

## Piaget's Theory of Cognitive Development

Citation: Huitt, W., & Hummel, J. (2003). Piaget's theory of cognitive development. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved [date] from <http://chiron.valdosta.edu/whuitt/col/cogsys/piaget.html>.

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Jean Piaget (1896-1980) was one of the most influential researchers in the area of developmental psychology during the 20th century. Piaget originally trained in the areas of biology and philosophy and considered himself a "genetic epistemologist." He was mainly interested in the biological influences on "how we come to know." He believed that what distinguishes human beings from other animals is our ability to do "abstract symbolic reasoning." Piaget's views are often compared with those of Lev Vygotsky (1896-1934), who looked more to social interaction as the primary source of cognition and behavior. This is somewhat similar to the distinctions made between Freud and Erikson in terms of the development of personality. The writings of Piaget (e.g., 1972, 1990; see Piaget, Gruber, & Voneche) and Vygotsky (e.g. Vygotsky, 1986; Vygotsky & Vygotsky, 1980), along with the work of John Dewey (e.g., Dewey, 1997a, 1997b), Jerome Bruner (e.g., 1966, 1974) and Ulrick Neisser (1967) form the basis of the constructivist theory of learning and instruction.

While working in Binet's IQ test lab in Paris, Piaget became interested in how children think. He noticed that young children's answers were qualitatively different than older children which suggested to him that the younger ones were not dumber (a quantitative position since as they got older and had more experiences they would get smarter) but, instead, answered the questions differently than their older peers because they thought differently.

There are two major aspects to his theory: the process of coming to know and the stages we move through as we gradually acquire this ability.

**Process of Cognitive Development.** As a biologist, Piaget was interested in how an organism adapts to its environment (Piaget described as intelligence.) Behavior (adaptation to the environment) is controlled through mental organizations called schemes that the individual uses to represent the world and designate action. This adaptation is driven by a biological drive to obtain balance between schemes and the environment (equilibration).

Piaget hypothesized that infants are born with schemes operating at birth that he called "reflexes." In other animals, these reflexes control behavior throughout life. However, in human beings as the infant uses these reflexes to adapt to the environment, these reflexes are quickly replaced with constructed schemes.

Piaget described two processes used by the individual in its attempt to adapt: assimilation and accommodation. Both of these processes are used throughout life as the person increasingly adapts to the environment in a more complex manner.

Assimilation is the process of using or transforming the environment so that it can be placed in preexisting cognitive structures. Accommodation is the process of changing cognitive structures in order to accept something from the environment. Both processes are used simultaneously and alternately throughout life. An example of assimilation would be when an infant uses a sucking schema that was

developed by sucking on a small bottle when attempting to suck on a larger bottle. An example of accommodation would be when the child needs to modify a sucking schema developed by sucking on a pacifier to one that would be successful for sucking on a bottle.

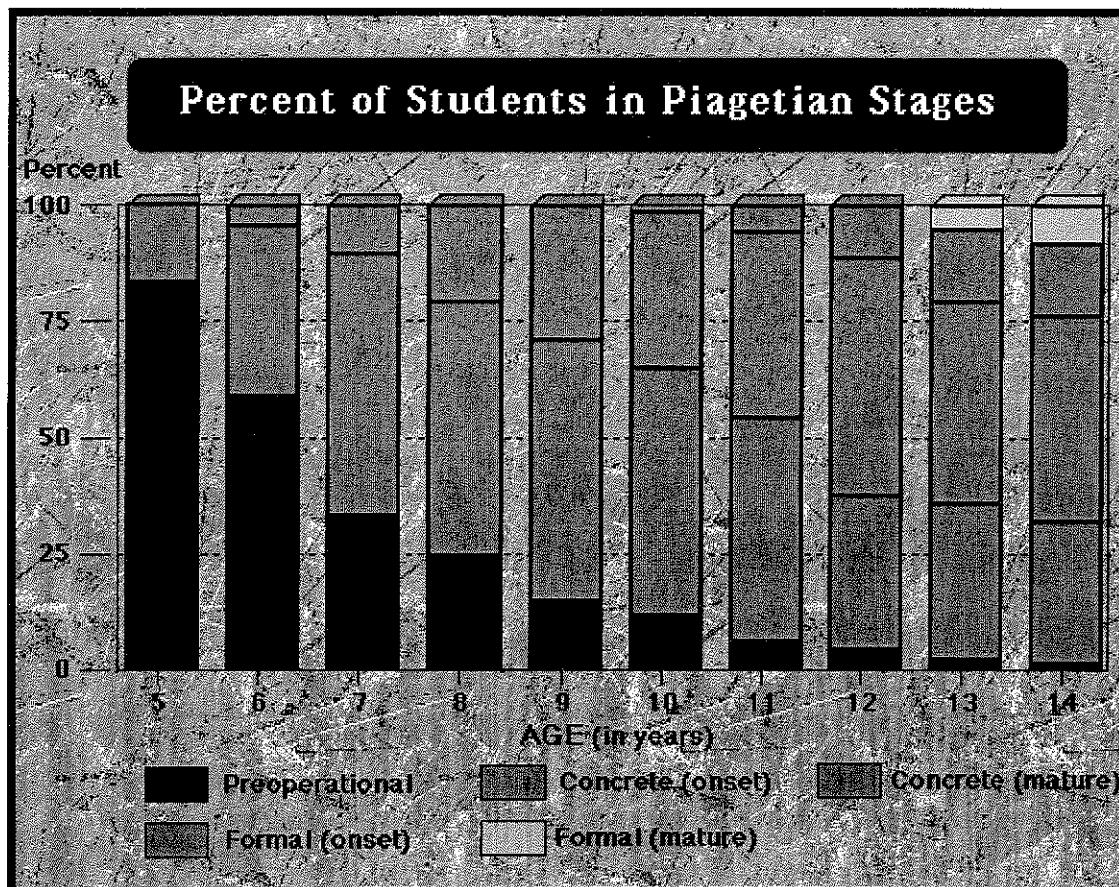
As schemes become increasingly more complex (i.e., responsible for more complex behaviors) they are termed structures. As one's structures become more complex, they are organized in a hierarchical manner (i.e., from general to specific).

