

## Cognitive Development in 3-5 Year Olds

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*By Michelle Anthony, PhD*

The preschool period is a time of rapid growth along a number of developmental measures, not the least of which is children's thinking abilities, or cognition. Across this time period, children learn to use symbolic thought, the hallmarks of which are language and symbol use, along with more advanced pretend play. Children this age show centration of thought, meaning their focus is limited to one aspect of a situation or object. Memory abilities come online and children show their own ways of categorizing, reasoning, and problem solving.

### Memory

Memory is the ability to acquire, store, and recall information or experiences across time. It is not until age 3 that children can reliably do this, although they remain better at recognition than recall, and they do not show the ability to spontaneously use mnemonic strategies to assist remembering for a number of years. Preschoolers use language to encode and compare information for later retrieval; thus, talking about events increases children's memory of them.

Memories are more easily recalled when the child is a participant as opposed to an observer, or when something makes a significant impression. Children's ability to create mental images of people or events also facilitates memory. Help your child learn to create and maintain images with these fun puzzles.

Children tend to use routines to define understanding of events, and to recall sequence, but preschoolers' sense of time is very general (e.g., they may use the word "yesterday" to mean a month ago). As a result of their relatively weak memory skills, they can repeatedly hear the same story over and over, and delight in each retelling as if it were the first time.

### Vygotsky

Russian researcher Lev Vygotsky believed cognition advanced through social interactions and problem solving. Vygotsky's work demonstrates that with the support of a More Knowledgeable Other (MKO) (adult or more skilled peer), children's ability shows marked increase, as long as the interactions were not too advanced for the child's present level of skill. He believed the right level of challenge would be in the child's "Zone of Proximal Development (ZPD)," which would be optimized by scaffolding (support and guidance that the MKO would provide without taking over).

Vygotsky also noticed that, as children were moving towards independence with challenging tasks, they would talk to themselves. Termed private speech, this self-talk is highly prevalent in children ages 3-7. Thereafter, it mutates into inner speech or internal thought, although it is likely to resurface at challenging or confusing tasks. According to Vygotsky, children's use of language in this way is the foundation of their executive function skills, including attention, memorization, planning, impulse control, etc.

### Preschool Thinking

Preschoolers are firmly in the stage Piaget called the preoperational (pre-logical) period (from 2-7). While current researchers question if preschoolers are as illogical as Piaget posited, anyone who has spent time with them knows they think differently than adults! Notably, they are not able to reverse actions (e.g., understand that if  $3+3=6$ , then  $6-3=3$ , or worrying that if they break a bone, it cannot be fixed).

In addition, they are unable to conserve (to recognize that objects that change in form do not change in amount). In his famous penny conservation experiment, Piaget demonstrated that until about the age of 6, children would say that the spread out row of pennies had more than the row with the (equal number) of more squished together pennies, even if they themselves counted each row. Piaget explains this contradiction by stating that children's logic in this time period is ruled by perceptions as opposed to reasoning.

The idea of perceptually-based centration expands beyond conservation to the preschoolers' larger world view. In general, children this age are egocentric; they cannot spontaneously and independently vary from their own perspective. For example, children may say that grass grows so that they do not get hurt when they fall or because they like chocolate, everyone must. As an extension, they believe that everyone shares the same viewpoint as them, so of course they should get the cookies if they think that, everybody does. As a component of egocentric thought, preschoolers show animism, the belief that nature and objects are alive with human-like characteristics (e.g., when your child says that the ground made them fall). The ability to decenter is one of the hallmarks of the completion of the preoperational stage.

Children's illogical thinking extends across various domains. For example, in their classification abilities, they cannot yet understand that one object can be classified multiple ways. For example, children may say there are more girls than children in a co-ed class, or that they don't want fruit for snack, they want a pear. In the same way, they will often over-generalize their category labels. For example, a child may call all animals with four legs "dogs," or all people with gray hair "grandma."

In addition, preschoolers often rely on transductive reasoning, whereby they believe the similarities between two objects or the sequence of events provides evidence of cause and effect. For example, if a child sees their teacher at school in the morning and again when they leave, they may believe their teacher must live there. Similarly, if their friend is Italian and eats pasta, they may believe that eating pasta will make someone Italian. In these examples, we see the way preschoolers' thoughts are dominated by their perceptions.

