

Cognitive Development Theory- Piaget



Dr. Asha P Pathrose

Asst. Professor
St. Joseph's College of Education, Mysuru

OBJECTIVES

- Understand the function and structure of cognition.
- Differentiate between, and provide examples in children of, assimilation, accommodation, and disequilibrium.
- Understand the stages of cognitive development.
- Understand about the cognitive representation.

Cognition

The term cognition is derived from the Latin word **“cognoscere”** which means **“to know”** or **“to recognise”** or **“to conceptualise”**.

It refers to the mental processes by an organism learns, remembers, understands, perceives, solves problems and thinks about a body of information.

Cognition progresses in stages with increasing levels of complexity and hence the phrase **“cognitive development”** which is the stages a child goes through conceptualizing the world at different age levels.

Cognition refers to all activity, processes, and products of the mind.

Cognitive Development

The term **cognitive development** refers to the process of growth and change in intellectual/mental abilities such as thinking, reasoning and understanding.

Cognitive development is a field of study in neuroscience and psychology focusing on a child's development in terms of information processing, conceptual resources, perceptual skill, language learning, and other aspects of brain development

It includes the acquisition and consolidation of knowledge. Infants draw on social-emotional, language, motor, and perceptual experiences and abilities for cognitive development.

Cognitive development is the construction of thought processes, including remembering, problem solving , and decision-making, from childhood through adolescence to adulthood

It refers to how a person perceives, thinks, and gains understanding of his or her world through the interaction of genetic and learned factors.

Among the areas of cognitive development are information processing, intelligence , reasoning , language development and memory .

They are attuned to relationships between features of objects, actions, and the physical environment. But they are particularly attuned to people.

Parents, family members, friends, teachers, and caregivers play a vital role in supporting the cognitive development of infants by providing the healthy interpersonal or social-emotional context in which cognitive development unfolds

Cognitive Development describes how these mental processes develop from birth until adulthood.

The acquisition of the ability to think, reason, and problem solve.

It is the process by which people's thinking changes across the life span.

Cognitive Development is gradual orderly, changes by which mental process become more complex and sophisticated

PIAGET THEORY

Cognitive Development in Children



Jean
Piaget



Piaget's Developmental Psychology



Jean Piaget (1896-1980) was one of the most influential researchers in the area of developmental psychology during the 20th century. Piaget was the first psychologist to make a systematic study of cognitive development.

Piaget originally trained in the areas of biology and philosophy and considered himself a "genetic epistemologist." (genetic= development, epistemology = study of knowledge)

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."

According to Piaget, children are born with a very basic mental structure (genetically inherited and evolved) on which all subsequent learning and knowledge is based.

Piaget designed a proper framework to understand the structure , functioning and development of the cognitive network of the human mind. He pointed that there are two aspects of human mind : cognitive structure and cognitive functioning

The development of human intellectual abilities take place as a result of the organization and reorganization of certain pattern of behaviour called ***schema*** . Schemas constitute the structural units of human mind i.e., *cognitive structure*

The process of organisation of theses structural units take place by three different activities –assimilation , accommodation and equilibration. These activities constitute the functional aspects of human mind.

The essential development of cognition is the establishment of new schemes. Assimilation and accommodation are both processing of the ways of cognitive development. The equilibration is the symbol of a new stage of the cognitive development.

Basic assumptions of Development

- A person has *hereditary organic reactions*
- He is naturally *active*
- He is *born without mind*
- He Needs to *adapt to environment*
- To adapt, he *organizes thinking into Structures (schemas)*

Constructivist Approach

Jean Piaget's theory remains the standard against which all other theories are judged and often labeled **constructivist because it depicts children as constructing knowledge for themselves** .

Piaget's theory is often described as a **constructivist view**. According to **constructivists**, people interpret their environments and experiences in light of the knowledge and experiences they already have. People do not simply take in an external reality and develop an unchanged, exact mental copy of objects or events. Instead, they build (or "construct") their own individual understandings and knowledge.

