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ABSTRACT

This booklet provides an overview of stages and levels of cognitive development. Particular attention is given to language skills, the growth of understanding and memory, levels of thinking, altruism, and conscience. The importance of parents' influence on the development of their child's thinking abilities is emphasized. Nine resources that parents can consult for additional information are listed, as are five references. (RH)

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LEARNING WHILE GROWING: Cognitive Development

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Caring About Kids is a series of pamphlets produced by the Division of Scientific and Public Information, National Institute of Mental Health, to help parents care for their children and themselves in ways that promote good mental health. Primarily for fathers and mothers, the subject matter of *Caring About Kids* will sometimes be useful for others, such as other relatives, school teachers, and babysitters, who play important roles in the lives of children.

Caring About Kids uses either "she" or "he" throughout an entire pamphlet. The choice of gender is alternated from pamphlet to pamphlet, but the information in each pamphlet is applicable to children of *both* sexes.

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Introduction

Every child wants to know more. A growing, active mind is in constant search of new adventure, more knowledge.

"Why? How? When?" the brain asks. "What will happen if I take this or add that? How far can I go?"

Intelligence is not a number on a test or a score on an exam. It is a tool for survival, a way of using what we know to solve the problems we meet and to learn more. There are many aspects of intelligence, including skill, talent, creativity, and wisdom. We learn to use our mental abilities in ways that help us face life's difficulties and opportunities and do what we want to do. Intelligence is also referred to as cognition or as knowing and thinking.

Minds, like computers, accept, sort, store, and use information. Our brains take a puzzling assortment of what we sense and perceive, what we conceive and imagine, what we remember and expect, and they piece these together to give us a picture of our world.

An Overview

Some experts believe mental processes develop smoothly and continuously; others believe that development occurs in distinct stages, each building on the other. Jean Piaget, a pioneer in the field of cognitive development, believed that specific types of thought processes occurred in a developmental sequence and that, until a child reaches the appropriate developmental stage, she is not ready to learn specific tasks. He described maturing thought processes in four stages.

From birth until 2, the first Piagetian stage, the child changes from a disorganized, reflexive bundle of humanity—thrashing arms and legs—to a gradually more controlled and coordinated being—smiling, imitating, reaching, crawling, walking. The child learns by trial and error, by doing.

The second stage, as conceived by Piaget, occurs between 2 and 7 years of age during which the child, having acquired language skills, begins to represent her world by symbols (words and images that stand for something). Curious about everything, she overflows with questions but interprets information according to her limited picture of the world made up of her own experiences. She cannot think as an adult—even a miniature adult. Abstract concepts and deductive reasoning are beyond her capability.

Piaget believed that children between 7 and 11 begin to solve problems by thinking instead of doing. Whereas previously a child needed fingers to count, she now begins to count and perform simple mathematical problems in her head. Nevertheless, she can only manipulate "concrete" numbers or objects—those things physically present or experienced. She will not be able to think in abstract terms, according to Piaget, until the final developmental stage, which begins between the ages of 11 and 16. This stage marks the start of adult thinking. When she reaches it, she can hypothesize about what might have been or what might be. She can plan for the future. All the necessary mental structures are in place.

Since Piaget made his observations, much research has been done, and it has become clear that cognitive abilities develop more individualistically than he realized. Just as children differ in their rates of physical development, so do they differ in their cognitive development. Also, the sequence in which specific skills are learned varies among children.

Further, children develop individual styles of thinking. This is especially true in problem solving. Some children arrive at conclusions quickly, without considering all the facts; others think problems through before acting. Research shows that reflective children—those who stop and think—tend to perform better than impulsive children in accomplishing tasks requiring detailed study.

Physical health and environment also play important roles in cognitive growth. There is evidence that during pregnancy, poor eating habits or excessive smoking on the mother's part can slow down the future development of her unborn child. Lack of proper nutrition during early childhood also has been found to retard intellectual functioning.

The role of environment becomes clearer in studies of identical twins. Identical twins raised separately in differing environments show greater differences in their performances on IQ tests than do identical twins raised in the same home. Exposure to stimulating and enriching environments provides children with major advantages for cognitive development.

The acquisition of language skills, understanding of the world and others, memory, levels of thinking, and altruism—all pieces of cognition—are influenced by inherited potential, general health, environment, and, to a great extent, parents.

