Concrete Operational Stage

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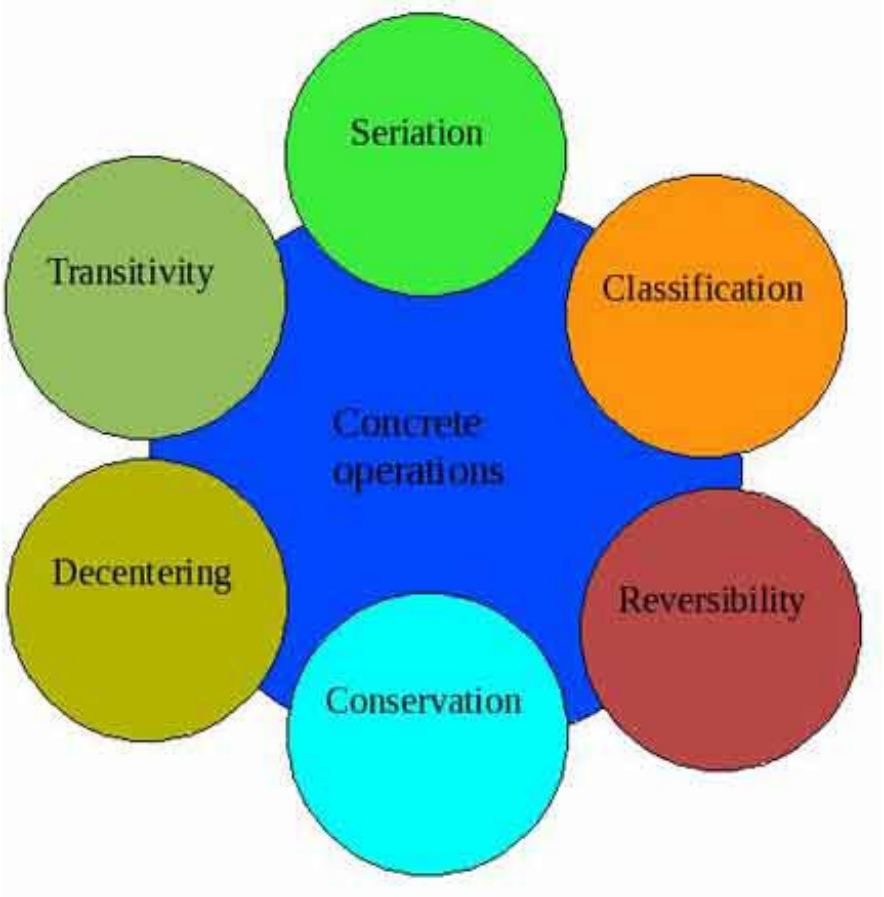
Saul McLeod, published 2010

The concrete operational stage is the third in Piaget's theory of cognitive development. This stage lasts around seven to eleven years of age, and is characterised by the development of organized and rationale thinking.

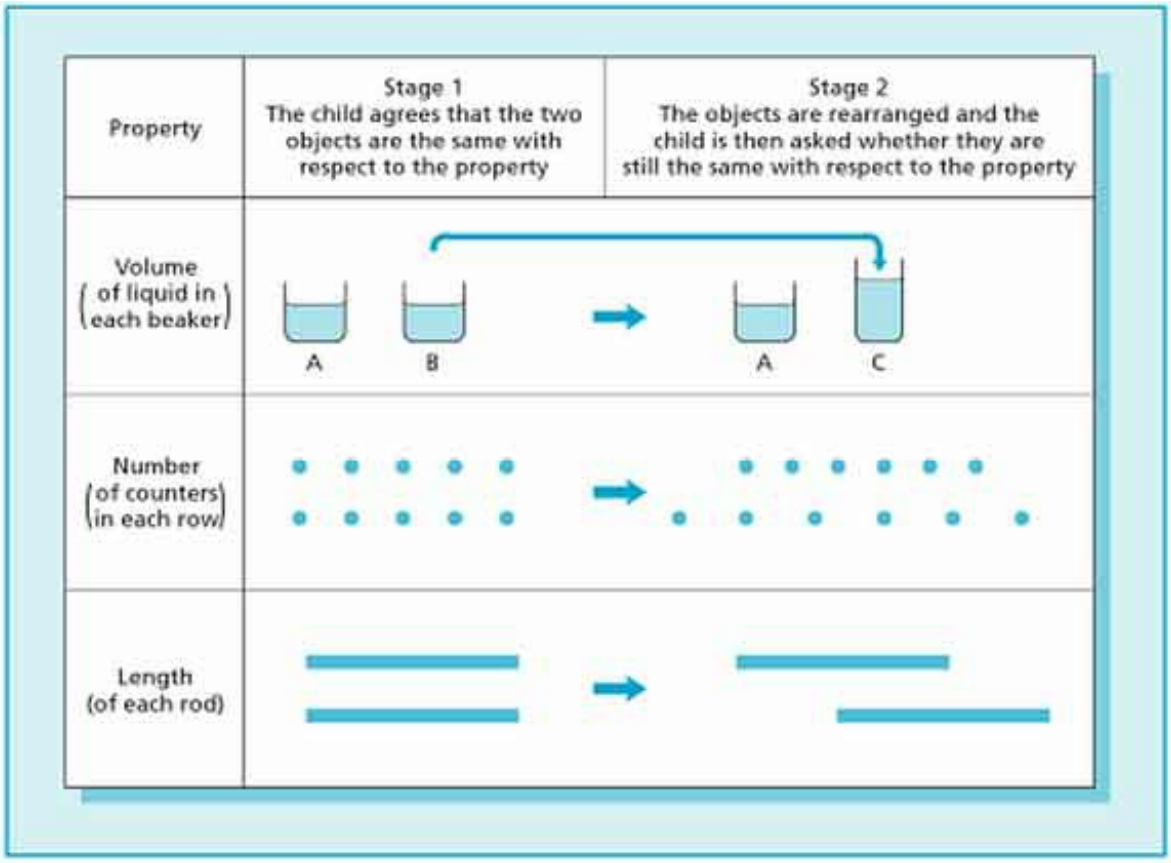
Piaget (1954a) considered the concrete stage a major turning point in the child's cognitive development, because it marks the beginning of logical or operational thought. The child is now mature enough to use logical thought or operations (i.e. rules) but can only apply logic to physical objects (hence concrete operational).

