THEORIES : PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

(Lecture Series-3), B.A. IInd (Honors)

(Paper-IVth Systems in Psychology)

By

Dr. Masaud Ansari

Department of Psychology,

A.P.S.M. College, Barauni

L. N. M. University, Darbhanga

7th SEPTEMBER 2020

Theories of Cognitive Psychology

There are three important cognitive theories. The three cognitive theories are:

1. Piaget's developmental theory (1936),
2. Lev Vygotsky's social cultural cognitive theory (1934), and
3. Atkinson and Shiffrin's information process theory (1968)

Here, we will discuss **Piaget's developmental theory** only, and rest of the theories will be discussed in next lecture series of cognitive theories.

1. Piaget's developmental theory (1936)

Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence. It was first created by the Swiss developmental psychologist Jean Piaget (1896–1980). **The theory deals with the nature of knowledge itself and how humans gradually come to acquire, construct, and use it.** Piaget's theory is mainly known as a developmental stage theory. Piaget "was intrigued by the fact that children of different ages made different kinds of mistakes while solving problems".[2] He also believed that children are not like "little adults" who may know less; children just think and speak differently.

Jean Piaget (1896-1980)

Conti…

By Piaget thinking that children have great cognitive abilities, he came up with four different cognitive development stages, which he put out into testing. Within those four stages he managed to group them with different ages. Each stage he realized how children managed to develop their cognitive skills. For example, he believed that children experience the world through actions, representing things with words, thinking logically, and using reasoning.

To Piaget, cognitive development was a progressive reorganization of mental processes resulting from biological maturation and environmental experience. He believed that children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment, then adjust their ideas accordingly. Moreover, Piaget claimed that cognitive development is at the center of the human organism, and language is contingent on knowledge and understanding acquired through cognitive development. **Child-centered classrooms and "open education" are direct applications of Piaget's views.**

- **Nature of intelligence: operative and figurative**

Piaget noted that reality is a dynamic system of continuous change. Reality is defined in reference to the two conditions that define dynamic systems. Specifically, he argued that reality involves transformations and states. **Transformations** refer to all manners of changes that a thing or person can undergo. **States** refer to the conditions or the appearances in which things or persons can be found between transformations. For example, there might be changes in shape or form (for instance, liquids are reshaped as they are transferred from one vessel to another, and similarly humans change in their characteristics as they grow older), in size (a toddler does not walk and run without falling, but after 7 yrs of age, the child's sensory motor anatomy is well developed and now acquires skill faster), or in placement or location in space and time (e.g., various objects or persons might be found at one place at one time and at a different place at another time). Thus, Piaget argued, if human intelligence is to be adaptive, it must have functions to represent both the transformational and the static aspects of reality. He proposed that operative intelligence is responsible for the representation and manipulation of the dynamic or transformational aspects of reality, and that figurative intelligence is responsible for the representation of the static aspects of reality.

Conti…

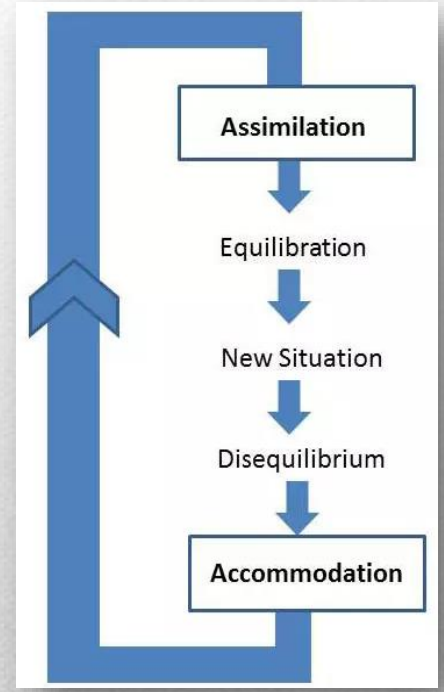
Operative intelligence is the active aspect of intelligence. It involves all actions, overt or covert, undertaken in order to follow, recover, or anticipate the transformations of the objects or persons of interest. **Figurative intelligence** is the more or less static aspect of intelligence, involving all means of representation used to retain in mind the states (i.e., successive forms, shapes, or locations) that intervene between transformations. That is, it involves perception, imitation, mental imagery, drawing, and language. Therefore, the figurative aspects of intelligence derive their meaning from the operative aspects of intelligence, because states cannot exist independently of the transformations that interconnect them. Piaget stated that the figurative or the representational aspects of intelligence are subservient to its operative and dynamic aspects, and therefore, that understanding essentially derives from the operative aspect of intelligence. At any time, operative intelligence frames how the world is understood and it changes if understanding is not successful. Piaget stated that this process of understanding and change involves two basic functions: **assimilation** and **accommodation**.

