

# Piaget (...and his critics)

## 1) Overview of Lectures

- [philosophical background](#)
- [Piaget's theory of cognitive development](#)
- [limitations in Piaget's method and theory](#)
- [Vygotsky's theory](#)

## 2) Philosophical Background

Study of 'epistemology' dates to ancient Greek philosophers.

Focus on question "how do we come to know the world?" or "where does knowledge come from?".

Cognitive Psychology is the modern study of the processes and structures underlying knowledge

(i.e. thinking and remembering).

## 3) Where does Knowledge come from?

Three main positions:

### 1) Empiricism

- "blank slate" - Aristotle
  - mental processes are seen as qualitatively similar in the child and the adult human.
  - child has had less experience of the world and therefore has less knowledge
- e.g. Behaviourism.

### 2) Rationalism

- "innate ideas" - Plato
  - we are born with knowledge structures which subsequently 'unfold' or are discovered through the process of thinking.
  - more recently, emphasis on maturation and self-contained knowledge 'modules' which come 'on-line' at different stages in development.
- e.g. Chomsky's LAD

### 3) Constructivism / Interactionism

- Kant's synthesis of empiricist and rationalist ideas.
  - born with very basic mental structure which imposes some regularity on sensory information.
- e.g. Piagetian theory.

Important to note that these distinctions persist in theories of cognitive development

to this day.

## 4) Piaget's Theory of Cognitive Development

Piaget strongly influenced by Kant's constructivist theory of knowledge. Formulated his theory as alternative to and rejection of behaviourist (empiricist) theories of development, which account for development in terms of learning.

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

Combined the biological notion of adaptation with Kant's constructivism to produce a theory of the development of adaptive knowledge which he called "genetic epistemology" (the study of the growth of knowledge).

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.

There are a number of key features to Piaget's theory which are worth outlining at this point:

### **Action:**

- physical activity seen as crucial in initial stages of cognitive development.
- all early knowledge about the world comes from actions upon objects in the child's environment.
- the function of reflexes is to bring the child into active contact with objects and surfaces.
- ultimately, Piaget sees all thinking as a kind of action; at the more advanced stages, action is thought about rather than necessarily carried out.

### **Schemas:**

- a specific set of actions (physical or mental) applied to a particular situation.
- schemas can be applied to other situations (as when we assimilate new information to a particular scheme) in a process of generalization.
- schemas can be combined to form more sophisticated sequences of actions.

### **Equilibration:**

- Piaget believed that all human thought seeks order and is uncomfortable with contradictions and inconsistencies in knowledge structures.
- equilibration is accomplished through two complementary processes which Piaget evokes to account for the development of all knowledge.
  - assimilation: bringing new information into an existing body of knowledge by "filtering or modifying" the input.  
(e.g. incorporating the concept 'dog' into the higher level concept of 'animals').
  - accommodation: altering the knowledge structure to allow assimilation of new information which is inconsistent with current knowledge.

(e.g. extending an existing concept to allow for a new, inconsistent example).  
- in every interaction with the world, we assimilate information into existing schemas and simultaneously accommodate our schemas to the environment.

**Stages:**

- thinking (intelligence) develops through an invariant sequence of stages.
- at each stage, a new kind of thinking replaces a more immature one.
- idea of an invariant sequence of development central to this model, the actual ages when children achieve different levels of understanding is not.

**Domain Independence:**

- Piaget's theory was intended to cover all areas (domains) of mental life (perception, language, morality, number etc.)
- used the word 'intelligence' to describe this general quality of thought which develops in the child.

According to Piaget, there are four identifiable stages in the development of cognition:

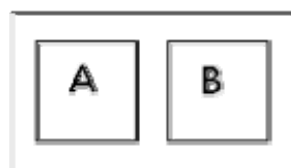
**Sensorimotor Stage**

This stage from birth to approximately 2 years is a period of rapid cognitive growth. Initially equipped with a set of reflex movements and a set of perceptual systems, infant quickly begins to build up direct knowledge of world around her, by relating physical actions to perceived results of those actions. Through the processes of assimilation and accommodation, these actions become progressively adapted to the world (e.g. grasping schema).

