

Piaget's four stages

According to Jean Piaget's theory of cognitive development, intelligence is the basic mechanism of ensuring equilibrium in the relations between the person and the environment. This is achieved through the actions of the developing person on the world. At any moment in development, the environment is assimilated in the schemes of action that are already available and these schemes are transformed or accommodated to the peculiarities of the objects of the environment, if they are not completely appropriate. Thus, the development of intelligence is a continuous process of assimilations and accommodations that lead to increasing expansion of the field of application of schemes, increasing coordination between them, increasing interiorization, and increasing abstraction. The mechanism underlying this process of increasing abstraction, interiorization, and coordination is reflecting abstraction. That is, reflecting abstraction gradually leads to the rejection of the external action components of sensorimotor operations on objects and to the preservation of the mental, planning or anticipatory, components of operation. These are the mental operations that are gradually coordinated with each other, generating structures of mental operations. These structures of mental operations are applied on representations of objects rather than on the objects themselves. Language, mental images, and numerical notation are examples of representations standing for objects and thus they become the object of mental operations. Moreover, mental operations, with development, become reversible. For instance, the counting of a series of objects can go both forward and backward with the understanding that the number of objects counted is not affected by the direction of counting because the *same* number can be retrieved both ways.^[2] Piaget described four main periods in the development towards completely reversible equilibrated thought structures. These are the periods described below. As shown below, for Piaget intelligence is not the same at different ages. It changes qualitatively, attaining increasingly broader, more abstract, and more equilibrated structures thereby allowing access to different levels of organization of the world.

State 1: Sensorimotor period

The **Sensorimotor Stage** is the first of the four stages of cognitive development. "In this stage, infants construct an understanding of the world by coordinating sensory experiences (such as seeing and hearing) with physical, motoric actions." ^[3] "Infants gain knowledge of the world from the physical actions they perform on it." ^[3] "An infant progresses from reflexive, instinctual action at birth to the beginning of symbolic thought toward the end of the stage." ^[3] "Piaget divided the sensorimotor stage into six sub-stages"^[3].

Sub-Stage	Age	Description
1 <i>Simple Reflexes</i>	Birth-6 weeks	"Coordination of sensation and action through reflexive behaviors" ^[3] . Three primary reflexes are described by Piaget: sucking of objects in the mouth, following moving or interesting objects with the eyes, and closing of the hand when an object makes contact with the palm (palmar grasp). Over the first six weeks of life, these reflexes begin to become voluntary actions; for example, the palmar reflex becomes intentional grasping. ^[4]
2 <i>First habits and primary circular reactions phase</i>	6 weeks-4 months	"Coordination of sensation and two types of schemes: habits (reflex) and primary circular reactions (reproduction of an event that initially occurred by chance). Main focus is still on the infant's body." ^[3] As an example of this type of reaction, an infant might repeat the motion of passing their hand before their face. Also at this phase, passive reactions, caused by classical or operant conditioning, can begin ^[4] .

3 <i>Secondary circular reactions phase</i>	4–8 months	Development of habits. "Infants become more object-oriented, moving beyond self-preoccupation; repeat actions that bring interesting or pleasurable results." ^[3] This stage is associated primarily with the development of coordination between vision and prehension. Three new abilities occur at this stage: intentional grasping for a desired object, secondary circular reactions, and differentiations between ends and means. At this stage, infants will intentionally grasp the air in the direction of a desired object, often to the amusement of friends and family. Secondary circular reactions, or the repetition of an action involving an external object begin; for example, moving a switch to turn on a light repeatedly. The differentiation between means and ends also occurs. This is perhaps one of the most important stages of a child's growth as it signifies the dawn of logic ^[4] .
4 <i>Coordination of secondary circular reactions stage</i>	8–12 months	"Coordination of vision and touch--hand-eye coordination; coordination of schemes and intentionality." ^[3] This stage is associated primarily with the development of logic and the coordination between means and ends. This is an extremely important stage of development, holding what Piaget calls the "first proper intelligence." Also, this stage marks the beginning of goal orientation, the deliberate planning of steps to meet an objective ^[4] .
5 <i>Tertiary circular reactions, novelty, and curiosity</i>	12–18 months	"Infants become intrigued by the many properties of objects and by the many things they can make happen to objects; they experiment with new behavior." ^[3] This stage is associated primarily with the discovery of new means to meet goals. Piaget describes the child at this juncture as the "young scientist," conducting pseudo-experiments to discover new methods of meeting challenges ^[4] .
6 <i>Internalization of Schemes</i>	18–24 months	"Infants develop the ability to use primitive symbols and form enduring mental representations." ^[3] This stage is associated primarily with the beginnings of insight, or true creativity. This marks the passage into the preoperational stage.

"By the end of the sensorimotor period, objects are both separate from the self and permanent."^[3] "Object permanence is the understanding that objects continue to exist even when they cannot be seen, heard, or touched."^[3] "Acquiring the sense of object permanence is one of the infant's most important accomplishments, according to Piaget."^[3]

Stage 2: Preoperational Period

The Preoperative stage is the second of four stages of cognitive development.^[5] By observing sequences of play, Piaget was able to demonstrate that towards the end of the second year, a qualitatively new kind of psychological functioning occurs.

