Piaget's Theory and Stages of Cognitive Development

Jean Piaget's theory of cognitive development suggests that intelligence changes as children grow. A child's cognitive development is not just about acquiring knowledge, the child has to develop or construct a mental model of the world.

Cognitive development occurs through the interaction of innate capacities and environmental events, and children pass through a series of stages. Piaget's stages are:

Sensorimotor stage: birth to 18-24 months

Preoperational stage: 2 to 7 years

Concrete operational stage: 7 to 11 years

Formal operational stage: ages 12 and up

The sequence of the stages is universal across cultures and follow the same invariant (unchanging) order. All children go through the same stages in the same order (but not all at the same rate).

How Piaget Developed the Theory

Piaget was employed at the Binet Institute in the 1920s, where his job was to develop French versions of questions on English intelligence tests. He became intrigued with the reasons children gave for their wrong answers to the questions that required logical thinking.

He believed that these incorrect answers revealed important differences between the thinking of adults and children.

Piaget branched out on his own with a new set of assumptions about children's intelligence:

- Children's intelligence differs from an adult's in quality rather than in quantity. This means that children reason (think) differently from adults and see the world in different ways.
- Children actively build up their knowledge about the world. They are not passive creatures waiting for someone to fill their heads with knowledge.
- The best way to understand children's reasoning was to see things from their point of view.

What Piaget wanted to do was not to measure how well children could count, spell or solve problems as a way of grading their I.Q. What he was more interested in was the way in which fundamental concepts like the very idea of number, time, quantity, causality, justice and so on emerged.

Piaget studied children from infancy to adolescence using naturalistic observation of his own three babies and sometimes controlled observation too. From these he wrote diary descriptions charting their development.

He also used clinical interviews and observations of older children who were able to understand questions and hold conversations.

Stages of Cognitive Development

Jean Piaget's theory of cognitive development suggests that children move through four different stages of intellectual development which reflect the increasing sophistication of children's thought

Each child goes through the stages in the same order, and child development is determined by biological maturation and interaction with the environment.

At each stage of development, the child's thinking is qualitatively different from the other stages, that is, each stage involves a different type of intelligence.

Piaget's Four Stages

Stage	Age	Goal
Sensorimotor	Birth to 18-24 months	Object permanence
Preoperational	2 to 7 years old	Symbolic thought
Concrete operational	Ages 7 to 11 years	Logical thought
Formal operational	Adolescence to adulthood	Scientific reasoning

Although no stage can be missed out, there are individual differences in the rate at which children progress through stages, and some individuals may never attain the later stages.

Piaget did not claim that a particular stage was reached at a certain age - although descriptions of the stages often include an indication of the age at which the average child would reach each stage.

The Sensorimotor Stage (Ages: Birth to 2 Years)

Major Characteristics and Developmental Changes:

- The infant learns about the world through their senses and through their actions (moving around and exploring its environment).
- During the sensorimotor stage a range of cognitive abilities develop. These include: object permanence; self-recognition; deferred imitation; and representational play.
- They relate to the emergence of the general symbolic function, which is the capacity to represent the world mentally
- At about 8 months the infant will understand the permanence of objects and that they will still exist even if they can't see them and the infant will search for them when they disappear.

During this stage the infant lives in the present. It does not yet have a mental picture of the world stored in its memory therefore it does not have a sense of object permanence.

If it cannot see something then it does not exist. This is why you can hide a toy from an infant, while it watches, but it will not search for the object once it has gone out of sight.

The main achievement during this stage is object permanence - knowing that an object still exists, even if it is hidden. It requires the ability to form a mental representation (i.e., a schema) of the object.

Towards the end of this stage the general symbolic function begins to appear where children show in their play that they can use one object to stand for another. Language starts to appear because they realise that words can be used to represent objects and feelings.

The child begins to be able to store information that it knows about the world, recall it and label it.

The Preoperational Stage (Ages: 2 - 7 Years)

Major Characteristics and Developmental Changes:

- Toddlers and young children acquire the ability to internally represent the world through language and mental imagery.
- During this stage, young children can think about things symbolically. This is the ability to make one thing, such as a word or an object, stand for something other than itself.
- A child's thinking is dominated by how the world looks, not how the world is. It is not yet capable of logical (problem solving) type of thought.
- Infants at this stage also demonstrate animism. This is the tendency for the child to think that non-living objects (such as toys) have life and feelings like a person's.

By 2 years, children have made some progress towards detaching their thought from physical world. However have not yet developed logical (or 'operational') thought characteristic of later stages.

Thinking is still intuitive (based on subjective judgements about situations) and egocentric (centred on the child's own view of the world).

The Concrete Operational Stage (Ages: 7 - 11 Years)

Major Characteristics and Developmental Changes:

- During this stage, children begin to thinking logically about concrete events.
- Children begin to understand the concept of conservation; understanding that, although things may change in appearance, certain properties remain the same.
- During this stage, children can mentally reverse things (e.g. picture a ball of plasticine returning to its original shape).
- During this stage, children also become less egocentric and begin to think about how other people might think and feel.