Language Skills

Language is one of the most important tools for thinking and communication. By the age of 4, a child has learned over 1,000 words. The language-learning process starts with babbling at about 6 months, imitating speech at 8 months, and using words after the first birthday. At about 18 months or 2 years of age, the child is mastering two-word sentences like "all gone" or "me go!" Children also talk out loud to themselves while doing things, rehearsing words to go with actions. As the child learns and becomes more familiar with language, this self-talk becomes abbreviated, then whispered. Finally, it disappears, absorbed into the thinking process.

At 2 years, children enjoy rhymes (Jack and Jill went up the hill). By 3, they learn responses which require signs and reactions, as in the game *Simon Says*. At the age of 4, they can cluster thoughts and words; by 5 they deal with information in a series. In the process, children begin the progression from concrete to abstract thinking—from perceptual (I see) to conceptual (I put together in my mind).

The child who talks early is almost always of above-average intelligence. However, the reverse statement cannot be made. Although some gifted children talk 4 months earlier than the average child, some do not talk until they are 2- or 3-years-old (Einstein did not talk until he was 4). Parents often worry needlessly about averages and norms. Discussing concerns with a pediatrician may help the worried parent.

Growth of Understanding and Memory

The development of understanding can be seen in many ways. For instance, a preschooler may not know the difference between make-believe and lying. She may not see the difference between fact (what is true) and fantasy (the way she would like it to be). As a result, she may color facts when telling a story to make it come out the way she wants it to. Elementary school children, on the other hand, are thought to be less "me" oriented. They seem better able than preschoolers to put themselves in another person's place and understand how their actions affect her or him. To some extent, they can anticipate what the other person will do and feel and what will happen as a result. Nevertheless, even in the primary grades, some children still have difficulty imagining themselves in somebody else's situation.

A preschooler tends to think in terms of herself. Living in her own world, she may not realize that other people think and feel differently. She thinks a doll, even when facing in a direction different from hers, sees the same view that she sees. A 4-year-old can tell you what a plane looks like from the side (because that's how she has usually seen it in pictures) but not from other angles.

One way a child grows beyond this self-centered world is by talking to other people. When this communication process begins to feed back information, what happens can be very exciting for a child. She wants to talk not only to parents and friends but also to people she does not know. She wants to know people's names, where they live, and what they do. This is how children first learn about roles.

Acquiring knowledge about roles helps a child understand obligations and relationships to others. For example, a fireman fights fires; he saves people and buildings; he is a hero whom people look up to and need. Then children gradually come to realize that, for example, a father cannot be a father without a child, that teachers need students, and that doctors have patients.

Understanding this network of obligations, expectations, and associations helps a child learn how to get along with others. Without conscious effort, she begins to build concepts or ideas, fitting what she knows with what she learns from other people. The information from others helps a child understand who she is. She mentally takes this self and tries on the roles of those around her (as in playing house or doctor). When she plays new roles, she learns more about herself and others. Thinking about self and role plays of this type are an important part in the cognitive process.

Each time a child learns something, the information is stored in her memory. The mind sorts what has been learned and finds ways to use it. The older a child becomes, the longer she can store facts, lists, instructions, words, plans, images, and ideas in her memory.

