# Piaget's Stages

Piaget's Stages of Cognitive Development

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## Introduction

From his observation of children, Piaget understood that children were creating ideas. They were not limited to receiving knowledge from parents or teachers; they actively constructed their own knowledge. Piaget's work provides the foundation on which constructionist theories are based.

Constructionists believe that knowledge is constructed and learning occurs when children create products or artifacts. They assert that learners are more likely to be engaged in learning when these artifacts are personally relevant and meaningful.

In studying the cognitive development of children and adolescents, Piaget identified four major stages: sensorimotor, preoperational, concrete operational and formal operational. Piaget believed all children pass through these phases to advance to the next level of cognitive development. In each stage, children demonstrate new intellectual abilities and increasingly complex understanding of the world. Stages cannot be "skipped"; intellectual development always follows this sequence. The ages at which children progress through the stages are averages--they vary with the environment and background of individual children. At any given time a child may exhibit behaviors characteristic of more than one stage.

## Stages of Cognitive Development
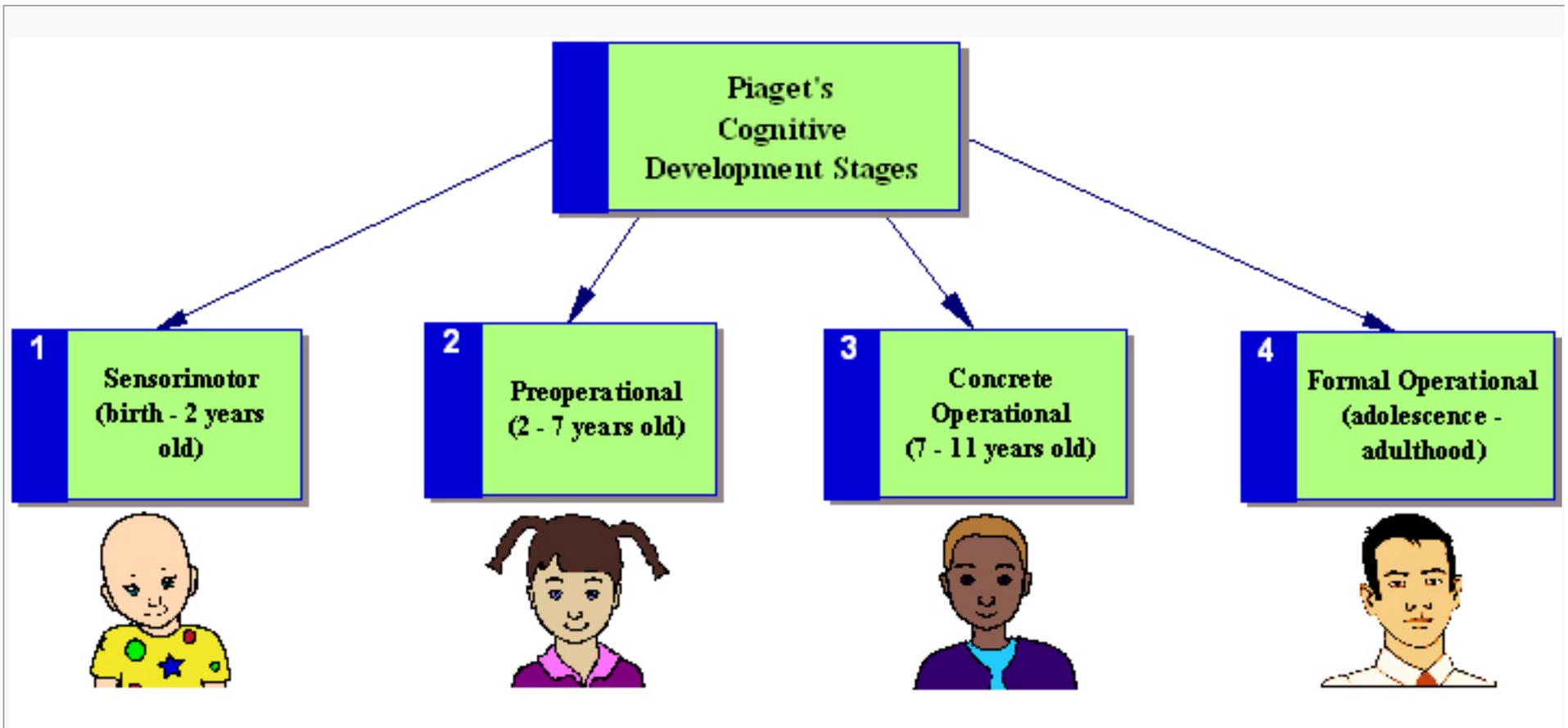
**Figure 1.** *The Inspiration web above illustrates Piaget's four cognitive development stages; sensorimotor (birth-2 years), preoperational (2 - 7 years), concrete operational (7 - 11 years), and formal operational (adolescence - adulthood). By Tiffany Davis, Meghann Hummel, and Kay Sauers (2006)*

