

# Cognitive & Language Development in

## Middle Childhood

Children in middle childhood are beginning a new experience—that of formal education. In the United States, formal education begins at a time when children are beginning to think in new and more sophisticated ways. According to Piaget, the child is entering a new stage of cognitive development where they are improving their logical skills. During middle childhood, children also make improvements in short term and long term memory.

According to Piaget, children in early childhood are in the preoperational stage of development in which they learn to think symbolically about the world. From ages 7 to 11, the school-aged child continues to develop in what Piaget referred to as the **concrete operational stage of cognitive development**. This involves mastering the use of logic in concrete ways. The child can use logic to solve problems tied to their own direct experience but has trouble solving hypothetical problems or considering more abstract problems. The child uses inductive reasoning, which means thinking that the world reflects one's own personal experience. For example, a child has one friend who is rude, another friend who is also rude, and the same is true for a third friend. Using inductive reasoning, the child may conclude that friends are rude. (We will see that this way of thinking tends to change during adolescence as children begin to use deductive reasoning effectively.)

The word concrete refers to that which is tangible; that which can be seen or touched or experienced directly. The concrete operational child is able to make use of logical principles in solving problems involving the physical world. For example, the child can understand the principles of cause and effect, size, and distance.

As children's experiences and vocabularies grow, they build schema and are able to classify objects in many different ways. **Classification** can include new ways of arranging information, categorizing information, or creating classes of information. Many psychological theorists, including Piaget, believe that classification involves a hierarchical structure, such that information is organized from very broad categories to very specific items.

One feature of concrete operational thought is the understanding that objects have an **identity** or qualities that do not change even if the object is altered in some way. For instance, the mass of an object does not change by rearranging it. A piece of chalk is still chalk even when the piece is broken in two.

During middle childhood, children also understand the concept of **reversibility**, or that some things that have been changed can be returned to their original state. Water can be frozen and then thawed to become liquid again. But eggs cannot be unscrambled. Arithmetic operations are reversible as well:  $2 + 3 = 5$  and  $5 - 3 = 2$ . Many of these cognitive skills are incorporated into the school's curriculum through mathematical problems and in worksheets about which situations are reversible or irreversible. (If you have access to children's school papers, look for examples of these.)

Remember the example from the earlier module of children thinking that a tall beaker filled with 8 ounces of water was "more" than a short, wide bowl filled with 8 ounces of water? Concrete operational children can understand the concept of **reciprocity** which means that changing one quality (in this example, height or water level) can be compensated for by changes in another quality (width). So there is the same amount of water in each container although one is taller and narrower and the other is shorter and wider.

These new cognitive skills increase the child's understanding of the physical world. Operational or logical thought about the abstract world comes later.

## Information Processing Theory

Information processing theory is a classic theory of memory that compares the way in which the mind works to computer storing, processing and retrieving information. According to the theory, there are three levels of memory:

1) **Sensory memory**: Information first enters our sensory memory (sometimes called sensory register). Stop reading and look around the room very quickly. (Yes, really. Do it!) Okay. What do you remember? Chances are, not much, even though EVERYTHING you saw and heard entered into your sensory memory. And although you might have heard yourself sigh, caught a glimpse of your dog walking across the room, and smelled the soup on the stove, you may not have registered those sensations. Sensations are continuously coming into our brains, and yet most of these sensations are never really perceived or stored in our minds. They are lost after a few seconds because they were immediately filtered out as irrelevant. If the information is not perceived or stored, it is discarded quickly.

2) **Working memory** (short-term memory): If information is meaningful (either because it reminds us of something else or because we must remember it for something like a history test we will be taking in 5 minutes), it moves from sensory memory into our working memory. The process by which this happens is not entirely clear. Working memory consists of information that we are immediately and consciously aware of. All of the things on your mind at this moment are part of your working memory.

There is a limited amount of information that can be kept in the working memory at any given time. For most people, this is somewhere around  $7 \pm 2$  pieces or chunks of

information. If you are given too much information at a time, you may lose some of it. (Have you ever been writing down notes in a class and the instructor speaks too quickly for you to get it all in your notes? You are trying to get it down and out of your working memory to make room for new information and if you cannot “dump” that information onto your paper and out of your mind quickly enough, you lose what has been said.)