Individuals construct their own knowledge during the course of interaction with the environment. Thinking is an active process whereby people organize their perceptions of the world

Children are seen as

- Active
- Learning many important lessons on their own
- Intrinsically motivated to learn
- Generating hypotheses, performing experiments, drawing conclusions

Schemas

- Schemas are the basic structural units of human mind . They constitute patterns of behaviour that an individual use in dealing with objects in his environment . Piaget called the schema the basic building block of intelligent behavior – a way of organizing knowledge.
- A schema can be defined as a set of linked mental representations of the world, which we use both to understand and to respond to situations.
- Schemas are mental or cognitive structures which enables a person to adapt and to organise the environment.
- Schemas are categories of knowledge that help us to interpret and understand the world.

- For example, at birth the schema of a baby is reflexive in nature such as sucking and grasping. The sucking reflex is a schema and the infant will suck on whatever is put in its mouth such as a nipple or a finger.
- The infant is unable to differentiate because it has only a single sucking schema. Slowly, the infant learns to differentiate where milk-producing objects are accepted while non-milk objects are rejected.
- At this point, the infant has two sucking schemas, one for milk-producing objects and one for non-milk producing objects.

Factors influencing Thinking

- Biological Maturation • Activity • Social Experience • Equilibration • Basic Tendencies in thinking • Organisation
 - Combining
 - Arranging
 - Recombining
 - Rearranging
- Adaptation • Equilibration • operations

Assimilation

- Assimilation is using an existing schema to deal with a new object or situation. The process of taking in new information into our previously existing schema's is known as **assimilation**. **Assimilation** which is using an existing schema to deal with a new object or situation.
- It is the process of taking in new information into our already existing schemas is known as assimilation. The process is somewhat subjective because we tend to modify experiences and information slightly to fit in with our preexisting beliefs

It's a kind of matching between the already existing cognitive structure and the environmental needs as they arise.

- Eg: A child sees a Donkey for the first time and immediately calls it a Horse. Thus, the child has assimilated into his schema that this animal is a Horse.
- Another 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.

Accommodation

Accommodation involves modifying existing schemas, or ideas, as a result of new information or new experiences. New schemas may also be developed during this process.

- The boy who had assimilated the Donkey as a Horse will eventually accommodate more information and thus realize the different characteristics between a Horse and a Donkey. The child will learn that the Donkey is not a Donkey but a Horse, an accommodated ability.

Equilibration

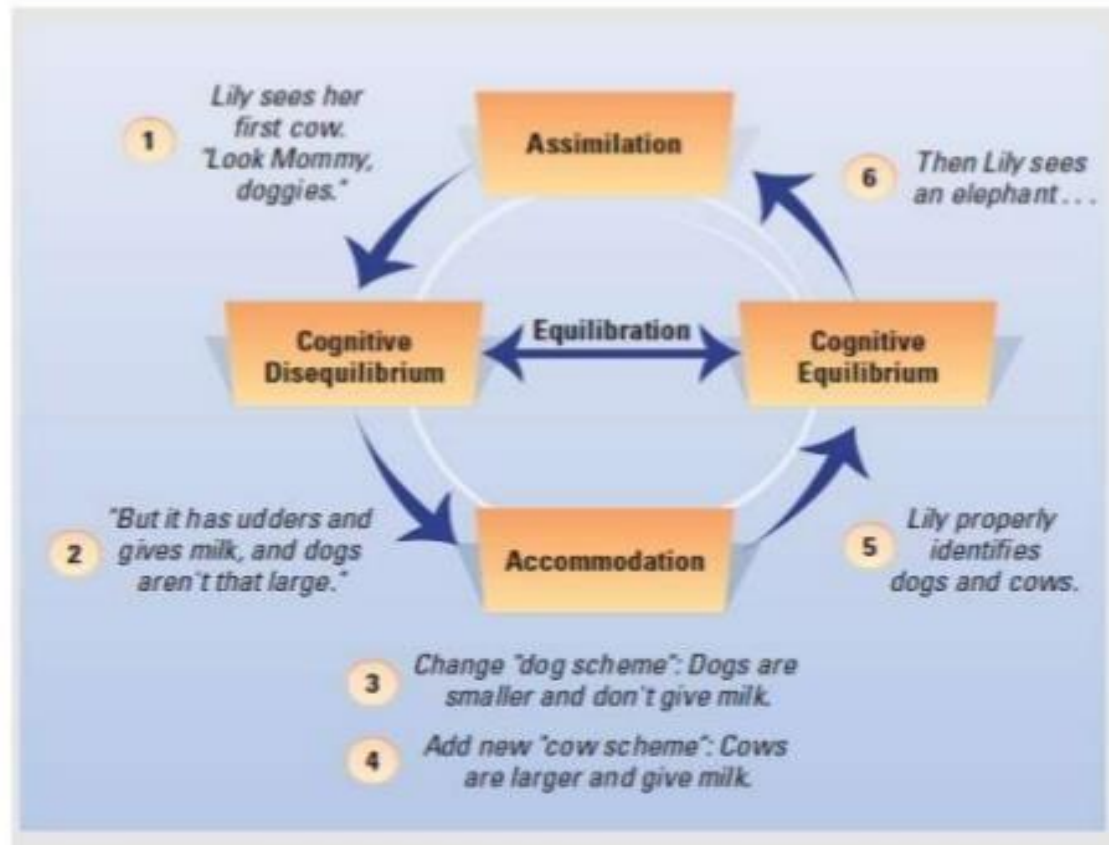
According to Piaget's theory, optimal level of intellectual functioning takes place when there is a balance between assimilation and accommodation. This process of maintaining *this balance is termed as Equilibration*. The cognitive structure change from one stage to another by the process of equilibration, maintaining child and his changing environment.