The stage is called concrete because children can think logically much more successfully if they can manipulate real (concrete) materials or pictures of them.

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).

Children can conserve number (age 6), mass (age 7), and weight (age 9). Conservation is the understanding that something stays the same in quantity even though its appearance changes.

But operational thought only effective here if child asked to reason about materials that are physically present. Children at this stage will tend to make mistakes or be overwhelmed when asked to reason about abstract or hypothetical problems.

The Formal Operational Stage (Ages: 12 and Over)

Major Characteristics and Developmental Changes:

- Concrete operations are carried out on things whereas formal operations are carried out on ideas. Formal operational thought is entirely freed from physical and perceptual constraints.
- During this stage, adolescents can deal with abstract ideas (e.g. no longer needing to think about slicing up cakes or sharing sweets to understand division and fractions).
- They can follow the form of an argument without having to think in terms of specific examples.
- Adolescents can deal with hypothetical problems with many possible solutions. E.g. if asked 'What would happen if money were abolished in one hour's time? they could speculate about many possible consequences.

From about 12 years children can follow the form of a logical argument without reference to its content. During this time, people develop the ability to think about abstract concepts, and logically test hypotheses.

This stage sees emergence of scientific thinking, formulating abstract theories and hypotheses when faced with a proble

Piaget's Theory Differs From Others In Several Ways:

Piaget's (1936, 1950) theory of cognitive development explains how a child constructs a mental model of the world. He disagreed with the idea that intelligence was a fixed trait, and regarded cognitive development as a process which occurs due to biological maturation and interaction with the environment.

Children's ability to understand, think about and solve problems in the world develops in a stop-start, discontinuous manner (rather than gradual changes over time).

▪ It is concerned with children, rather than all learners.

▪ It focuses on development, rather than learning per se, so it does not address learning of information or specific behaviors.

▪ It proposes discrete stages of development, marked by qualitative differences, rather than a gradual increase in number and complexity of behaviors, concepts, ideas, etc.

The goal of the theory is to explain the mechanisms and processes by which the infant, and then the child, develops into an individual who can reason and think using hypotheses.

To Piaget, cognitive development was a progressive reorganization of mental processes as a result of biological maturation and environmental experience.

Children construct an understanding of the world around them, then experience discrepancies between what they already know and what they discover in their environment.

Schemas

Piaget claimed that knowledge cannot simply emerge from sensory experience; some initial structure is necessary to make sense of the world.

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

Schemas are the basic building blocks of such cognitive models, and enable us to form a mental representation of the world.

Piaget (1952, p. 7) defined a schema as: "a cohesive, repeatable action sequence possessing component actions that are tightly interconnected and governed by a core meaning."

In more simple terms Piaget called the schema the basic building block of intelligent behavior – a way of organizing knowledge. Indeed, it is useful to think of schemas as “units” of knowledge, each relating to one aspect of the world, including objects, actions, and abstract (i.e., theoretical) concepts.

Wadsworth (2004) suggests that schemata (the plural of schema) be thought of as 'index cards' filed in the brain, each one telling an individual how to react to incoming stimuli or information.

When Piaget talked about the development of a person's mental processes, he was referring to increases in the number and complexity of the schemata that a person had learned.

When a child's existing schemas are capable of explaining what it can perceive around it, it is said to be in a state of equilibrium, i.e., a state of cognitive (i.e., mental) balance.

Piaget emphasized the importance of schemas in cognitive development and described how they were developed or acquired. 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. The assumption is that we store these mental representations and apply them when needed.

The Process of Adaptation

Jean Piaget , viewed intellectual growth as a process of **adaptation** (adjustment) to the world. This happens through assimilation, accommodation, and equilibration.

Assimilation

Piaget defined assimilation as the cognitive process of fitting new information into existing cognitive schemas, perceptions, and understanding. Overall beliefs and understanding of the world do not change as a result of the new information.

This means that when you are faced with new information, you make sense of this information by referring to information you already have (information processed and learned previously) and try to fit the new information into the information you already have.

Accommodation

Jean Piaget defined accommodation as the cognitive process of revising existing cognitive schemas, perceptions, and understanding so that new information can be incorporated. This happens when the existing schema (knowledge) does not work, and needs to be changed to deal with a new object or situation.

In order to make sense of some new information, he actual adjusts information he already has (schemas you already have, etc.) to make room for this new information.

For example, a child may have a schema for birds (feathers, flying, etc.) and then they see a plane, which also flies, but would not fit into their bird schema.

With this new knowledge, the boy was able to change his schema of “clown” and make this idea fit better to a standard concept of “clown”.