Infancy characterised by extreme egocentrism, where the child has no understanding of the world other than her own, current point of view. The main development during this stage is the understanding that objects exist and events occur in the world independently of one's own actions.  
(the object concept', or 'object permanence').

**Object Permanence:**

The typical test for understanding object permanence is some form of 'Search Task', where an object is hidden and the child then tries to find it. The 'A-B' search task reveals the progressive acquisition of the object concept during the sensorimotor stage.



Two possible hiding places presented to child (e.g. two handkerchiefs on a tabletop).  
Object hidden under first hiding place (A) then moved to second hiding place (B)

either secretly or in view of the child. A developmental sequence of acquisition of the object concept revealed by child's responses to this task:

*Substage III: 4 - 8 months*

Child will not search for a hidden object at all, even when she sees it placed under A. By the end, she will attempt to recover a partially concealed object.

*Substage IV: 8 - 12 months*

When object is hidden under A, she will attempt to retrieve it. However, if after a few of these trials object is first hidden under A and then moved to B (in the child's view), she will persist in looking under A. ('A-not B' error or the 'Stage IV' error). For Piaget, this error is clear evidence of egocentric understanding of the situation: child learns a response based on the actions of first uncovering and then grasping the object, but she cannot generalize this action sequence to the new situation, even though the two situations seem very similar to us.

*Substage V: 12 - 18 months*

Child has now mastered the basic A-B task, and reliably searches in correct location even after a sequence of visible displacements of hidden object. The significance of this is that the child can now represent the existence and position of an invisible object. This is the earliest instance of thought that is fully internalized; detached from visible and tangible world.

But, only the case for objects that they have seen being hidden. In a variant of the A-B task, Piaget first placed the object in a container, then moved object and container under a hiding place. The object was dropped out of the container under the hiding place and the container was removed. Children at this stage search in the container, but do not go on to look under the hiding place. Can represent the position of a hidden object, but cannot track the sequence of movements which would lead them back to the hiding place.

*Substage VI: 18 - 24 months*

Child has now begun to experiment with objects rather than just reproduce familiar routines on particular objects. In the modified A-B task, on finding that the object is not in the container, the child will begin to experiment with other possible locations and eventually find the object.

## **Preoperational**

By 2 years, children have made some progress towards detaching their thought from the physical world. However have not yet developed logical (or 'operational') thought characteristic of later stages. Thinking in this stage is intuitive (based on subjective judgements about situations) and egocentric (centred on the child's own view of the world).

### **Conservation:**

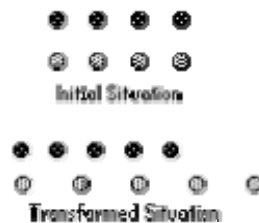
The intuitive and illogical aspect of the preoperational child's thought is revealed most clearly in a set of tasks examining 'conservation'. In physics, the notion of conservation is that as one aspect of a situation changes, another stays the same (e.g. conservation of matter). Conservation tasks present children with very simple physics

experiments to see if they understand this important logical principle. Some examples of conservation experiments are:

*Number:*

Two identical rows of identical counters presented to child. Child asked whether both rows have the same number. Preoperational child can answer this correctly.

Experimenter rearranges one row of counters by spreading them out or pushing them together. Child is then asked the initial question again.



Young preoperational children say that the number of counters in the two rows is now different.

*Liquid:*

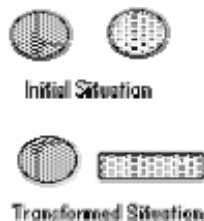
Child shown two identical beakers with the same amount of liquid in each. The liquid from one beaker is poured into a wider (or narrower) beaker.