As children progress through the stages of cognitive development, it is important to maintain a balance between applying previous knowledge (assimilation) and changing behavior to account for new knowledge (accommodation). Equilibration helps explain how children can move from one stage of thought into the next

Adaptation:

- Assimilation and accommodation are the two sides of adaptation. It is the ability of the person to adjust to the environment and to interact with it.
- It's a process that takes place through direct interaction with the environment.
- Adaptation occurs as a result of two complementary processes, Assimilation and Accommodation.

In the cycle of adaptation and equilibration, a new experience is first assimilated into an existing scheme. If it doesn't fit properly, cognitive disequilibrium results. Accommodating (adjusting) the scheme brings the child to cognitive equilibrium, until a new assimilation challenges the scheme again.



Piaget's Stages of Cognitive Development

- **1.Sensorimotor Stage**
- **2.Preoperational Stage**
- **3.Concrete Operational Stage**
- **4.Formal Operational Stage**

Stage 1: Sensorimotor Thought (Birth to 2 Years)

The first stage of Piaget's theory starts from birth to approximately age 2 and is centered on the infant trying to make sense of the world. During this stage, the child's knowledge is limited to sensory perceptions and simple motor activities. e.g. looking, sucking, grasping.

Sub-stages of the Sensorimotor Stage:

It can be divided into 6 separate sub-stages.

According to Piaget, infants can engage only in sensorimotor thought. That is, they know the world only in terms of their own sensory input (what they can see, smell, taste, touch, and hear) and their physical or motor actions on it (e.g., sucking, reaching, and grasping). They do not have internal mental representations of the objects and events that exist outside their own body.

- Representational, symbolic thought gradually emerges as the stage progresses.
- Object permanence develops as the stage progresses.

1. Reflexes (0-1 month): In the first month of life, infants' behaviors reflect innate reflexes—automatic responses to particular stimuli. The child understands the environment purely through inborn reflexes such as suckling, grasping, knee-jerking. These are the reactive functions that infants essentially exit the womb with.

2. Primary Circular Reactions (1-4 months): It involves coordinating sensation and new schemas. In the first few months of life, infants' behaviors are focused almost exclusively on their own bodies (in Piaget's terminology, the behaviors are *primary*) and are repeated over and over again (i.e., they are *circular*). Infants also begin to refine their reflexes and combine them into more complex actions.

3. **Secondary Circular Reactions (4-8 months):** In this stage the child become *more aware of and more responsive to the outside world (their behaviors become secondary), and they begin to notice that their behaviors can have interesting effects* on the objects around them. The child becomes more focused on the world and begins to intentionally repeat an action in order to trigger a response in the environment.
4. **Coordination of Reactions (8-12 months):** The child starts to show clearly intentional actions. The child may also combine schemas in order to achieve a desired effect. After repeatedly observing that certain actions lead to certain consequences, infants gradually acquire knowledge of cause-effect relationships.