Rehearsal can help you maintain information in your working memory, but the process by which information moves from working memory into long term memory seems to rely on more than simple rehearsal. Information in our working memory must be stored in an effective way in order to be accessible to us for later use. It is stored in our long-term memory or knowledge base.

3) **Long-term memory** (knowledge base): This level of memory has an unlimited capacity and stores information for days, months or years. It consists of things that we know of or can remember if asked. This is where you want the information to ultimately be stored. The important thing to remember about storage is that it must be done in a meaningful or effective way. In other words, if you simply try to repeat something several times in order to remember it, you may only be able to remember the sound of the word rather than the meaning of the concept. So if you are asked to explain the meaning of the word or to apply a concept in some way, you will be lost. Studying involves organizing information in a meaningful way for later retrieval. Passively reading a text is usually inadequate and should be thought of as the first step in learning material. Writing keywords, thinking of examples to illustrate their meaning, and considering ways that concepts are related are all techniques helpful for organizing information for effective storage and later retrieval.

During middle childhood, children are able to learn and remember due to an improvement in the ways they attend to and store information. As children enter school and learn more about the world, they develop more categories for concepts and learn more efficient strategies for storing and retrieving information. One significant reason is that they continue to have more experiences on which to tie new information. New experiences are similar to old ones or remind the child of something else about which they know. This helps them file away new experiences more easily.

Children in middle childhood also have a better understanding of how well they are performing on a task and the level of difficulty of a task. As they become more realistic about their abilities, they can adapt studying strategies to meet those needs. While preschoolers may spend as much time on an unimportant aspect of a problem as they do on the main point, school-aged children start to learn to prioritize and gauge what is significant and what is not. They develop metacognition or the ability to understand the best way to figure out a problem. They gain more tools and strategies (such as “i before e except after c” so they know that “receive” is correct but “recieve” is not.)

# Language Development

**A far more visible expression of children's cognitive development during middle childhood can be found in their ability to use and appreciate increasingly sophisticated forms of language. Commonly, children will master several subtle but powerful communication skills during their middle childhood years**

Much of children's cognitive development happens "beneath the surface", so to speak. It is subtle and hard to visualize. It is difficult, for instance, to track the development of children's cognitive operations or the expansion of their information processing abilities across time without observing what children do when confronted with specially designed problems and tasks or to having them sit through formal tests of attention and memory. A far more visible expression of children's cognitive development during middle childhood can be found in their ability to use and appreciate increasingly sophisticated forms of language. Commonly, children will master several subtle but powerful communication skills during their middle childhood years.



First, school-aged children learn how to emphasize or stress certain syllables so as to alter the meaning of words and sentences. This skill enables them to communicate distinctly different messages using the same words. For example a child's request to go to the store could be phrased as a sweet, kind question

*"Can we go to the store?"*

or as an insistent demand

*"Can we GO-O to the store?"*

depending on how words within the request are stressed.

Next, children develop meta-linguistic awareness during middle childhood. This skill helps them begin to appreciate that communications can carry multiple layers of meaning at once, beyond just the surface layer and the literal meanings of the basic words that are used. For example, most preschool-aged children think that the saying, "cool as a cucumber" means something is cold to the touch, like a cucumber that's been in the refrigerator. However, as they progress through middle childhood, children begin to realize that the phrase "cool as a cucumber" actually conveys a deeper meaning,

suggesting a person who remains calm and collected despite stress. As a result of this increasing appreciation of the sophisticated ways that language is used, children begin to understand and tell more complex jokes, metaphors, and puns and to appreciate sarcasm.

Children's technical communication skills also improve during this period. Children's grasp of grammar improves, enabling them to start using more complex sentence structures in their speech and writing. For instance, children will begin to use the passive voice (e.g., "The cookies were made yesterday") instead of always using the active voice (e.g., "Mom made cookies yesterday"). Children in the middle childhood stage will also start to use infinitive phrases such as "to go to the store," or "to play with the dog" for the first time. As children learn shading (the ability to gradually and logically transition between subjects in a conversation), it becomes easier for others to follow their conversation. Children's tendency to abruptly change the topic of discussion decreases. Children of this age also develop referential communication skills, meaning that they develop the ability to clearly express their own ideas as well as to ask for clarification when they don't understand what other people are saying.