The first stage, **sensorimotor**, begins at birth and lasts until 18 months-2 years of age. This stage involves the use of motor activity without the use of symbols. Knowledge is limited in this stage, because it is based on physical interactions and experiences. Infants cannot predict reaction, and therefore must constantly experiment and learn through trial and error. Such exploration might include shaking a rattle or putting objects in the mouth. As they become more mobile, infants' ability to develop cognitively increases. Early language development begins during this stage. Object permanence occurs at 7-9 months, demonstrating that memory is developing. Infants realize that an object exists after it can no longer be seen.

The **preoperational** stage usually occurs during the period between toddlerhood (18-24months) and early childhood (7 years). During this stage children begin to use language; memory and imagination also develop. In the preoperational stage, children engage in make believe and can understand and express relationships between the past and the future. More complex concepts, such as cause and effect relationships, have not been learned. Intelligence is egocentric and intuitive, not logical.

This animation demonstrates one of Piaget's classic experiments known as the "Three Mountain Problem." He designed this experiment to support his theory that children possess egocentrism characteristics of thought during the preoperational period of cognitive development. Piaget wanted to show that children have a self-centered perception of the world at this age. This flash animation demonstrates Piaget's theory. The girl is sitting in front of a mountain that has a cross visible only from her side. In addition, there is a doll on the other side of the mountain. According to Piaget's work, if preoperational children are asked to say what the doll can see, their response would reflect what can be seen from their perspective only. Clicking on the green button rotates the mountain to reveal the doll's true perspective. It does not show the cross. Critics of this experiment contend that the Three Mountain Problem is too complex. The same experiment was done using a simplified scene and the child was able to explain the view from the other side, thus displaying non-egocentric behavior Kuanchung Chen, Kris Irwin, Jamie Parker, Saied Roushanzamir (2004).

The **concrete operational** stage typically develops between the ages of 7-11 years. Intellectual development in this stage is demonstrated through the use of logical and systematic manipulation of symbols, which are related to concrete objects. Thinking becomes less egocentric with increased awareness of external events, and involves concrete references.

The period from adolescence through adulthood is the **formal operational** stage. Adolescents and adults use symbols related to abstract concepts. Adolescents can think about multiple variables in systematic ways, can formulate hypotheses, and think about abstract relationships and concepts.

Piaget believed that intellectual development was a lifelong process, but that when formal operational thought was attained, no new structures were needed. Intellectual development in adults involves developing more complex schema through the addition of knowledge.

## Educational Implications

An important implication of Piaget's theory is adaptation of instruction to the learner's developmental level. The content of instruction needs to be consistent with the developmental level of the learner.

The teacher's role is to facilitate learning by providing a variety of experiences. "Discovery learning" provides opportunities for learners to explore and experiment, thereby encouraging new understandings. Opportunities that allow students of differing cognitive levels to work together often encourage less mature students to advance to a more mature understanding. One further implication for instruction is the use of concrete "hands on" experiences to help children learn. Additional suggestions include:

- Provide concrete props and visual aids, such as models and/or time line

- Use familiar examples to facilitate learning more complex ideas, such as story problems in math.

- Allow opportunities to classify and group information with increasing complexity; use outlines and hierarchies to facilitate assimilating new information with previous knowledge.

- Present problems that require logical analytic thinking; the use of tools such as "brain teasers" is encouraged.

