitive development into the following four stages: (1) sensorimotor -- birth to two, (2) preoperational – two to seven, (3) concrete operational – seven to eleven, and (4) formal operations – eleven on. During this developmental progression, the focus of development gradually moves from simple sensations and movements to representational (symbolic) thinking, to the beginnings of logical thinking and finally to full-scale logical thinking.
- According to Vygotsky, children’s language and thinking are driven by the language that is embedded in their surrounding social context. That is, they hear, absorb and imitate the speech around them.
- Vygotsky divided speech and thinking into the following three stages: (1) social or external speech, (2) egocentric speech, and (3) inner speech. During this developmental progression, the focus moves from the expression of simple emotions or needs to self-directed speech, and finally to internalized speech that is used to guide thinking and behavior.

References