- **Object Permanence**

Another acquisition at this sub-stage is **object permanence, means knowing that an object still exists**, even if it is hidden. According to Piaget, **Object Permanence is a child's awareness or understanding that** objects continue to exist even though they cannot be seen or heard.

Preoperational Stage (2 to 7 yrs) (Toddler and Early Childhood)

- Piaget's second stage, **preoperational thought**, features the **flourishing use of mental representations** and the beginnings of logic (intuitive thought).
- This stage begins when the child starts to use symbols and language. This is a period of developing language and concepts. So, the child is capable of more complex mental representations i.e. words and images. He is still unable to use 'operations', i.e. logical mental rules, such as the rules of arithmetic. It is divided into two sub-stages:
- **1. Preconceptual stage (2 to 4 years):** *Here, cognitive development becomes increasingly dominated by symbolic activity. The child can use symbols to stand for actions; a toy doll stands for a real baby or the child role-plays mummy or daddy. Language also develops during this stage. According to Piaget, language development is based on children's mental representational ability—their ability to let a symbol (e.g., a word) stand for an object in the environment.*
- **2. Intuitive stage (5 to 7 years):** *This stage is characterized by the way in which children base their knowledge on what they feel or sense to be true, yet they cannot explain the underlying principles behind what they feel or sense.*

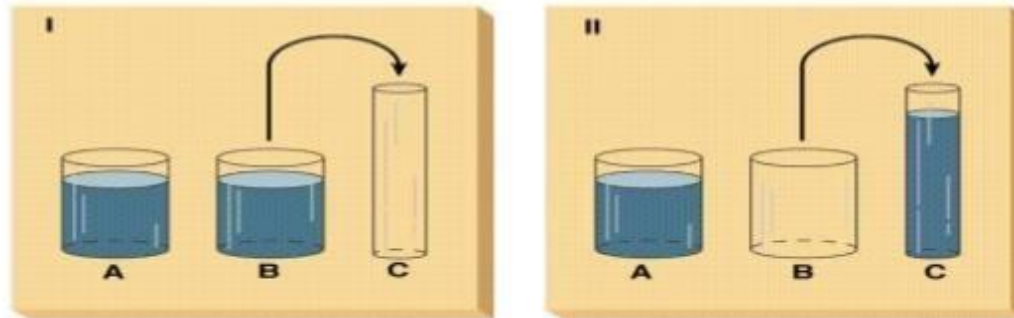
- The following are the key features of this stage:
- **1. Egocentrism:** The child's thoughts and communications are typically egocentric i.e. about themselves or his/her point of view. *It is the inability to see the world through anyone else's eyes except on his own.* According to Piaget, the egocentric child assumes that other people see, hear, and feel exactly the same as the child does.
- **2. Animism:** Treating inanimate objects as living ones. E.g.: Children bathing, dressing and feeding their dolls as if they are alive.
- **3. Centration:** It refers to the tendency to focus on only one aspect of a situation, problem or object, and so cannot see the big picture. Centration is noticed in conservation: the awareness that altering a substance's appearance does not change its basic properties. Children at this stage are unaware of conservation.

- **Symbols in Artwork.**
- Preoperational children's increasing ability to use mental representation is also seen clearly in the artwork they produce. To produce such artwork, the child must have mental representations
- **Pretend (or symbolic) Play**
- Toddlers often pretend to be people they are not (e.g. superheroes, policeman), and may play these roles with props that symbolize real life objects. Children may also invent an imaginary playmate.
- Watch children engaged in play, and you will soon see clear evidence of symbol use. In *symbolic play children use one object to stand for another, such as* when they pretend that a blanket is a magic carpet or a banana is a telephone.
- **Artificialism**
- This is the belief that certain aspects of the environment are manufactured by people (e.g. clouds in the sky).
- **Irreversibility**
- This is the inability the reverse the direction of a sequence of events to their starting point.