Children gain the abilities of conservation (number, area, volume, orientation) and reversibility. However, although children can solve problems in a logical fashion, they are typically not able to think abstractly or hypothetically.



Conservation

Conservation is the understanding that something stays the same in quantity even though its appearance changes. To be more technical conservation is the ability to understand that redistributing material does not affect its mass, number, volume or length.



By around seven years the majority of children can **conserve liquid** (see video below), because they understand that when water is poured into a different shaped glass, the quantity of liquid remains the same, even though its appearance has changed. Five-year-old children would think that there was a different amount because the appearance has changed.

Conservation of number (see video below) develops soon after this. Piaget (1954b) set out a row of counters in front of the child and asked her/him to make another row the same as the first one. Piaget spread out his row of counters and asked the child if there were still the same number of counters.

Most children aged seven could answer this correctly, and Piaget concluded that this showed that by seven years of age children were able to conserve number.

Some forms of conservation (such as mass) as understood earlier than others (volume). Piaget used the term *horizonal decalage* to describe this (and other) developmental inconsistencies.

Critical Evaluation of Conservation Tasks

Several aspects of the conservation tasks have been criticized, for example that they fail to take account of the social context of the child's understanding.

Rose and Blank (1974) argued that when a child gives the wrong answer to a question, we repeat the question in order to hint that their first answer was wrong. This is what Piaget did by asking children the same question twice in the conservation experiments, before and after the transformation.

When Rose and Blank replicated this but asked the question only once, after the liquid had

been poured, they found many more six-year-olds gave the correct answer. This shows children can conserve at a younger age than Piaget claimed.

Another feature of the conservation task which may interfere with children's under-standing is that the adult purposely alters the appearance of something, so the child thinks this alteration is important. McGarrigle and Donaldson (1974) devised a study of conservation of number in which the alteration was accidental.

When two identical rows of sweets were laid out and the child was satisfied there were the same number in each, a 'naughty teddy' appeared. Whilst playing around, teddy actually messed up one row of sweets. Once he was safely back in a box the children were asked if there were the same number of sweets.

The children were between four- and six-years-old, and more than half gave the correct answer. This suggests that, once again, Piaget's design prevented the children from showing that they can conserve at a younger age than he claimed.

Classification

Classification is the ability to identify the properties of categories, to relate categories or classes to one another, and to use categorical information to solve problems.

One component of classification skills is the ability to group objects according to some dimension that they share. The other ability to is order subgroups hierarchically, so that each new grouping will include all previous subgroups.

Seriation

The cognitive operation of seriation involves the ability to mentally arrange items along a quantifiable dimension, such as height or weight.

Critical Evaluation

Dasen (1994) showed that different cultures achieved different operations at different ages depending on their cultural context.

Dasen (1994) cites studies he conducted in remote parts of the central Australian desert with 8-14 year old Aborigines. He gave them conservation of liquid tasks and spatial awareness tasks. He found that the ability to conserve came later in the aboriginal children, between aged 10 and 13 (as opposed to between 5 and 7, with Piaget’s Swiss sample).

However, he found that spatial awareness abilities developed earlier amongst the Aboriginal children than the Swiss children. Such a study demonstrates cognitive development is not purely dependent on maturation but on cultural factors too – spatial awareness is crucial for nomadic groups of people.

Greenfield (1966) that schooling influenced the acquisition of such concepts as

conservation.

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