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Jean Piaget (1896-1980) was a Philosopher and Psychologist. His theory on cognitive development is among the most influential in Human Development. He based his theory on his study on his children - Jacqueline, Laurent and Lucienne among others.

Piaget's theory is genetic epistemological i.e. it deals with the development of knowledge in individuals from birth to adolescence and beyond. His theory is considered as the process theory of intelligence though he prefers to substitute the word intelligence by cognition. By cognition we mean an overarching label which includes perception, learning, thinking, memory, decision making and creativity. It refers to information processing of sensorial data to make it meaningful. Piaget suggested three basic processes by which knowledge is acquired. These are accommodation, assimilation and equilibration. These processes operate throughout life. Accommodation refers to the process of acquiring new knowledge, beliefs and action sequences according to the demands of the ever-changing

environment e.g. an infant feeding oneself by a spoon for the first time learns to hold it, spoon some rice into her mouth, dip it back into the rice to fork out some more grains of rice and then put it into her mouth and so on. Here spoon is the representation of the environment. Assimilation refers to the process of imposing one's knowledge, beliefs and learned action sequences on the environment e.g. a child playing with a cardboard box imagining it to be her doll's house. Equilibration means learning new knowledge and skills and changing beliefs to achieve balance and fill in lacunae in knowledge and skills e.g. an adolescent learns to use a statistical software for data processing.

Jean Piaget proposed the fourfold stages of cognitive development with each stage being qualitatively different from the next. The series of stages were thought by Piaget to be modular and universal. The stages are the following:

1. Sensorimotor stage (birth to 18 months or roughly 2 years of age)
2. Preoperational stage (18 months or roughly 2 years to 7 years of age)
3. Concrete Operational stage (7 years of age to roughly 12 years of age)

4. Formal Operational stage (12 years of age and beyond).

Brief Description of the stages of Cognitive Development:

1. Sensorimotor stage - Here the means of acquiring knowledge are sensory (e.g. looking, listening, touching, smelling and mouthing) and motor (e.g. handling and playing). Reflexive movements gradually give way to voluntary movements. Circular Reactions are seen. These are repetitive actions. Primary Circular Reactions refer to repetitive actions using own body parts like thumb sucking. Secondary Circular Reactions refer to maintaining changes in the environment by repetitive actions e.g. the curtain moves in the wind, the wind stops but the baby raises its hands to keep the curtain moving to and fro repeatedly. Tertiary Circular Reactions slowly appear. These are repetitive actions of the infant which produce a newness in the environment e.g. repeatedly beating a container to listen to sound. Morgan et al. (1987) while discussing Piaget's theory say that Means-End Readiness gradually makes an appearance. Action sequences begin to be guided by thought (appearance of Scheme) e.g. an infant was playing with a ball which eventually rolled under the bed. The infant tried to reach it using her hands but failed to do so. Then she looked around the room and caught sight of a stick and thought for a while. She went and grasped the stick and came back to where the ball was. Grabbing the stick she made efforts to get the ball back. In this stage Object Constancy is gradually attained e.g. seven month old infant was playing with a toy which was hidden behind a barrier right before his eyes. The infant lost interest and did not look for the toy. But the same infant then one year of age would take the barrier away and find the toy. This means that infants slowly learn that objects continue to exist even when they are out of sight. But the infant at the end of this stage still shows immaturity in cognition.

2. Preoperational stage - This stage is categorised into two sub-stages i.e. Preconceptual sub-stage (18 months or roughly 2 years to 4 years of age) and Perceptual or Intuitive sub-stage (4 years to 7 years of age).

The common features of the Preoperational stage are operations (i.e. flexible mental actions which can be combined to solve problems) do not appear (Morgan et al. 1987). Thinking is largely unsystematic. Linguistic development appears. Symbolic Representation develops. Thinking shows Egocentrism, Animism and Faulty Reasoning about Cause and Effect. Egocentrism refers to limitation in understanding that others may have needs, motives and emotions different from one's own e.g. failure to adopt others' point of view is manifested through a child's offering her doll to comfort her sobbing mother. Animism refers to the faulty belief that the non-living are actually alive e.g. a child thinks that the television having audio-visual mode so is alive. Faulty Cause and Effect Thinking indicates limitations in reasoning about cause-effect e.g. a child thinks that the Sun rises when she opens her eyes. In Preconceptual stage concepts do not appear e.g. a child when asked to name vegetables says elephant. A concept is the name of a category of objects sharing common features. In Perceptual or Intuitive sub-stage the child focuses too much on appearances (perception) rather

than its implications (hidden import) e.g. a girl in a pair of trousers having hoarse voice and short hair may be perceived as a boy. This is the failure in Decentration. Conservation of properties is lacking which means that despite changes in appearance objects remain the same across dimensions like volume, mass and number. For instance a ball of play dough rolled to form a cylinder now appears to the child to have more mass than before. Intuitive thinking is another characteristic of this sub-stage. It refers to guessing the reasons behind occurrences using logical thinking.

3. Concrete Operational stage - The child who is now between 7 and 12 years of age demonstrates Conservation of properties i.e. understands that objects continue to be the same in volume, mass and number despite changed appearance e.g. a ball of play dough rolled to form a cylinder now appears to the child to have the same mass as before provided the change in appearance occurs right before the child's eyes. The child can think logically, flexibly and reversibly about objects which exist in time and place (Morgan et al. 1987). They can think about alternate ways of reaching the school. They can estimate sizes of objects and tell which ones are taller, shorter etc. They can line up objects according to their sizes in ascending and descending order. These are examples of Seriation. The child now understands hierarchy in different manifestations.

4. Formal Operational stage - Adolescence is the starting point of this stage although not individuals reach this stage. The adolescents, adults including older persons can carry out abstract thinking. They think logically, flexibly and reversibly when thinking about abstract ideas like patriotism. They can think about hypothetical events i.e. events have not yet happened but may happen in the future e.g. What will happen if the Sun is extinguished? This is called Hypothetico-Deductive Thinking or simply Hypothetical Thinking. Adolescents at this stage can think using Deductive Reasoning and Inductive Reasoning. Deductive Reasoning means thinking about specific events based on a general principle. They may also engage in Inductive Thinking i.e. discovering a general principle based on evidences from specific events. Deductive Reasoning is a form of thinking largely used in Humanities and Inductive Reasoning is used more in Science. The adolescent at this stage can analyse their own thinking e.g. I am trying to remember where I went wrong while solving a problem in algebra. This is Metacognition (thinking about thinking) or Reflective Thinking.

Merits of Piaget's Theory of Cognitive Development

1. Piaget proposed four stages of cognitive development from birth and beyond. So it is important from the point of view of human development.
2. His theory of cognitive development is regarded by his followers as universal in approach.
3. Piaget's theory is not only based on researches but has generated a lot of research.
4. His theory has applications in the field of education.

Limitations of Piaget's Theory of Cognitive Development

1. Piaget's theory relies on the role of environment in human development. It seems not to have paid much attention to hereditary factors of individuals.
2. His theory has been subject to controversy because Neo-Piagetian researchers have not been able to replicate some of his findings.
3. Piaget's theory clubs cognitive development of adolescents and adults including older persons at the Formal Operational stage which has been questioned and amended.
4. His theory focused on the immediate environment and did not consider the larger sociocultural environment.

Reference

Morgan, C.T., King, R.A., Weisz, J.R. and Schopler, J. (1987). Introduction to Psychology. 7th ed. New York: McGraw-Hill.