Child now says that there is less (or more) liquid in the second beaker.

*Mass:*

Child is shown two identical balls of clay. One of the balls is rolled into a sausage shape.



The child now says that the sausage has more clay than the ball.

## So, what do these tasks tell us about the limitations of preoperational thought in general?

Piaget drew a number of related conclusions:

- 1) Understanding of these situations is 'perception bound'. Child is drawn by changes in the appearance of the materials to conclude that a change has occurred.
- 2) Thinking is 'centred' on one aspect of the situation. Child notices change in level of water or in length of clay without noticing that other aspects of the situation have changed simultaneously.
- 3) Thinking is focused on states rather than on transformations. Child fails to track what has happened to the materials and simply makes an intuitive judgement based on how they appear 'now'.
- 4) Thinking is 'irreversible' in that the child cannot appreciate that a reverse transformation would return the material to its original state. Reversibility is a crucial aspect of the logical (operational) thought of later stages.

### Class Inclusion:

Another indication of the lack of logical thought is the preoperational child's inability to think hierarchically; to think simultaneously about subordinate and super-ordinate categories. For instance child is shown a set of counters four of which are red and two of which are blue.



Child is asked: "Are there more red counters or more counters?". Preoperational child answers that there are more red counters. Child centres on the most salient perceptual characteristic of the situation, and fails to consider the hierarchical aspect of the question (i.e. the total number of counters versus the relative number of different coloured counters).

### Perspective:

Due to preoperational egocentrism, child can only appreciate one perspective on a situation: her own. Piaget devised the 'Three Mountains' task to test children's understanding of perspective.



Child views a model of three mountains from one side, and is asked to determine what another person sitting on the other side of the model can see by choosing from four pictures of the different sides of the model. The preoperational child chooses picture showing own view of model.

## Concrete Operational

Piaget considered this a major turning point in the child's cognitive development, because it marks the beginning of logical or operational thought. Operational thought is relatively free from the perceptual world, is relatively decentred and conforms to physical laws such as reversibility and transitivity (if  $A > B$  and  $B > C$  then  $A > C$ ).

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

## Formal Operational

In contrast, formal operational thought is entirely freed from physical and perceptual constraints. It becomes possible to reason abstractly and hypothetically about the world. This stage sees the emergence of scientific thinking, formulating abstract theories and hypotheses when faced with a problem.

# Cognitive Development - 2

## 5) Methodological Criticisms

Since the early 1970s, an increasing amount of evidence has suggested that Piaget's methodology may have underestimated many of the child's abilities. In this section we will look at new evidence regarding the abilities of the sensorimotor child and the preoperational child.

### Sensorimotor

A major problem with Piaget's sensorimotor tasks is that they required an active response from the infant (e.g. removing a cloth and grasping an object). Child may be limited by other factors (e.g. immature motor skills) rather than lack of understanding of situation.

Recent research has used a habituation technique (see Perception Lectures) to probe children's understanding of object permanence.

*Baillargeon et al. (1985)*

- habituated child to screen that moved back and forth like a drawbridge through a  $180^\circ$  arc.
- a yellow box placed behind the screen.
- child then shown one of two test situations:

1) Possible Event: the screen is rotated up from a flat position until it rests against the

box where it stops before returning to the original position.

2) Impossible Event: the screen rotated up from flat position and appeared to move through the box before returning to original position.

-> infants as young as 3.5 months looked longer at the impossible event.

Suggests that infants were surprised at this event and that they expected the screen to come to rest against the box even though it was out of sight.

## **Preoperational**

It has been suggested that Piaget's tasks at this stage may have underestimated the child's abilities due to a number of factors including:

- complicated language.
- unfamiliar materials.
- lack of context.
- children misinterpreting experimenter's intention.

More recent studies have attempted to ask questions more clearly and to present situations to which children can relate more easily.