Huitt and Hummel (1998) assert that "only 35% of high school graduates in industrialized countries obtain formal operations; many people do not think formally during adulthood". This is significant in terms of developing instruction and performance support tools for students who are chronologically adults, but may be limited in their understanding of abstract concepts. For both adolescent and adult learners, it is important to use these instructional strategies

- Use visual aids and models.

- Provide opportunities to discuss social, political, and cultural issues.

- Teach broad concepts rather than facts, and to situate these in a context meaningful and relevant to the learner.

## Criticisms of Piaget's Theory

Researchers during the 1960's and 1970's identified shortcomings in Piaget's theory. First, critics argue that by describing tasks with confusing abstract terms and using overly difficult tasks, Piaget under estimated children's abilities. Researchers have found that young children can succeed on simpler forms of tasks requiring the same skills. Second, Piaget's theory predicts that thinking within a particular stage would be similar across tasks. In other words, preschool children should perform at the preoperational level in all cognitive tasks. Research has shown diversity in children's thinking across cognitive tasks. Third, according to Piaget, efforts to teach children developmentally advanced concepts would be unsuccessful. Researchers have found that in some instances, children often learn more advanced concepts with relatively brief instruction. Researchers now believe that children may be more competent that Piaget originally thought, especially in their practical knowledge.

This illustration demonstrates a child developing a schema for a dog by assimilating information about the dog. The child then sees a cat, using accommodation compares existing knowledge of a dog to form a schema of a cat. Animation created by Daurice Grossniklaus and Bob Rodes (03/2002).

When the parent reads to the child about dogs, the child constructs a schema about dogs. Later, the child sees a dog in the park; through the process of assimilation the child expands his/her understanding of what a dog is. When the dog barks, the child experiences disequilibria because the child's schema did not include barking. Then the child discovers the dog is furry, and it licks the child's hand. Again, the child experiences disequilibria. By adding the newly discovered information to the existing schema the child is actively constructing meaning. At this point the child seeks reinforcement from the parent. The parent affirms and reinforces the new information. Through assimilation of the new information the child returns to a state of equilibrium.

The process of accommodation occurs when the child sees a cat in the park. A new schema must be formed, because the cat has many traits of the dog, but because the cat meows and then climbs a tree the child begins to actively construct new meaning. Again the parent reinforces that this is a cat to resolve the child's disequilibria. A new schema about cats is then formed and the child returns to a state of equilibrium.

## References

Constructionism / Constructivism http://members.shaw.ca/ncpg/links_constructivism.html

Constructivism http://carbon.cudenver.edu/~mryder/itc_data/constructivism.html

Constructivism http://www.edwebproject.org/constructivism.html

Developmental Psychology http://www.u.arizona.edu/ic/indv101/greenberg/devlect.htm

Huitt, W. & Hummel, J. (1998). Cognitive development. Retrieved February 10, 2002 from the World Wide Web: http://chiron.valdosta.edu/whuitt/col/cogsys/piaget.html Kafia, Y.B. & Resnick, M. (1996). Introduction. In Y. Kafai & M. Resnick. (Eds.) Construction in practice designing, thinking and learning in a digital world. Mahwah, New Jersey: Lawrence Erlbaum Associated, Publishers.

Liebert, R.M., Wicks-Nelson, R., & Kail, R.V. (1986). Developmental Psychology. (4th ed). Englewood Cliffs, N.J.: Prentice Hall.

PBS Online. (1998). A Science odyssey: People and discoveries. Retrieved February 10, 2002 from the World Wide Web: http://www.pbs.org/plweb-cgi/fastweb?getdoc+asodata+asodata+58+0+wAAA+piaget

Selected Jean Piaget Resources http://www.questia.com/Index.jsp?CRID=jean_piaget&OFFID=se1

Slavin, R.E. (1988). Educational psychology theory into practice. (2nd ed). Englewood Cliffs, N. J.: Prentice Hall.

Summary of Presentation by Prof. Murray on Piaget and Cognitive Development http://www.udel.edu/billf/armen2.html

# Citation

APA Citation: Wood, K. C., Smith, H., Grossniklaus, D. (2001). Piaget's Stages of Cognitive Development. In M. Orey (Ed.), Emerging perspectives on learning, teaching, and technology. Retrieved <insert date>, from http://projects.coe.uga.edu/epltt/