- **Assimilation and Accommodation**

Through his study of the field of education, Piaget focused on two processes, which he named assimilation and accommodation. To Piaget, assimilation meant integrating external elements into structures of lives or environments, or those we could have through experience. **Assimilation** is how humans perceive and adapt to new information. It is the process of fitting new information into pre-existing cognitive schemas. **Assimilation** in which new experiences are reinterpreted to fit into, or assimilate with, old ideas. It occurs when humans are faced with new or unfamiliar information and refer to previously learned information in order to make sense of it. In contrast, **accommodation** is the process of taking new information in one's environment and altering pre-existing schemas in order to fit in the new information. This happens when the existing schema (knowledge) does not work, and needs to be changed to deal with a new object or situation. Accommodation is imperative because it is how people will continue to interpret new concepts, schemas, frameworks, and more. Piaget believed that the human brain has been programmed through evolution to bring **equilibrium**, which is what he believed ultimately influences structures by the internal and external processes through assimilation and accommodation.

Conti…

Piaget's understanding was that assimilation and accommodation cannot exist without the other. They are two sides of a coin. To assimilate an object into an existing mental schema, one first needs to take into account or accommodate to the particularities of this object to a certain extent. For instance, to recognize (assimilate) an apple as an apple, one must first focus (accommodate) on the contour of this object. To do this, one needs to roughly recognize the size of the object. Development increases the balance, or equilibration, between these two functions. When in balance with each other, assimilation and accommodation generate mental schemas of the operative intelligence. When one function dominates over the other, they generate representations which belong to figurative intelligence.



Piaget's Sensorimotor stages

In his theory of Cognitive development, Jean Piaget proposed that humans progress through four developmental stages:

1. Sensorimotor stage,
2. Preoperational stage,
3. Concrete operational stage and
4. Formal operational stage.

1. Sensorimotor Stage (Birth to 2 Yrs)

The first of these, the **sensorimotor stage** "extends from birth to the acquisition of language." In this stage, infants progressively construct knowledge and understanding of the world by coordinating experiences (such as vision and hearing) from physical interactions with objects (such as grasping, sucking, and stepping). Infants gain knowledge of the world from the physical actions they perform within it. They progress from reflexive, instinctual action at birth to the beginning of symbolic thought toward the end of the stage.

Children learn that they are separate from the environment. They can think about aspects of the environment, even though these may be outside the reach of the child's senses. In this stage, according to Piaget, the development of object permanence is one of the most important accomplishments. **Object permanence** is a child's understanding that an object continues to exist even though they cannot see or hear it. Peek-a-boo is a game in which children who have yet to fully develop object permanence respond to sudden hiding and revealing of a face. By the end of the sensorimotor period, children develop a permanent sense of self and object and will quickly lose interest in Peek-a-boo.

Six sub-stages of Sensorimotor stage

Piaget divided the sensorimotor stage into six sub-stages".

S.No.	Sub-Stage	Age
i	Simple reflexes	Birth–6 weeks
ii	First habits and primary circular reactions phase	6 weeks–4 months
iii	Secondary circular reactions phase	4–8 months
iv	Coordination of secondary circular reactions stages	8–12 months
v	Tertiary circular reactions, novelty, and curiosity	12–18 months
iv	Internalization of schemas	18–24 months

i. Simple reflexes (Birth to 6 weeks)

"Coordination of sensation and action through reflexive behaviors". 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.

ii. First habits and primary circular reactions phase (6 weeks to 4 month)

"Coordination of sensation and two types of schema: habits (reflex) and primary circular reactions (reproduction of an event that initially occurred by chance). The main focus is still on the infant's body". 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.

iii. Secondary circular reactions phase (4 months to 8 months)

Development of habits. "Infants become more object-oriented, moving beyond self-preoccupation; repeat actions that bring interesting or pleasurable results". 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.

iv. Coordination of secondary circular reactions stages (8 months to 12 months)

"Coordination of vision and touch—hand-eye coordination; coordination of schemas and intentionality". 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.

v. Tertiary circular reactions, novelty, and curiosity (12 months to 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". 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.

vi. Internalization of schemas (18 months to 24 month)

"Infants develop the ability to use primitive symbols and form enduring mental representations". This stage is associated primarily with the beginnings of insight, or true creativity. This marks the passage into the preoperational stage.

2. Pre-operational stage (2 to 7 Yrs)

During this stage, young children can think about things symbolically. This is the ability to make one thing - a word or an object - stand for something other than itself. Thinking is still egocentric, and the infant has difficulty taking the viewpoint of others.