Language development depends upon parallel achievements in areas of children's cognitive and physical abilities. Language production depends on children's mastery of fine motor control over the movements of their lips, tongue, breath, etc. Similarly, mastery of complex language phrasing and sentence construction depends on children's various cognitive abilities, including memory and attention abilities. Delays in these other systems may cause delays in children's language development. Parents who are concerned about their own children's language development should consult with a qualified Speech Therapist.

# *Emotional and Social Development*

As children become more mature physically, cognitively, and emotionally, their social relationships with family and peers also mature and change. During middle childhood, peer friendships take on a more prominent role than ever before. Peer relationships can include friends at school, friends in the neighborhood, teammates or other co-participants in activities like Boy or Girl Scouts, and near-age siblings.

During this middle developmental period, as communication and cognitive skills continue to improve, children develop increased interpersonal awareness. As a result, they become better at reading and responding to other kids' emotions, and understanding other kids' intentions and needs; why they behave in specific ways at specific times. These social skills lay the foundation for the formation of closer friendships.

## **Peer Friendships Based Upon Reciprocity**

In middle childhood, friendships take on some of the key attributes characteristic of adult relationships and start to become something more than simple playtime companionship. Now, friendships come to be based upon mutual regard for another individual's personality, abilities and behavior. Children grow closer together because they respect the other child's kindness, humor, loyalty, fearlessness, intellect, etc. Mutual trust and willingness to support each other (in a word "reciprocity") are the hallmarks of these friendships.

Most children of this age also begin forming peer groups, which are circles of friends where they spend most of their time playing, talking, and socializing. However, this period often is associated with a decrease in children's total number of friends (e.g., a child might have 2 or 3 best friends rather than 5 or 6), as they put more time and effort into maintaining particular special friendships.

Some children struggle to develop close friendships or find secure positions within peer groups. In some of these cases, children are physically or emotionally harmed by bullies who taunt, tease, threaten or actually violently assault them. Bullying is a serious issue

which can result in substantial long term social, occupational and emotional harm if not addressed. For more information on the management of school-aged bullying, please see our Middle Childhood Parenting center.

### **Continuing Emotional Dependence Upon Family**

Though children's peer relationships mature and become increasingly prominent during middle childhood, children's connection to their parents and core family continues to be of tremendous importance for their well being and functioning. As a rule, children will continue to model the choices, beliefs, and behaviors of the adults or older youth who are present in their family. Children will also continue to derive most of their emotional support, nurturing, and affection from their families. Children may come to seek this support from a narrower selection of family members, however, as they form more individualized family relationships which depend on shared activities, perceived family roles, and other common or complementary personality traits rather than simple presence.

### **New Susceptibility to Guilt and Shame**

Children's increased interest and investment in relationships with peers and adults in middle childhood makes them sensitive to the self-conscious emotions of pride, guilt and shame. Children derive a sense of pride, and thus an increased sense of self-esteem from making connections between their good choices and positive outcomes. They like the approval they may get from adults or peers, and they like the intrinsic feeling of pride in having achieved some objective. As feeling proud is very reinforcing, children who have this experience will be powerfully motivated to take on future challenges. Parental and peer correction experiences (where children are told that they've done something wrong) can similarly result in feelings of guilt or shame which are aversive, and which motivate them to behave differently, so as to obtain different outcomes.

Though mild guilt and shame are useful emotions, children's experience of excessive guilt or shame after negative outcomes can become destructive. Children who overgeneralize and conclude, on the basis of having made specific mistakes, that they are globally incapable people (e.g., kids who conclude, "I made that mistake because I

am a stupid person") may suffer severe decreases in self-esteem, which can lead to problems with depression, anxiety, peer relationships, and school problems.

Please see our Nurturing Children's Self-Esteem center for further discussion of how to address children's tendency towards negative self-talk



# **Physical & Motor Development of middle childhood: Age 7–11**

Ages 7 through 11 comprise **middle childhood**. Some authorities divide middle childhood into **early-middle** (ages 7–9) and **late-middle** (ages 10–11) periods. Like infants, toddlers, and preschoolers, these older children grow both physically and cognitively, although their growth is slower than it was during early childhood.