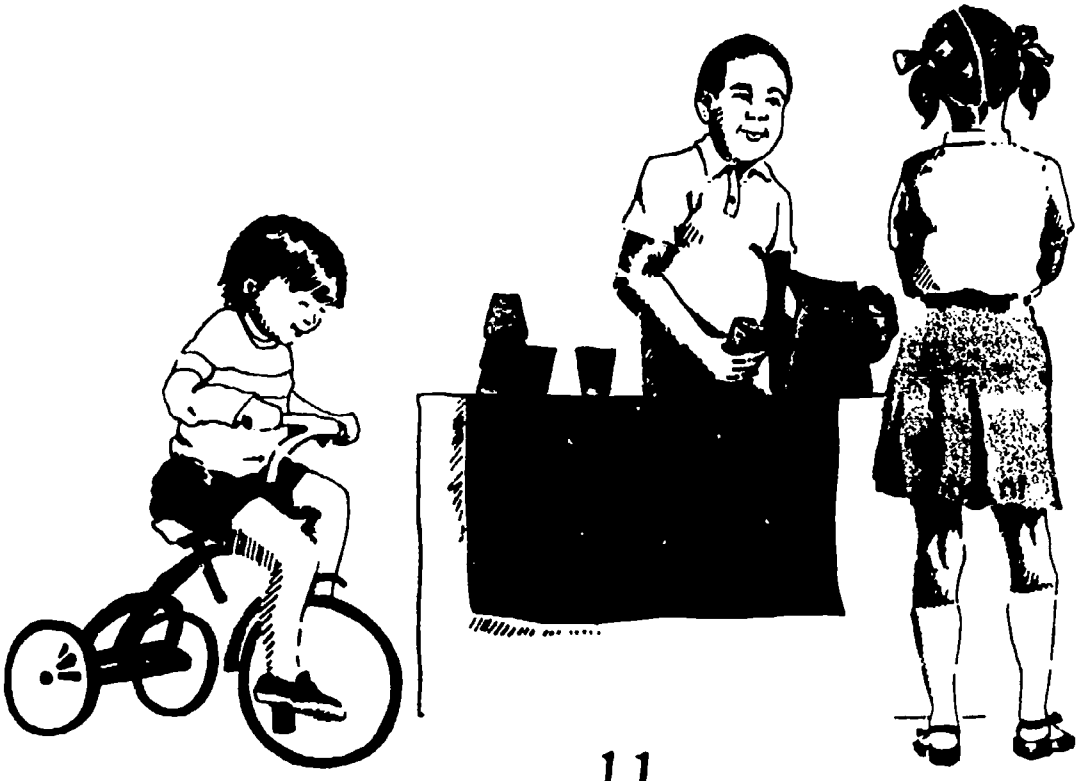
There are different kinds of memory. Sensory information may stay only long enough to be realized (you pinch yourself, feel the pain, and then usually forget it fast). Short-term memory information stays about 30 seconds (for example, you look up a telephone number and forget it after you dial). Long-term memory keeps some information for many years or a lifetime.

Levels of Thinking

In addition to growing language, understanding, and memory skills, mental development includes increasingly complex levels of thinking. Authorities disagree on how many such levels exist. Educational psychologist Benjamin Bloom suggests there are six, beginning with knowledge and continuing through comprehension, application, analysis, synthesis, and evaluation.

To illustrate these six levels, let's pretend that a child is going to open a lemonade stand. She has learned that she can make lemonade and sell it to neighborhood children for 5¢ a glass (that's knowledge). If she's very young, she may gather up the ingredients from her kitchen and count all the money she receives as profit. However, if she's older and wiser, she understands that lemonade and paper cups cost money and that the cost must be deducted from the profit (that's comprehension). Application is putting the plan together, getting parental approval, and going ahead. After the child has developed analytical ability, she figures out that smaller cups will increase the profit and that a sign at the curb will bring more customers.

If other children in the neighborhood are also selling lemonade, she has to come up with a better idea. Among other possibilities, she can move to a better location or give something extra. Here, she is using the ability to synthesize or to put ideas and objects together to create something new. If her thinking abilities have matured to the point where she can evaluate various strategies or ideas, she may put wheels on her stand to make it mobile and an umbrella to protect it from the weather and be in business for as long as she chooses.



Altruism and Conscience

Another important element in a child's mental and emotional growth is the learning of altruism, the ability to consider the well-being of others, which some experts believe is related to the development of conscience, knowing the difference between right and wrong.

Dr. Carolyn Zahn-Waxler, Chief of the Laboratory of Developmental Psychology of the National Institute of Mental Health, and her co-investigators studied altruism in children between the ages of 1½ and 2½. They looked at children's responses to two situations. In one case, the child was an innocent bystander to another's discomfort—observing someone crying, for example. In the other situation, the child was the cause of another's hurt or unhappiness. A child's caring and sympathetic words or actions as the bystander are typically interpreted by researchers as altruistic, while such comforting behaviors following an incident where the child was responsible for the "hurt" are viewed as the beginnings of conscience.

The investigators also studied mothers' interactions with their children during the two situations and found that mothers became involved more often and reacted more strongly when their children were the cause of a problem than when they were bystanders. In addition, the scientists found that how mothers handled such situations influenced their children's altruistic tendencies.

More altruistic behaviors were observed in children whose mothers responded with strong feelings and in a variety of ways—explaining, restraining, comforting—than among children whose mothers either ignored the situation or offered the child no explanations of why they could or could not act in specific ways. Explanations that contained moralistic and judgmental content, such as "You shouldn't do that because it hurts Johnny and hurting people isn't nice," seemed to inspire altruism, whereas a simple "Stop that" or "Don't do that" appeared to have the opposite effect, discouraging altruistic behaviors. Children who were more altruistic in situations where they have been the cause of the trouble were also altruistic in situations where they were the bystanders, an indication that learning in one case is transferred to the other.

