Lecture 3: Piaget's Theory of Cognitive Development

1. Background and Key Concepts of Piaget's Theory

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

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

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.

Schemas

Piaget claimed that knowledge emerges from sensory experience but some initial structure is necessary to make sense of the world using schemata.

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. 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.

2. 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.

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.

2.1. 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.

2.2. 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.

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

2.3. The Concrete Operational Stage

Ages: 7 - 11 Years

Major Characteristics and Developmental Changes:

- During this stage, children begin to think 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.
- 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 at this stage will tend to make mistakes or be overwhelmed when asked to reason about abstract or hypothetical problems.

2.4. 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 need 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.

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

3. The Process of Adaptation

Jean Piaget (1952; see also Wadsworth, 2004) viewed intellectual growth as a process of **adaptation** (adjustment) to the world. This happens through assimilation, accommodation, and equilibration.

3.1. Assimilation

Piaget defined assimilation as the cognitive process of fitting new information into existing cognitive schemas, perceptions, and understanding. 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). So, your understanding of the world do not change as a result of the new information. For example, a 2-year-old child sees a man who is bald on top

of his head and has long frizzy hair on the sides. To his father's horror, the toddler shouts "Clown, clown" (Siegler et al., 2003).

3.2. Accommodation

Psychologist 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, you adjust the information you already have 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. He would change the old information to understand that a flying object may not always be a bird; it can be a plane.

3.3. 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).

4. 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.

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.

Some themes emerged like: 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-centred 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:

o Focus on the process of learning, rather than the end product of it.
o Using active methods that require rediscovering or reconstructing "truths."

o Using collaborative, as well as individual activities (so children can learn from each other).

o Evaluate the level of the child's development so suitable tasks can be set.

5. Critical Evaluation

5.1. 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.
- His ideas have been of practical use in understanding and communicating with children, particularly in the field of education (re: Discovery Learning).

5.2. Criticisms

- Are the stages real? Vygotsky and Bruner would rather not talk about stages at all, preferring to see development as a continuous process. Others have queried the age ranges of the stages. Some studies have shown that progress to the formal operational stage is not guaranteed.
- 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.
- Piaget's research methods (observation and clinical interviews) are more open to biased interpretation than other methods.
- Because Piaget conducted the observations alone the data collected are based on his own subjective interpretation of events. It would have been more reliable if Piaget conducted the observations with another researcher and compared the results afterward to check if they are similar (i.e., have inter-rater reliability).
- 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).
- 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.
- 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.
- 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.

7. Piaget vs Vygotsky

Piaget maintains that cognitive development stems largely from independent explorations in which children construct knowledge of their own. Whereas Vygotsky argues that children learn through social interactions, building knowledge by learning from more knowledgeable others such as peers and adults. In other words, Vygotsky believed that culture affects cognitive development.

These factors lead to differences in the education style they recommend: Piaget would argue for the teacher to provide opportunities which challenge the children's existing schemas and for children to be encouraged to discover for themselves. Alternatively, Vygotsky would recommend that teacher's assist the child to progress through the zone of proximal development by using scaffolding.

However, both theories view children as actively constructing their own knowledge of the world; they are not seen as just passively absorbing knowledge. They also agree that cognitive development involves qualitative changes in thinking, not only a matter of learning more things.

	Piaget	**Vygotsky**
Sociocultural	Little emphasis	Strong emphasis
Constructivism	Cognitive constructivist	Social constructivist
Stages	Cognitive development follows universal stages	Cognitive development is dependent on social context (no stages)
Learning & Development	The child is a 'lone scientist', develops knowledge through own exploration	Learning through social interactions. Child builds knowledge by working with others
Role of Language	Thought drives language development	Language drives cognitive development
Role of the Teacher	Provide opportunities for children to learn about the world for themselves (discovery learning)	Assist the child to progress through the ZPD by using scaffolding

6. Applications of the Theory

Teaching the Preoperational Child (Toddler and Early Childhood)	
Principle	**Application**
Use concrete props and visual aids to illustrate lessons and help children understand what is being presented.	• Use physical illustrations and drawings.
Make instructions relatively to lessen likelihood that the students will get confused.	• After giving instructions, ask a student to demonstrate them as a model for the rest of the class.
Do not expect the students to find it easy to see the	• Avoid lessons about worlds too far

world from someone else's perspective since they are likely to be very egocentric at this point.	removed from the child's experience. • Discuss sharing from the child's own experience.
Give children a great deal of physical practice with the facts and skills that will serve as building blocks for later development.	• Use cut-out letters to build words. • Avoid overuse of workbooks and other paper-and-pencil tasks.
Encourage the manipulation of physical objects that can change in shape while retaining a constant mass, giving the students a chance to move toward the understanding of conservation.	• Provide opportunities to play with clay, water, or sand.
Provide many opportunities to experience the world in order to build a foundation for concept learning and language.	• Take field trips. • Use and teach words to describe what they are seeing, doing, touching, tasting, etc. • Discuss what they are seeing on TV.

Teaching the Concrete Operational Child
(Middle Childhood)

Principle	Application
Continue to use concrete props and visual aids.	• Provide time-lines for history lessons. • Provide three-dimensional models in science.
Continue to give students a chance to manipulate objects.	• Demonstrate simple scientific experiments in which the students can participate. • Show craftwork to illustrate daily occupations of people of an earlier period.
Make sure that lectures and readings are brief and well organized.	• Use materials that present a progression of ideas from step to step. • Have students read short stories or books with short, logical chapters, moving to longer reading assignments only when the students are ready.
Use familiar examples to help explain more complex ideas so that students will have a beginning point for assimilating new information.	• Compare students' own lives with those of the characters in a story.
Give opportunities to classify and group objects and ideas on increasingly complex levels.	• Give students separate sentences on slips of paper to be grouped into paragraphs. • Use outlines, hierarchies, and analogies to show the relationship of new material to already acquired knowledge.
Present problems which require logical, analytical thinking to solve.	• Provide materials such as Mind Twisters, Brain Teasers, and riddles. • Focus discussions on open-ended questions which

	stimulate thinking (e.g., are the mind and the brain the same thing?)

Teaching Students Beginning to Use Formal Operations (Adolescence)	
Principle	**Application**
Continue to use many of the teaching strategies and materials appropriate for students at the concrete operational stage.	• Use visual aids such as charts and illustrations, graphs and diagrams.
Give students an opportunity to explore many hypothetical questions.	• Provide students opportunities to discuss social issues or hypothetical "other worlds."
Encourage students to explain how they solve problems.	• Ask students to work in pairs with one student acting as the problem solver, thinking aloud while tackling a problem, with the other student acting as the listener, checking to see that all steps are mentioned and that everything seems logical. • Make sure that at least some of the tests you give ask for more than rote memory or one final answer; essay questions, for example, might ask students to justify two different positions on an issue.
Whenever possible, teach broad concepts, not just facts, using materials and ideas relevant to the students.	• While discussing a topic such as the Civil War, consider what other issues have divided the country since then. • Use lyrics from popular music to teach poetic devices, to reflect on social problems, and so on.

Source

McLeod, S. A. (2018, June 06). *Jean piaget's theory of cognitive development*. Simply Psychology. www.simplypsychology.org/piaget.html
Materials have been adapted from: Woolfolk & McCune-Nicolich. (1984). *Educational psychology for teachers*. (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.
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