Conservation refers to the idea that a quantity remains the same despite changes in appearance. At this stage, capabilities for logical reasoning are limited and the child's thought processes are dominated by the immediate sensory impressions. This characteristic can be illustrated by asking the child to solve a liquid conservation problem

Papalia, Human Development, 7th Edition, Copyright © 1998, McGraw-Hill Companies, Inc. All Rights Reserved.

Piaget's Conservation Task



Piaget's Stages of Cognitive Development:



Sensorimotor
Stage

Birth to 2 yrs

Preoperational
Stage

2 to 7 yrs

Concrete
Operational
Stage

7 to 11 yrs

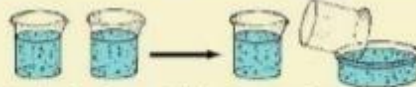
Formal
Operational
Stage

12 and up

3. Concrete Operational Stage (7 to 12 yrs of age) (Childhood and early Adolescence)

The Concrete Operational stage is characterized by the appropriate use of logic. This stage when capacity for logical thought first emerge. During this stage, the child begins to develop:

- **1. Serialization/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
- **2. Transitivity:** The ability to recognize logical relationships among elements in a serial order. Eg.: if A is taller than B and B is taller than C, then A must be taller than C.
- **3. 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.
- **4. Reversibility:** The child understands that numbers or objects can be changed, then returned to their original state. **6. Conservation: understanding that quantity, length or number of items is unrelated to** the arrangement or appearance of the object or items.
- **5. Elimination of Egocentrism:** The child's egocentrism wanes and develop the ability to view things from another's perspective.
- **6. Inductive- Deductive reasoning :** The child begins to think in terms of a set of interrelated principle rather than single bits of knowledge. He use inductive-deductive approaches in terms of reasoning and arriving at conclusion.
- **7. Understanding of conservation :** The child began to understand that physical quantities do not change based on the arrangement and/or appearance of the object



Liquids: Two identical beakers are filled to the same level, and the child agrees that they have the same amount to drink.

Contents of one beaker are poured into a different shaped beaker so that the two columns of water are of unequal height.

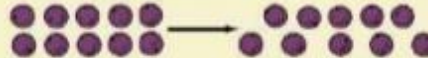
Conserving child recognizes that each beaker has the same amount to drink (on the average, conservation of liquids is attained at age 6-7 years).



Mass (continuous substance): Two identical balls of playdough are presented. The child agrees that they have equal amounts of dough.

One ball is rolled into the shape of a sausage.

Conserving child recognizes that each object contains the same amount of dough (average age, 6-7).



Number: Child sees two rows of beads and agrees that each row has the same number.

One row of beads is increased in length.

Child recognizes that each row still contains the same number of beads (average age, 6-7).



Volume (water displacement): Two identical balls of clay are placed in two identical beakers that had been judged to have the same amount to drink. The child sees the water level rise to the same point in each beaker.

One ball of clay is taken from the water, molded into a different shape, and placed above the beaker. Child is asked whether the water level will be higher than, lower than, or the same as in the other beaker when the clay is reinserted into the water.

Conserving child recognizes that the water levels will be the same because nothing except the shape of the clay has changed—that is, the pieces of clay displace the same amount of water (average age, 9-12).

4 Formal Operational Stage

(from 12 yrs and up) (Adolescence and Adulthood)