As an extension, preschoolers demonstrate magical thinking, whereby they believe that if they wish for something, they have the power to make it happen, including accidentally wishing harm on a sibling, or being the cause of their parent's divorce. Try Flabby Physics for some fun ways to develop your child's sense of cause and effect.

## **Symbol Use**

The time from 3-5 is the heart of symbol development in young children. Use of symbols entails the ability to use one thing to represent another, for example to have the letters 'dog' represent an actual dog, have a drawing/map stand for a location, or to have a checker represent a cookie in a game. Preschoolers learn to mentally use and represent tangible objects through images, words, and drawings.

While children cannot yet manipulate these symbols, or represent abstract ideas, the ability to use symbols rather than engage in simple motor play is a defining characteristic of the preschool period.

In fact, imaginative play is related to cognitive growth and achievement. For example, preschoolers who engage in more complex pretend play demonstrate advanced general intellectual development and are seen as more socially competent by their teachers.

Children who create imaginary friends, who previously would have been red-flagged as at risk for maladjustment, demonstrate more advanced mental representations and more sociability with their peers than those who do not.

While there is no denying the unique perspective that preschoolers view the world with, there are contexts and domains within which these very young children do in fact think logically. The key to this “hidden ability” is the amount of knowledge or experience the child has in the particular domain or area of study. Importantly, the way this knowledge is acquired—through investment, engagement, exploration, and discovery—is the means by which preschoolers advance in their thinking and reasoning skills.

Source: <http://www.scholastic.com/parents/resources/article/stages-milestones/cognitive-development-3-5-year-olds>

## **Cognitive Development in Preschoolers**

*By C. Seefeldt and B.A. Wasik*

One of the most important cognitive shifts in the preschool years that occurs between three- to four-year-olds is the development of symbolic thought. Symbolic thought is the ability to mentally or symbolically represent concrete objects, actions, and events (Piaget, 1952). The most obvious sign of the development of symbolic thought in four-year-olds is the significant increase in their use of make-believe play, which becomes more elaborate as they grow. “Do you like my horse?” Sam asks as he rides around his classroom on a makeshift broom. “He’s really fast and loves it when I brush his hair.”

Three-year-olds and some young four-year-olds are considered pre-operational thinkers, which means that they rely solely on the concrete appearance of objects rather than ideas, they focus on only one relationship at a time, and they often see things from only one point of view—their own (Piaget, 1969). Three-year-old Eric looks at a row of six cups that are spaced about three inches apart. Below the row of cups is a second row of cups with the same number as the row above; however, they are spaced one inch apart. When asked which row has more cups, he says that the top row has more because it is longer. Eric makes his decision based on how long the row appears, the physical feature of the line, and doesn’t attend to the absolute number of cups in the row. When his mom counts the number of cups in each row, Eric still says that the longer row has more cups. Clearly, Eric’s thinking is based on what he sees and understands. To a three-year-old, longer means more. When Eric’s mom aligns the cups in the top row with the cups in the bottom row, and they look to be the same length, Eric says that there is the same number of cups. Again, Eric’s decision making is dependent on the appearance of the cups. According to Piaget, Eric does not have conservation of number and will develop this cognitive skill by the time he is five years old.

The same is true for three- and young four-year-olds’ understanding of conservation of quantity. Eric is shown two cups; one cup is tall and thin and the second cup is short and wide. Both hold the same amount of juice. Eric’s mom pours juice from the tall, thin cup into the short, wider cup showing him that the same amount of juice fits into both glasses. When asked what glass of juice he wants, Eric replies, “I want this,” pointing to the tall glass, “because I am really thirsty and I want more juice.” Eric, who just turned four, attends to the most salient feature of the cup—its height. At this age, children are concrete thinkers and solve problems based on physical features.

Three-year-olds have good memories for things in their immediate experiences. However, they have not developed effective strategies for recalling information over longer periods of time. Therefore, structure and routines are important in three-year-olds’ lives. This allows them to anticipate and predict what they will be doing and what is expected of them. However, children’s wonder at this age for things that they have repeatedly experienced is related to their under developed memories. Three-year-olds can repeatedly watch the same puppet or read the

same book 40 times and still show the same delight as they did the first time they were engaged in these activities.