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, known as the pre-operational stage, the second of Piaget's four developmental stages. It starts when the child begins to learn to speak at age two and lasts up until the age of seven. During the pre-operational stage of cognitive development, Piaget noted that children do not yet understand concrete logic and cannot mentally manipulate information. Children's increase in playing and pretending takes place in this stage. However, the child still has trouble seeing things from different points of view. The children's play is mainly categorized by symbolic play and manipulating symbols. Such play is demonstrated by the idea of checkers being snacks, pieces of paper being plates, and a box being a table. Their observations of symbols exemplifies the idea of play with the absence of the actual objects involved.

- **Symbolic function sub-stage of Pre-operational stage (2 to 7 Yrs)**

At about two to four years of age, children cannot yet manipulate and transform information in a logical way. However, they now can think in images and symbols. Other examples of mental abilities are language and pretend play. Symbolic play is when children develop imaginary friends or role-play with friends. Children's play becomes more social and they assign roles to each other. Some examples of symbolic play include playing house, or having a tea party. The type of symbolic play in which children engage is connected with their level of creativity and ability to connect with others. Additionally, the quality of their symbolic play can have consequences on their later development. For example, young children whose symbolic play is of a violent nature tend to exhibit less prosocial behavior and are more likely to display antisocial tendencies in later years.

- **Intuitive thought sub-stage of Pre-operational stage (2 to 7 Yrs)**

At between about the ages of 4 and 7, children tend to become very curious and ask many questions, beginning the use of primitive reasoning. There is an emergence in the interest of reasoning and wanting to know why things are the way they are. Piaget called it the "intuitive substage" because children realize they have a vast amount of knowledge, but they are unaware of how they acquired it. Centration, conservation, irreversibility, class inclusion, and transitive inference are all characteristics of preoperative thought. Centration is the act of focusing all attention on one characteristic or dimension of a situation, whilst disregarding all others. Conservation is the awareness that altering a substance's appearance does not change its basic properties. Children at this stage are unaware of conservation and exhibit centration. Both centration and conservation can be more easily understood once familiarized with Piaget's most famous experimental task.

Conti…

In this task, a child is presented with two identical beakers containing the same amount of liquid. The child usually notes that the beakers do contain the same amount of liquid. When one of the beakers is poured into a taller and thinner container, children who are younger than seven or eight years old typically say that the two beakers no longer contain the same amount of liquid, and that the taller container holds the larger quantity (centration), without taking into consideration the fact that both beakers were previously noted to contain the same amount of liquid. Due to superficial changes, the child was unable to comprehend that the properties of the substances continued to remain the same (conservation).

Irreversibility is a concept developed in this stage which is closely related to the ideas of centration and conservation. Irreversibility refers to when children are unable to mentally reverse a sequence of events. In the same beaker situation, the child does not realize that, if the sequence of events was reversed and the water from the tall beaker was poured back into its original beaker, then the same amount of water would exist. Another example of children's reliance on visual representations is their misunderstanding of "less than" or "more than". When two rows containing equal numbers of blocks are placed in front of a child, one row spread farther apart than the other, the child will think that the row spread farther contains more blocks.

3. Concrete operational stage (7 to 11 Yrs)

Piaget considered the concrete stage a major turning point in the child's cognitive development because it marks the beginning of logical or operational thought. This means the child can work things out internally in their head (rather than physically try things out in the real world).

This stage, which follows the preoperational stage, occurs between the ages of 7 and 11 (middle childhood and preadolescence) years, and is characterized by the appropriate use of logic. During this stage, a child's thought processes become more mature and "adult like". They start solving problems in a more logical fashion. Abstract, hypothetical thinking is not yet developed in the child, and children can only solve problems that apply to concrete events or objects. At this stage, the children undergo a transition where the child learns rules such as conservation. Piaget determined that children are able to incorporate inductive reasoning. Inductive reasoning involves drawing inferences from observations in order to make a generalization. In contrast, children struggle with deductive reasoning, which involves using a generalized principle in order to try to predict the outcome of an event. Children in this stage commonly experience difficulties with figuring out logic in their heads. For example, a child will understand that "A is more than B" and "B is more than C". However, when asked "is A more than C?", the child might not be able to logically figure the question out mentally.

Testing for concrete operations

Piagetian tests are well known and practiced to test for concrete operations. The most prevalent tests are those for conservation. There are some important aspects that the experimenter must take into account when performing experiments with these children.