(Pre)Operatory Thought is any procedure for mentally acting on objects. The hallmark of the preoperational stage is sparse and logically inadequate mental operations. During this stage, the child learns to use and to represent objects by images, words, and drawings.^[5] The child is able to form stable concepts as well as mental reasoning and magical beliefs.^[5] The child however is still not able to perform operations; tasks that the child can do mentally rather than physically.^[5] Thinking is still egocentric: The child has difficulty taking the viewpoint of others. Two substages can be formed from preoperative thought.^[5]

- **The Symbolic Function Substage**

Occurs between about the ages of 2 and 4.^[5] The child is able to formulate designs of objects that are not present.^[5] Other examples of mental abilities are language and pretend play.^[5] Although there is an advancement in progress, there are still limitations such as **egocentrism** and **animism**.^[5] Egocentrism occurs when a child is unable to distinguish between their own perspective and that of another person's.^[5] Children tend to pick their own view of what they see rather than the actual view shown to others.^[5] An example is an experiment performed by Piaget and Barbel Inhelder.^[5] Three views of a mountain are shown and the child is asked what a traveling doll would see at the various angles; the child picks their own view compared to the actual view of the doll.^[5] Animism is the belief that inanimate objects are capable of actions and have lifelike qualities.^[5] An example is a child believing that the sidewalk was mad and made them fall down.^[5]

- **The Intuitive Thought Substage**

Occurs between about the ages of 4 and 7.^[5] Children tend to become very curious and ask many questions; begin the use of primitive reasoning.^[5] There is an emergence in the interest of reasoning and wanting to know why things are the way they are.^[5] Piaget called it the intuitive substage because children realize they have a vast amount of knowledge but they are unaware of how they know it.^[5] **Centration** and **conservation** are both involved in preoperative thought.^[5] Centration is the act of focusing all attention on one characteristic compared to the others.^[5] Centration is noticed in conservation; the awareness that altering a substance's appearance does not change its basic properties.^[5] Children at this stage are unaware of conservation.^{[5][5]} In Piaget's most famous task, a child is represented with two identical beakers containing the same amount of liquid.^[5] The child usually notes that the beakers have the same amount of liquid.^[5] When one of the beakers is poured into a taller and thinner container, children who are typically younger than 7 or 8 years old say that the two beakers now contain a different amount of liquid.^[5] The child simply focuses on the height and width of the container compared to the general concept.^[5] Piaget believes that if a child fails the conservation-of-liquid task, it is a sign that they are at the preoperational stage of cognitive development.^[5] The child also fails to show conservation of number, matter, length, volume, and area as well.^[5] Another example is when a child is shown 7 dogs and 3 cats and asked if there are more dogs than cats. The child would respond positively. However when asked if there are more dogs than animals, the child would once again respond positively. Such fundamental errors in logic show the transition between intuitiveness in solving problems and true logical reasoning acquired in later years when the child grows up.

Piaget considered that children primarily learn through imitation and play throughout these first two stages, as they build up symbolic images through internalized activity.^{[6][7]}

Studies have been conducted among other countries to find out if Piaget's theory is universal.^[5] Psychologist Patricia Greenfield conducted a task similar to Piaget's beaker experiment in the West African nation of Senegal.^[5] Her results stated that only 50 percent of the 10-13 year old understood the concept of

conservation.^[5] Other cultures such as central Australia and New Guinea had similar results.^[5] If adults had not gained this concept, they would be unable to understand the point of view of another person.^[5] There may have been discrepancies in the communication between the experimenter and the children which may have altered the results.^[5] It has also been found that if conservation is not widely practiced in a particular country, the concept can be taught to the child and training can improve the child's understanding.^[5] Therefore, it is noted that there are different age differences in reaching the understanding of conservation based on the degree to which the culture teaches these tasks.^[5]

Stage 3: Concrete operational stage

The **Concrete operational stage** is the third of four stages of cognitive development in Piaget's theory. This stage, which follows the **Preoperational stage**, occurs between the ages of 7 and 11 years^[8] and is characterized by the appropriate use of logic. Important processes during this stage are:

Seriation — the ability to sort objects in an order according to size, shape, or any other characteristic. For example, if given different-shaded objects they may make a color gradient.

Transitivity — The ability to recognize logical relationships among elements in a serial order, and perform 'transitive inferences' (for example, If A is taller than B, and B is taller than C, then A must be taller than C).

Classification — the ability to name and identify sets of objects according to appearance, size or other characteristic, including the idea that one set of objects can include another.

Decentering — where the child takes into account multiple aspects of a problem to solve it. For example, the child will no longer perceive an exceptionally wide but short cup to contain less than a normally-wide, taller cup.

Reversibility — the child understands that numbers or objects can be changed, then returned to their original state. For this reason, a child will be able to rapidly determine that if $4+4$ equals t , $t-4$ will equal 4, the original quantity.