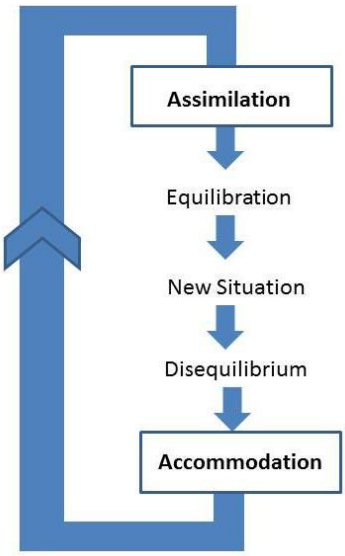
Equilibration

Piaget believed that all human thought seeks order and is uncomfortable with contradictions and inconsistencies in knowledge structures. In other words, we seek 'equilibrium' in our cognitive structures.

Equilibrium occurs when a child's schemas can deal with most new information through assimilation. However, an unpleasant state of disequilibrium occurs when new information cannot be fitted into existing schemas (assimilation).

Piaget believed that cognitive development did not progress at a steady rate, but rather in leaps and bounds. Equilibration is the force which drives the learning process as we do not like to be frustrated and will seek to restore balance by mastering the new challenge (accommodation).

Once the new information is acquired the process of assimilation with the new schema will continue until the next time we need to make an adjustment to it.



Educational Implications

Piaget (1952) did not explicitly relate his theory to education, although later researchers have explained how features of Piaget's theory can be applied to teaching and learning.

Piaget has been extremely influential in developing educational policy and teaching practice. For example, a review of primary education by the UK government in 1966 was based strongly on Piaget's theory. The result of this review led to the publication of the Plowden report (1967).

Discovery learning – the idea that children learn best through doing and actively exploring - was seen as central to the transformation of the primary school curriculum.

'The report's recurring themes are individual learning, flexibility in the curriculum, the centrality of play in children's learning, the use of the environment, learning by discovery and the importance of the evaluation of children's progress - teachers should 'not assume that only what is measurable is valuable.'

Because Piaget's theory is based upon biological maturation and stages, the notion of 'readiness' is important. Readiness concerns when certain information or concepts should be taught. According to Piaget's theory children should not be taught certain concepts until they have reached the appropriate stage of cognitive development.

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:

1) Focus on the process of learning, rather than the end product of it.
2) Using active methods that require rediscovering or reconstructing "truths."
3) Using collaborative, as well as individual activities (so children can learn from each other).

4) Devising situations that present useful problems, and create disequilibrium in the child.
5) Evaluate the level of the child's development so suitable tasks can be set.

Critical Evaluation

Support

- The influence of Piaget's ideas in developmental psychology has been enormous. He changed how people viewed the child's world and their methods of studying children.

  He was an inspiration to many who came after and took up his ideas. Piaget's ideas have generated a huge amount of research which has increased our understanding of cognitive development.

- Piaget (1936) was the first psychologist to make a systematic study of cognitive development. His contributions include a stage theory of child cognitive development, detailed observational studies of cognition in children, and a series of simple but ingenious tests to reveal different cognitive abilities.
- His ideas have been of practical use in understanding and communicating with children, particularly in the field of education (re: Discovery Learning).

Criticisms

1) Because Piaget concentrated on the universal stages of cognitive development and biological maturation, he failed to consider the effect that the social setting and culture may have on cognitive development.
2) The concept of schema is incompatible with the theories of Bruner (1966) and Vygotsky (1978). Behaviorism would also refute Piaget's schema theory because is cannot be directly observed as it is an internal process. Therefore, they would claim it cannot be objectively measured.
3) Piaget studied his own children and the children of his colleagues in Geneva in order to deduce general principles about the intellectual development of all children. Not only was his sample very small, but it was composed solely of European children from families of high socio-economic status. Researchers have therefore questioned the generalisability of his data.
4) For Piaget, language is seen as secondary to action, i.e., thought precedes language. The Russian psychologist Lev Vygotsky (1978) argues that the development of language and thought go together and that the origin of reasoning is more to do with our ability to communicate with others than with our interaction with the material world.
5) Vygotsky, a contemporary of Piaget, argued that social interaction is crucial for cognitive development. According to Vygotsky the child's learning always occurs in a social context in co-operation with someone more skillful . This social interaction provides language opportunities and Vygotksy considered language the foundation of thought.

6) As several studies have shown Piaget underestimated the abilities of children because his tests were sometimes confusing or difficult to understand (e.g., Hughes, 1975).

Piaget failed to distinguish between competence (what a child is capable of doing) and performance (what a child can show when given a particular task). When tasks were altered, performance (and therefore competence) was affected. Therefore, Piaget might have underestimated children's cognitive abilities.

For example, a child might have object permanence (competence) but still not be able to search for objects (performance). When Piaget hid objects from babies he found that it wasn't till after nine months that they looked for it. However, Piaget relied on manual search methods – whether the child was looking for the object or not.

- Vygotsky and Bruner preferred to see development as a continuous process, rather than well defined stages. Others have queried the age ranges of the stages. Some studies have shown that progress to the formal operational stage is not guaranteed.

  For example, Keating (1979) reported that 40-60% of college students fail at formal operation tasks, and Dasen (1994) states that only one-third of adults ever reach the formal operational stage.