One example of an experiment for testing conservation is the water level task. An experimenter will have two glasses that are the same size, fill them to the same level with liquid, which the child will acknowledge is the same. Then, the experimenter will pour the liquid from one of the small glasses into a tall, thin glass. The experimenter will then ask the child if the taller glass has more liquid, less liquid, or the same amount of liquid. The child will then give his answer. The experimenter will ask the child why he gave his answer, or why he thinks that is.

Conti…

- **Justification:** After the child has answered the question being posed, the experimenter must ask why the child gave that answer. This is important because the answers they give can help the experimenter to assess the child's developmental age.
- **Number of times asking:** Some argue that if a child is asked if the amount of liquid in the first set of glasses is equal then, after pouring the water into the taller glass, the experimenter asks again about the amount of liquid, the children will start to doubt their original answer. They may start to think that the original levels were not equal, which will influence their second answer.
- **Word choice:** The phrasing that the experimenter uses may affect how the child answers. If, in the liquid and glass example, the experimenter asks, "Which of these glasses has more liquid?", the child may think that his thoughts of them being the same is wrong because the adult is saying that one must have more. Alternatively, if the experimenter asks, "Are these equal?", then the child is more likely to say that they are, because the experimenter is implying that they are.

4. Formal operational stage (12 to Adulthood)

Intelligence is demonstrated through the logical use of symbols related to abstract concepts. This form of thought includes "assumptions that have no necessary relation to reality."[45] At this point, the person is capable of hypothetical and deductive reasoning. During this time, people develop the ability to think about abstract concepts.

Piaget stated that "hypothetico-deductive reasoning" becomes important during the formal operational stage. This type of thinking involves hypothetical "what-if" situations that are not always rooted in reality, i.e. counterfactual thinking. It is often required in science and mathematics.

- Abstract thought emerges during the formal operational stage. Children tend to think very concretely and specifically in earlier stages, and begin to consider possible outcomes and consequences of actions.
- Metacognition, the capacity for "thinking about thinking" that allows adolescents and adults to reason about their thought processes and monitor them.
- Problem-solving is demonstrated when children use trial-and-error to solve problems. The ability to systematically solve a problem in a logical and methodical way emerges.

Conti…

While children in primary school years mostly used inductive reasoning, drawing general conclusions from personal experiences and specific facts, adolescents become capable of deductive reasoning, in which they draw specific conclusions from abstract concepts using logic. This capability results from their capacity to think hypothetically. "However, research has shown that not all persons in all cultures reach formal operations, and most people do not use formal operations in all aspects of their lives".

Piaget and his colleagues conducted several experiments to assess formal operational thought:

Experiments by Piaget and his colleagues

In one of the experiments, Piaget evaluated the cognitive capabilities of children of different ages through the use of a scale and varying weights. The task was to balance the scale by hooking weights on the ends of the scale. To successfully complete the task, the children must use formal operational thought to realize that the distance of the weights from the center and the heaviness of the weights both affected the balance. A heavier weight has to be placed closer to the center of the scale, and a lighter weight has to be placed farther from the center, so that the two weights balance each other. While 3- to 5- year olds could not at all comprehend the concept of balancing, children by the age of 7 could balance the scale by placing the same weights on both ends, but they failed to realize the importance of the location. By age 10, children could think about location but failed to use logic and instead used trial-and-error. Finally, by age 13 and 14, in early adolescence, some children more clearly understood the relationship between weight and distance and could successfully implement their hypothesis.

Implication

Parents can use Piaget's theory in many ways to support their child's growth. Teachers can also use Piaget's theory, for instance, when discussing whether the syllabus subjects are suitable for the level of students or not. For example, recent studies have shown that children in the same grade and of the same age perform differentially on tasks measuring basic addition and subtraction fluency. While children in the preoperational and concrete operational levels of cognitive development perform combined arithmetic operations (such as addition and subtraction) with similar accuracy, children in the concrete operational level of cognitive development have been able to perform both addition problems and subtraction problems with overall greater fluency.

According to Piaget (1958), assimilation and accommodation require an active learner, not a passive one, because problem-solving skills cannot be taught, they must be discovered. Within the classroom learning should be student-centered and accomplished through active discovery learning. The role of the teacher is to facilitate learning, rather than direct tuition. Therefore, teachers should encourage the following within the classroom:

Conti…

- Focus on the process of learning, rather than the end product of it.
- Using active methods that require rediscovering or reconstructing "truths."
- Using collaborative, as well as individual activities (so children can learn from each other).
- Devising situations that present useful problems, and create disequilibrium in the child.
- Evaluate the level of the child's development so suitable tasks can be set.

https://en.wikipedia.org/wiki/Piaget%27s_theory_of_cognitive_development

https://www.simplypsychology.org/piaget.html

Thank You