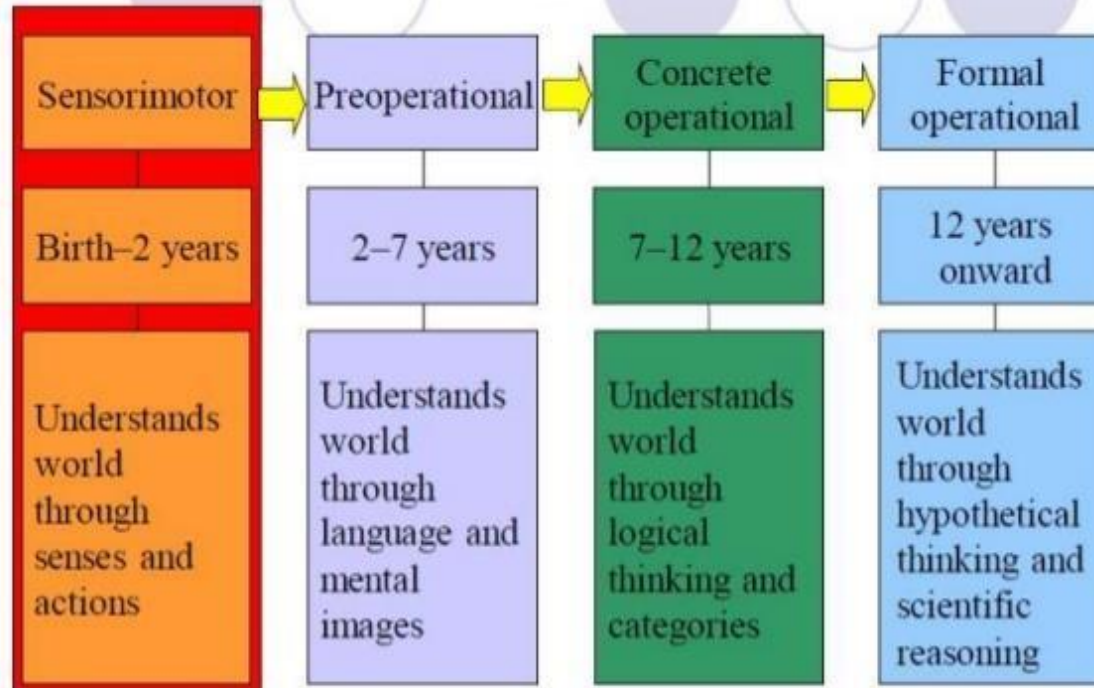
This is the most complete stage of development. Ability to deal with abstract concepts and abstract reasoning develops by about age 11. Intellectually the child can and should be treated as an adult. The high order intellectual development/functioning is occurred in this stage . According Piaget , after the expiry of the formal operation stage the child may reach full intellectual potential.

- Successful communication, in other words, requires a feel for the child's stage of intellectual development.
- They are now aware that others think, but usually, in new expressions of egocentrism, presume that they and others are thinking about the same thing. Because young adolescents are experiencing tremendous biologic changes in growth and sexual development, they are preoccupied with these events.

In this stage, the individual's

- At this stage, the adolescent or young adult begins to think abstractly and reason about hypothetical problems.
- Teens begin to think more about moral, philosophical, ethical, social, and political issues that require theoretical and abstract reasoning.
- Begin to use deductive logic, or reasoning from a general principle to specific information.
- thought becomes increasingly flexible and abstract, i.e., can carry out systematic experiments.
- ability to systematically solve a problem in a logical and methodical way.
- Understand that nothing is absolute; everything is relative.
- Understand that the rules of any games or social system are developed by man by mutual agreement and hence could be changed or modified.

Stages



Four Stages of Development

SENSORIMOTOR STAGE

The child begins to interact with the environment.



0-2

PREOPERATIONAL STAGE

The child begins to represent the world symbolically.



2-6 or 7

CONCRETE OPERATIONAL STAGE

The child learns rules such as conservation.



7-11 or 12

FORMAL OPERATIONAL STAGE

The adolescent can transcend the concrete situation and think about the future.



12-Adulthood

Educational Implications:

- Piaget's theory provides valuable information and advice on curriculum planning and structuring the schemas.
- Learning and development are the net result of interaction between a person's cognitive structure and functioning of their children. This type of knowledge may prove quite beneficial to them in dealing with the children and planning their training and education.
- It focuses on child-centered education by giving educational experience suitable to learners' cognitive structure.
- Useful in providing learning experiences in tune with the mental abilities of the child.
- Emphasis on discovery approach in learning.
- Curriculum should provide specific educational experience based on children's developmental level.
- Arrange classroom activities so that they assist and encourage self-learning.
- Do not treat children as miniature adults; they think and learn differently from adults.
- Practical learning situations.
- Simple to Complex and Project method of teaching.
- Co-curricular activities have equal importance as that of curricular experiences in the cognitive development of children.
- Major goals of education are equal to the creative and critical thinking.