Conservation — understanding that quantity, length or number of items is unrelated to the arrangement or appearance of the object or items.

Elimination of Egocentrism — the ability to view things from another's perspective (even if they think incorrectly). For instance, show a child a comic in which Jane puts a doll under a box, leaves the room, and then Melissa moves the doll to a drawer, and Jane comes back. A child in the concrete operations stage will say that Jane will still think it's under the box even though the child knows it is in the drawer. (See also False-belief task).

Children in this stage can, however, only solve problems that apply to actual (concrete) objects or events, and not abstract concepts or hypothetical tasks.

Stage 4: Formal operational stage

The formal operational period is the fourth and final of the periods of cognitive development in Piaget's theory.^[9] This stage, which follows the Concrete Operational stage, commences at around 11 years of age (puberty) and continues into adulthood.^[9] In this stage, individuals move beyond concrete experiences and begin to think abstractly, reason logically and draw conclusions from the information available, as well as apply all these processes to hypothetical situations.^[9] The abstract quality of the adolescent's thought at the formal operational level is evident in the adolescent's verbal problem solving ability.^[9] The logical quality of the adolescent's thought is when children are more likely to solve problems in a trial-and-error fashion.^[9] Adolescents begin to think more as a scientist thinks, devising plans to solve problems and systematically testing solutions.^[9] They use hypothetical-deductive reasoning, which means that they develop hypotheses

or best guesses, and systematically deduce, or conclude, which is the best path to follow in solving the problem.^[9] During this stage the young adult is able to understand such things as love, "shades of gray", logical proofs and values. During this stage the young adult begins to entertain possibilities for the future and is fascinated with what they can be.^[9] Adolescents are changing cognitively also by the way that they think about social matters.^[9] Adolescent Egocentrism governs the way that adolescents think about social matters and is the heightened self-consciousness in them as they are which is reflected in their sense of personal uniqueness and invincibility.^[9] Adolescent egocentrism can be dissected into two types of social thinking, imaginary audience that involves attention getting behavior, and personal fable which involves an adolescent's sense of personal uniqueness and invincibility.^[9]

Notes

1. [^] [Munari, Alberto \(1994\). "JEAN PIAGET \(1896–1980\)". *Prospects: the quarterly review of comparative education* XXIV \(1/2\): 311–327.](#)
http://www.ibe.unesco.org/fileadmin/user_upload/archive/publications/ThinkersPdf/piagete.pdf.
2. [^] (in *An Exposition of Constructivism: Why Some Like it Radical*, 1990)
3. [^] [A Brief Biography of Jean Piaget](#), Jean Piaget Society (Society for the study of knowledge and development)
4. [^] Verne N. Rockcastle (1964, p. xi), the conference director, wrote in the conference report of the Jean Piaget conferences about Piaget: "Although few of us had any personal contact with Piaget prior to the conference, those who attended came to have the deepest and warmest regard for him both as a scientist and as a person. His sense of humor throughout the conference was a sort of international glue that flavored his lectures and punctuated his informal conversation. To sit at the table with him during a meal was not only an intellectual pleasure but a pure social delight. Piaget was completely unsophisticated in spite of his international stature. We could hardly believe it when he came prepared for two weeks' stay with only his 'serviette' and a small Swissair bag. An American would have had at least two large suitcases. When Piaget left Berkeley, he had his serviette, the small Swissair bag, and a third, larger bag crammed with botanical specimens. 'Where did you get that bag?' we asked. 'I had it in onw of the others,' he replied."
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6. [^] K. Kaye, *The Mental and Social Life of Babies*. U. Chicago Press, 1982.
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<<http://search.eb.com/eb/article-9059885>>.
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14. [^] Damerow, P. (1998). "[Prehistory And Cognitive Development](#)". *Piaget, Evolution, and Development*.
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20. [^] *La Construction du Réel Chez l'Enfant* by Jean Piaget (1937)
21. [^] Piaget, J. (1953) *The Origins of Intelligence in Children*. London: Routledge and Kegan Paul.

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External links:

- [Jean Piaget Society](#), society for the study of knowledge and development. It has some [free full text books](#) by Piaget.
- [The Jean Piaget Archives](#), with full bibliography.
- [Jean Piaget @ Teaching & Learning Developmental Psychology](#), Piaget as a scientist with resources for classes.
- [Jean Piaget's Genetic Epistemology: Appreciation and Critique](#) by Robert Campbell (2002), extensive summary of work and biography.
- [The Construction of Reality in the Child](#) by Jean Piaget (1955)
- Piaget's role in the [International Bureau of Education](#) and the [International Conference on Education](#)
- [Genetic Epistemology](#) by Jean Piaget (1968)
- [Comments on Vygotsky](#) by Jean Piaget (1962)
- [Piaget's Development Theory](#)
- [Piaget's Developmental Theory: An Overview](#), a 4-minute clip from a documentary film used primarily in higher education.
- [Foundation Jean Piaget for research in psychology and epistemology](#) - French version only - diffuse to the world community writings and talks of the Swiss scientist