Four- and five-year-olds experience important changes in cognitive growth. In general, four- and five-year-olds are beginning to problem solve, think about cause-and-effect relationships, and express these ideas to others. As four- and five-year-olds' cognition matures, they begin to make the distinction between private thoughts and public expressions.

Four-year-olds are actively manipulating their environment and constructing meaning from their world. At this age, children are very egocentric in their thinking. Egocentrism is the tendency to be more aware of their own point of view than that of others (Piaget, 1952). This explains why four-year-olds have difficulty understanding how the world looks to other people. It is difficult for them to understand why others are not happy when they are happy, sad when they are sad, and hungry when they are hungry. A four-year-old gave her teacher her favorite teddy bear because the teacher said that she was not feeling good. The teddy bear made the four-year-old feel better when she was sick, so the same must be true for her teacher. Because four-year-olds think egocentrically, it is best to present information that is hands-on and is relevant to their own experiences.

Four-year-olds' thinking and reasoning are concrete, and they typically reason from the particular to the particular as opposed to the particular to the general. (Siegler, 1997). Four-year-old Seth reasons that his dog is friendly, so the dog he passes on his way to school must be friendly, too. Seth likes chocolate, so everyone in his family must like chocolate. At this age, children presume a causal relationship if two events are closely associated in time or in some other way. Bryan sees his teacher at school when he arrives in the morning and leaves her there when he returns home in the afternoon. He reasons that his teacher must live at school.

Concept development is another important aspect of the cognitive development of four-year-olds. They are organizing information into concepts (e.g., chair or animal) based on attributes that define an object or an idea. However, at four years of age, the categories that the concepts are based on are derived from the appearance or the action of the object. Seth calls a small goat that he is allowed to pet at the zoo a "dog." In his mind, the goat fits all the criteria needed to be a dog: small, furry, and having four legs (Gelman, 1999).

Similarly, when four-year-olds classify objects into categories, they tend to focus on one aspect of the object and ignore the other features. Mary is trying to tell her mother that she does not want fruit for a snack; she wants an apple. She is having difficulty understanding that an apple is a part of the larger category of fruit. Because four-year-olds are beginning to understand part/whole and hierarchical relationships, they have difficulty grasping that objects can be in more than one class. Also at this age, when children are asked to sort objects into specific categories, they are beginning to sort objects on the basis of one attribute (Gelman, 1999). When asked to sort the blocks into groups, Nathan started to put all the blue blocks in one pile and the red blocks in another. At one point, he had put a circular red block in the blue pile because the last block he picked up was circular, and that one was placed in the blue pile. For a moment, Nathan needed to think about what feature of the block he was focusing on for sorting. He confused the shape with the color and soon corrected himself. This ability to focus on one attribute of an object to classify is developing in four-year-olds.

Time is a concept that four-year-olds have difficulty comprehending (Piaget, 1969). Four-year-olds view time as events occurring immediately or taking a very long time. Anyone who has ever told a four-year-old that he or she will be taking a field trip in a week knows that the child will ask every day if he or she is going on the trip that day.

Four-year-olds are developing their memory skills. They can, with some prompting, remember what they did last weekend. Salient events such as birthday parties, class trips, and a child breaking his or her arm on the playground can easily be remembered. The child can recall main

events in a story and can retell a story with some accuracy of the sequence. Four-year-olds have difficulty remembering lists or isolated information.

Learning and remembering things at this age are easier if information is presented in a context that is meaningful to the child. Learning and remembering about spiders is easier if the child can study a spider that was crawling on the playground.

At four, children are also beginning to develop a sense about what is real and what is not. This is called the appearance/reality distinction (Flavell, 1992). For example, four-year-old Kate was very frightened of the clown that was at her friend's birthday party, and she clung to her mother's leg. As the clown did a magic trick and made her laugh, she said to her mother, "The clown is like a real person. I love her." Children are beginning to understand what is real and what is not real, what is a dream and what is not a dream.