The development of a balanced, mature conscience and mind takes time and patience. As a child learns right from wrong and adopts values and ideals, she becomes more aware of the effect of her actions on herself and others. She sees the need for people to cooperate with one another in the interest of all.

How Parents Can Help a Child's Mind to Grow

The reactions of other people are very important to a child's development. When parents talk to and play with their baby, they stimulate her senses. The baby, in turn, becomes more confident of her abilities. Games like peek-a-boo and patty-cake increase the interaction and improve the relationship between parent and child. At the same time, they lay the groundwork for more complicated learning.

The potential for intelligent behavior does not simply unfold. Its development needs experience, encouragement, affection, and tender, loving care along with stimulation from the environment. (Enriching the environment of a culturally deprived child can bring striking improvements in intelligence test scores, especially if a child is quite young at the time of the change.)

There are many ways to stimulate the learning and thinking process. Parents can help by not using baby talk. They can also help by explaining objects and events, using more than one word, and trying to involve more than one sense. For instance, a child says, "Look!" The parent might respond, "What is it?" The child then names the object or, if she doesn't know the name, is told what it is. Other questions lead to her practicing what she already knows, or they add to her knowledge. Examples are: "What color is it?" "What is it doing?" "What does it feel like?"

Children are full of curiosity. They are full of questions that can lead to stimulation of their thought processes. When parents accept and respond to this curiosity, it grows. When they do not, it may wither—to the detriment of learning. If a parent responds receptively to each situation as it unfolds, a natural reaction takes place that helps the learning process as well as the parent-child relationship.

Therefore, when a child asks questions, be sure to give answers in such a way that she has something to think about. To encourage her to exchange information, ask her opinion about an idea, an object, or a situation. See if she can figure out more than one way to solve a problem or to find the information she needs. With increases in the child's ability to handle information, make your explanations more complex.

As a child is challenged, her learning speeds up and her world grows larger. On the other hand, if pushed so far that she can't succeed, she becomes frustrated. Also, if a parent gives too many or too complex directions, the child may give up and stop trying, or she may respond with anger and rebellion. Some adults think on such a

sophisticated level that they tend to talk over a child's head. Such an adult's instructions to a young child can be like an explanation of how to fly an airplane to someone who wants only to steer a scooter.

When a child has both choice and voice in a project, she is more likely to become involved and to commit herself to goals. And when behaviors are rewarded (for example, by paying attention to them), they are more likely to be repeated.

Your child's intellectual development doesn't hang on a single act but on an attitude that encourages enthusiasm for learning and new ideas. Your child models herself after you, and a major route for learning is your child's observations of how you learn and deal with your emotions and stress.

Children also learn from watching other siblings or TV shows. However, parents should not expect educational TV programs to do all the work. Research shows that a child gains the most from television when a parent is involved and shares the experience. For example, the parent helps by explaining what the child doesn't understand and by talking about issues raised in the program.

Instead of telling children what to think or do in every situation, help them to learn how to solve their problems themselves. People who are good at problem solving are better adjusted and more able to get along with other persons than those who are not. They are less nagging, demanding, impatient, and aggressive. They also tend to be less inhibited, shy, fearful, or withdrawn. They are more concerned about others and better liked. This has been found to be true of children as young as 4 years of age.

When children are encouraged to choose among alternatives and judge the consequences of their actions, they learn to think about the various possibilities. And they discover that, when the first idea for solving a problem does not work, there are other routes available.

In managing your child, use your imagination; put yourself in her place. Let's pretend that you are expecting guests and your child is fingerpainting. If you say, "You can't do that anymore; go ride your bike," her answer will probably be, "I don't want to." If instead you explain that you are expecting company and ask her to think of something less messy to do, she just might choose to ride her bike or may even offer to help. A child is much more likely to carry out her own idea than one suggested or imposed by an adult. Of course, there will be times when you will have to insist that a child do it your way.

In Summary

Every child wants to know more. As she explores, learns, and receives encouragement and reinforcement (or rewards) from the actions and words of parents, her world of knowlege expands along with her ability to think.

Parents are a key ingredient in the development of their child's thinking abilities. When they provide interesting experiences, encouragement, affection, love, and a challenging environment, they vastly expand what a child is likely to achieve.

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