*Light, Buckingham & Robbins(1979)*

- children shown two identical beakers with same amount of food in each.
- experimenter then points out that one of the beakers is chipped, and suggests putting the contents in a third, different shaped container for the sake of safety.

-> more children correctly say that there is still the same amount of food.

Suggests that context of task may be important for children's understanding of the situation. As far as children are concerned, adults rarely do something without a reason (e.g. they wouldn't pour liquid from one place to another unless they wanted to change something; they wouldn't ask a question unless something had in fact changed). By providing a clear reason for making the change (e.g. the chipped beaker) this allows some children to concentrate more on the materials.

*McGarrigle (1974)*

- presented children with Piagetian conservation tasks.
- instead of experimenter, a character called 'Naughty Teddy' performs transformation (means that the act of transforming the situation is divorced from the experimenter's second question).

-> 70% of 4 - 6 year olds passed this version of the task.

Suggests that differences in 'meaning' children ascribe to situation might cause them to pass or fail task.

*McGarrigle (1974)*

- suggested that class inclusion task is hard, because question doesn't make super-



ordinate category salient.

- presented children with a modified version of the task making super-ordinate category more salient.



- one group of children asked typical question: "Are there more black cows or more cows?"

- another group of children told that ALL the cows were sleeping, and then asked: "Are there more black cows or more sleeping cows?"  
(note that this is still a class inclusion question).

-> only 25% of the first group answered correctly.

-> 50% of the second group answered correctly.

Although performance not perfect with modified task, results show that at least a proportion failed the original task because of the way it was presented.

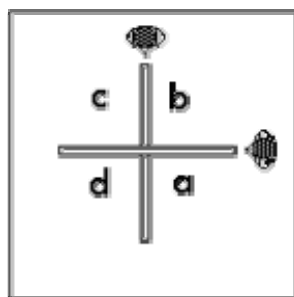
*Hughes(1975)*

- devised a version of the Piagetian perspective taking task which would make 'human sense' to a child.

- children shown a board with two barriers.

- toy policemen placed at the end of each barrier.

- child asked to place a model boy in the layout where the policeman can't see him.



Many preoperational children succeeded in placing model boy in section 'd' suggesting that they could understand the perspective of the two policemen.

Summary:

Taken together, these findings call into question the reliability of Piaget's findings. It may be that some of his tasks were easier and some harder, but for relatively trivial reasons (e.g. the child misunderstands the experimenter's intention).

## 6) Vygotskii's Cultural Theory

Lev Vygotskii was a Russian psychologist who developed his theories in the early years of the Soviet republics. His thinking was deeply influenced by Marxist ideas,

especially the historical development of culture and thought.

He criticised Piaget's theory, which presents the child as an intellectually isolated 'lone thinker', studiously working out the true nature of the world through her own actions. Emphasised the importance of culture and society in the development of the child's thought. Believed that as human cultures develop, they invent new tools for dealing with the world including 'psychological' tools as well as technological tools.

Vygotskii was interested in the way that the child constructs knowledge of the world within herself, but also in how the child comes to use and absorb cultural tools of different kinds. In this sense, he saw thinking as partly external to the person (e.g. when we use a calculator).

He emphasised the role of adults in providing the child with 'psychological' tools, suggesting that the child's thinking develops within a zone of proximal development defined as the difference between what a child can do unaided and what she can do with the help of an adult. It is within this zone that the child is exposed to and adopts the psychological tools of her culture.

Another crucial area in which Piaget's and Vygotskii's theories differed was the role of language in development. For Piaget, language emerges at the start of the preoperational period as the child begins to be able to use representational (symbolic) systems. Language becomes a way of expressing and communicating inner thought.

Vygotskii saw language as an inextricable part of human thought. Once the child has acquired language, she can use it to increase her cognitive abilities through 'inner speech' (or 'egocentric speech'). Thus Vygotskii saw the development as a crucial stage in the development of cognition.