Five-year-olds think about things. Lee watches the leaves fall off the trees and says that the leaves look like they are dancing. Then he asks, "Why do the leaves fall off the trees?" Five-year-olds are filled with questions about how things work, how things are made, and where things come from. This reflects their interest in understanding the world around them. Their imagination continues to develop, and their play centers around pretending. However, they begin to make distinctions between when they are pretending and when they are not. Classrooms are filled with children saying, "Look at me, I'm pretending to be a kite, or a dog, or a snake."

Although five-year-olds are egocentric in their thinking, they are beginning to be aware of others' feelings and points of view (Siegler, 1997). At this age, children can begin to understand that they can be happy when others are not and begin to accept that others do not have to play the exact game that they are playing. They are beginning to understand other children's likes and dislikes. Gary said at snack time, "You can give me Sam's graham crackers because I like them and he doesn't."

Five-year-olds' reasoning is still concrete, yet they reason less from the particular to the particular (Gelman, 1999). They may reason that because their dog is friendly, all dogs are friendly. However, they are quick to understand when an adult explains that that may not be the case with all dogs. They are beginning to understand that there are general rules, yet also exceptions to the rules. Also, five-year-olds' reasoning about concrete information, such as dogs that they see, is easier to accomplish than it is for more abstract information. Understanding that both whales and humans are mammals is a difficult concept for five-year-olds to grasp because it is difficult to demonstrate the similarities of the two in a concrete way.

Five-year-olds continue to become more sophisticated in their development and organization of concepts. With things that children are very familiar with, they can begin to see how different objects fit into different categories. Matthew has both a bunny and a turtle in his classroom. He understands that the bunny is soft and cuddly and eats carrots. The turtle lives in water, and his shell is hard. But when his teacher says that it is his turn to take the animals home for spring vacation, he understands that this means both the turtle and the bunny. He says, "Even though the bunny cannot swim, it still is an animal." Matthew is developing criteria for his concepts and refining his concepts on the basis of each new experience. His concept of "animal" is becoming more refined as he interacts with other animals and objects and begins to construct his notion of similarities and differences among things.

Five-year-olds are interested in sorting and grouping (Flavell, Miller, & Miller, 1992). They can successfully sort objects on the basis of a single feature, such as color, shape, and size. Sorting things on the basis of more abstract concepts, such as an object's use, is more challenging. Kim proudly showed her teacher how she sorted all the beads into different color groups. When asked to sort all the toys in the dramatic play area that could be used in the kitchen, the group included spoons, artificial foods, as well as a doll and teddy bear. Kim explained that she frequently played with her doll and teddy in her kitchen at home.

Understanding the concept of time is still a challenge for five-year-olds (Flavell, Green, & Flavell, 1995). They talk about things that happened in the past, yet yesterday means the same thing as last month or last week. However, they are able to understand time in terms of things that they are familiar with. To explain how long it will take to get to the zoo, the teachers say that it will take as long as it takes you to get home from school. Time is relative to things in the children's immediate experiences. Calendars posted in classrooms and in homes begin to help children conceptualize how long it will be until the field trip or their birthday.

At this age, children have not developed strategies for remembering information. However, with help, they can employ some strategies for remembering (Siegler, 1997). In remembering where they left their sneakers, the teacher can ask specific questions about what and where they were last playing, trying to help them reconstruct events to help them remember. Learning in context and in meaningful ways will increase their chances of recalling information. Five-year-olds can learn the alphabet if it is connected to experiences that they are familiar with. Also, they can recall parts of a story after two readings of a story (Morrow & Smith, 1990).

Five-year-olds are becoming more certain about what is real and what is pretend. At the classroom Halloween party, Jake stood and stared at the frightening witch who entered the room. Then he said, "Hey, Tina, is that you under there? You didn't fool me." At this age, children love to play pretend games, and their imaginations are boundless. They are fascinated with magic and think that things really can appear and disappear. Five-year-olds typically believe in the tooth fairy and the magic of Santa Claus. However, they are beginning to ask important questions about how the tooth fairy gets into their house and how she knows where the tooth is. These questions represent the evolution of their thinking and attempts to make concepts fit into what they know about the world.

*Excerpt from Early Education: Three, Four, and Five Year Olds Go to School, by C. Seefeldt, B.A. Wasik, 2006 edition, p. 50-54. © 2006, Merrill, an imprint of Pearson Education Inc.*