**Stages of Cognitive Development.** Piaget identified four stages in cognitive development:

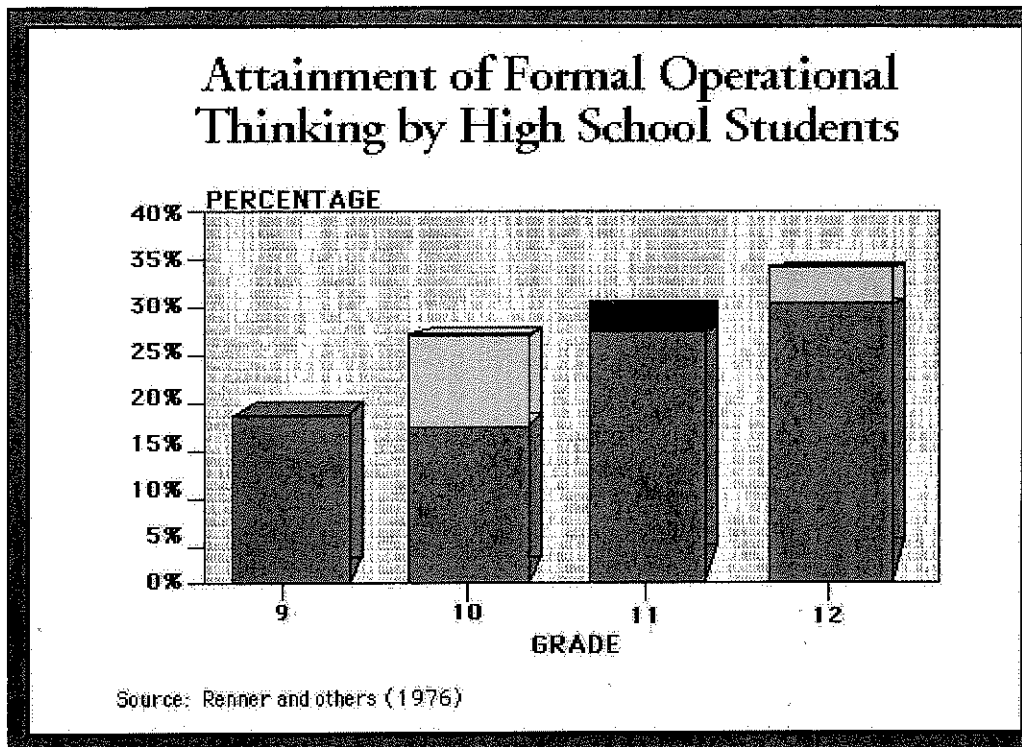
1. **Sensorimotor stage** (Infancy). In this period (which has 6 stages), intelligence is demonstrated through motor activity without the use of symbols. Knowledge of the world is limited (but developing) because it is based on physical interactions / experiences. Children acquire object permanence at about 7 months of age (memory). Physical development (mobility) allows the child to begin developing new intellectual abilities. Some symbolic (language) abilities are developed at the end of this stage.
2. **Pre-operational stage** (Toddler and Early Childhood). In this period (which has two substages), intelligence is demonstrated through the use of symbols, language use matures, and memory and imagination are developed, but thinking is done in a nonlogical, nonreversible manner. Egocentric thinking predominates.
3. **Concrete operational stage** (Elementary and early adolescence). In this stage (characterized by 7 types of conservation: number, length, liquid, mass, weight, area, volume), intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. Operational thinking develops (mental actions that are reversible). Egocentric thought diminishes.
4. **Formal operational stage** (Adolescence and adulthood). In this stage, intelligence is demonstrated through the logical use of symbols related to abstract concepts. Early in the period there is a return to egocentric thought. Only 35% of high school graduates in industrialized countries obtain formal operations; many people do not think formally during adulthood.

Many pre-school and primary programs are modeled on Piaget's theory, which, as stated previously, provides part of the foundation for constructivist learning. Discovery learning and supporting the developing interests of the child are two primary instructional techniques. It is recommended that parents and teachers challenge the child's abilities, but NOT present material or information that is too far beyond the child's level. It is also recommended that teachers use a wide variety of concrete experiences to help the child learn (e.g., use of manipulatives, working in groups to get experience seeing from another's perspective, field trips, etc).

Piaget's research methods were based primarily on case studies [they were descriptive]. While some of his ideas have been supported through more correlational and experimental methodologies, others have not. For example, Piaget believed that biological development drives the movement from one cognitive stage to the next. Data from cross-sectional studies of children in a variety of western cultures seem to support this assertion for the stages of sensorimotor, preoperational, and concrete operations.



However, data from similar cross-sectional studies of adolescents do not support the assertion that all individuals will automatically move to the next cognitive stage as they biologically mature. Data from adult populations provides essentially the same result: Between 30 to 35% of adults attain the cognitive development stage of formal operations (Kuhn, Langer, Kohlberg & Haan, 1977). For formal operations, it appears that maturation establishes the basis, but a special environment is required for most adolescents and adults to attain this stage.



There are a number of specific examples of how to use Piagetian theory in teaching/learning process.

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