Physical development in middle childhood is characterized by considerable variations in growth patterns. These variations may be due to gender, ethnic origin, genetics, hormones, nutrition, environment, or disease. While children of this age group follow the same basic developmental patterns, they do not necessarily mature at the same rate. Most girls experience a preadolescent growth spurt around age 9 or 10, while most boys experience the same growth spurt around age 11 or 12. Children who do not receive adequate nutrition or medical attention may be at risk for stunted or delayed growth development. For example, children who live in countries where malnutrition is not a problem tend to be taller than children who live in countries where malnutrition is a problem.

Physical changes, brain and nervous system development, gross and fine motor skills, and health issues are important aspects of physical development during middle childhood as in previous developmental stages.

## Physical changes

By the beginning of middle childhood, children typically have acquired a leaner, more athletic appearance. Girls and boys still have similar body shapes and proportions until both sexes reach **puberty**, the process whereby children sexually mature into teenagers and adults. After puberty, **secondary sexual characteristics**—breasts and curves in females, deeper voice and broad shoulders in males—make distinguishing females from males much easier.

Girls and boys grow about 2 to 3 inches and gain about 7 pounds per year until puberty. Skeletal bones and muscles broaden and lengthen, which may cause children (and adolescents) to experience growing pains. Skeletal growth in middle childhood is also associated with losing the **deciduous teeth**, or baby teeth.

Throughout most of middle childhood, girls are smaller than boys and have less muscle mass. As girls enter puberty, however, they may be considerably larger than boys of the same age, who enter puberty a few years later. Once boys begin sexually maturing, their heights and weights eventually surpass the heights and weights of girls of the same age.

## Brain and nervous system development

Brain and nervous system developments continue during middle childhood. More complex behavioral and cognitive abilities become possible as the central nervous system matures.

Early in middle childhood, a growth spurt occurs in the brain so that by age 8 or 9, the organ is nearly adult-size. Brain development during middle childhood is characterized by growth of specific structures, especially the **frontal lobes**. These lobes, located in the front of the brain just under the skull, are responsible for planning, reasoning, social judgment, and ethical decision making, among other functions. Damage to this part of brain results in erratic emotional outbursts, inability to plan, and poor judgment. The most anterior (front) portion of the frontal lobes is the **prefrontal cortex**, which appears to be responsible for personality.

As the size of the frontal lobes increases, children are able to engage in increasingly difficult cognitive tasks, such as performing a series of tasks in a reasonable order. An example is assembling a mechanical toy: unpacking the pieces, connecting the parts, making the model move by adding a power source—a series of tasks that must be completed in the correct order to achieve certain results.

**Lateralization** of the two hemispheres of the brain, also continues during middle childhood, as does maturation of the **corpus callosum** (the bands of neural fibers connecting the two cerebral hemispheres), and other areas of the nervous system. Interestingly, children achieve concrete operations around age 7 when the brain and nervous systems have developed a certain amount of neural connections. When these neural connections have developed, a child's ability to perceive and think about the world advances from an egocentric, magical viewpoint to a more concrete and systematic way of thinking.

### **Motor skills**

**Motor skills** are behavioral abilities or capacities. **Gross motor skills** involve the use of large bodily movements, and **fine motor skills** involve the use of small bodily movements. Both gross and fine motor skills continue to refine during middle childhood.

Children love to run, jump, leap, throw, catch, climb, and balance. Children play baseball, ride bikes, roller skate, take karate lessons, take ballet lessons, and participate in gymnastics. As school-age children grow physically, they become faster, stronger, and better coordinated. Consequently, during middle childhood, children become more adept at gross motor activities.

Children enjoy using their hands in detailed ways, too. From early in preschool, children learn and practice fine motor skills. Preschool children cut, paste, mold, shape, draw, paint, create, and write. These children also learn such skills as tying shoelaces, untying knots, and flossing their teeth. Some fortunate children are able to take music lessons for piano, violin, flute, or other instruments. Learning to play an instrument helps

children to further develop their fine motor skills. In short, along with the physical growth of children comes the development of fine motor skills, including the sense of competence and confidence to use these skills.