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LECTURE OBLIGATOIRE N° 2

Features of Piaget's stages II to IV (P. H. Miller)

Preoperational period (roughly 2 to 7 years)

Ending the first period and beginning the next can be likened to climbing a mountain, only to discover that it is merely a foothill to Mt Everest. The achievements of the sensorimotor period, although monumental, are also preparation for what is to come. In a sense, the child starts all over again. What he bas achieved in the realm of actions on the world is redeveloped, now in the realm of mental representations. He transfers notions about objects, relations, causality, space, and time to a new medium (mental representation) and a more highly organized structure.

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Although thinking through symbols and signs is a tremendous advance over sensorimotor thought, such thinking is limited in a number of ways. As the term *preoperational* suggests, children in this period have not yet acquired reversible mental operations, which characterize the thinking of the next period, called concrete operations.

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The main characteristics of preoperational thought are egocentrism, rigidity of thought, semilogical reasoning, and limited social cognition.

1. Egocentrism

Egocentrism does not refer to selfishness or arrogance, and Piaget does not use it in a derogatory way. Rather, the term refers to (a) the incomplete differentiation of the self and the world, including other people, and (b) the tendency to perceive, understand, and intepret the world in terms of the self. One implication is that the child cannot take another person' s perceptual or conceptual perspective. For example, the preoperational child does not realize that a person viewing a display from a position different from his own sees the display from a different perspective. A child holding a book upright points to a picture and asks, 'What is this?' He is unaware that his mother, who is facing him, can see only the back of the book. Egocentrism makes it difficult to take the role or point of view of another person.

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Egocentric speech is rampant in children's play groups. Children who apparently are talking while playing in a group may actually be talking, but not necessarily together. Each child's remarks are unrelated to anyone else's. There is a collective monologue, of sorts, rather than a conversation. For example, one child's statement, 'I think I saw Superman in a phonebooth yesterday', might be followed by 'this sweater makes me itch' from another child. Although the preoperational child is considered to be egocentric, he is less egocentric than he was in the sensorimotor period. Early sensorimotor functioning reflects a lack of differentiation between one's own actions and properties of objects. After the preoperational period, egocentrism continues to decline, but never disappears completely, even in adulthood.

2. Rigidity of thought

Piaget characterizes preoperational thought as frozen. One example is centration, the tendency to attend to or think about one salient feature of an object or event and ignore other features. If two identical containers have equal amounts of water and the contents of one container are poured into a taller, thinner container, the child centers on the heights of the liquids, while ignoring their widths. Consequently, he erroneously concludes that there is now more liquid because the water is higher. Centration and egocentrism are similar in that they both reflect an inability to deal with several aspects of a situation at the same time and that they both cause a biased view of the world.

We also find a rigidity, or lack of flexibility, of thought in the tendency to *focus on states* rather than on the transformations linking the states. When faced with the task concerning quantity of liquid in the containers, the child thinks about the 'before' and 'after' states, but ignores the process of changing from A to B as the liquid is poured. Perhaps the clearest example of the rigidity of thought is its *lack of reversibility*. The preoperational child cannot mentally reverse a series of events, transformations, or steps of reasoning. For example, he is unable to return the poured liquid to its original container mentally. His ability to internalize action is not yet complete because it is not bidirectional. Toward the end of the preoperational period, we begin to see 'the great thaw', as the child partially corrects the tendency of thought to be centrated, focused on states, and irreversible. We now see three positive achievements of the preoperational period: function, regulation, and identity.

A *function* is the notion that there is a covariation between factors, as expressed in the equation, y = f (x). For example, the more one pulls a curtain, the farther a curtain opens. Or when the rope on a pulley is pulled, there is an increase in the length of one section of rope as the other section decreases in length. However, the child cannot yet work out the precise and quantitative nature of the relationship.

A *regulation* is a mental act that is partially decentered. Again using the test of liquid quantity, we find that the child switches back and forth between using liquid height and width to make his judgments about quantity. A glass may contain more than another glass because it has a higher water level, or it may contain less because it is thinner.

The third achievement, identity, is the notion that an object can change its appearance without changing its basic nature, or identity. Water may look different after it is poured from one container to another, but it is the same water. Putting on a Halloween mask does not change a person into a witch, contrary to belief of younger children. Thinking has become less rigid because a concept can be maintained despite superficial physical changes.

3. Semilogical reasoning

As a young psychologist, Piaget questioned children about their beliefs concerning the world. These interviews revealed various fascinating characteristics of preoperational reasoning. The conversations provide many examples of egocentrism and rigidity of thought. We treat them separately because they demonstrate some specific, somewhat surprising, properties of semilogical reasoning.

The following protocol illustrates several facets of semilogical reasoning in a 6- year-old child.

How did the sun begin? - *It was when fife began*. - Has there always been a sun? - *No*. -How did it begin? - *Because it knew that life had begun*. - What is it made of? - *Of fire.* - But how? - *Because there was fire up there*. - Where did the fire come from? - *From the sky*. - How was the fire made in the sky? - *It was lighted with a match*. - Where did it come from, this match? - *God threw it away*… How did the moon begin? - *Because we began to be alive*. -What did that do? - *It made the moon get bigger*. - Is the moon alive? – *No... Yes*. - Why? - *Because we are alive*.

[Piaget, J. (1926/29). *The Child's Conception of the World*. New York: Harcourt Brace].

The child tries to explain the mysterious natural events in terms of everyday life. One solution is to explain natural events in terms of human behaviour. The sun and moon, like people, are alive, are created by a humanlike action (a god lighting a match) and are tied to human activities (the moon began because people began to exist). Similarly, a preoperational child may assert that snow is made for children to play in and clouds move because they are pulled when people walk.

Thoughts are often linked together in a loose way rather than in a logical relationship. For example, one afternoon when Lucienne had no nap, she reasoned that it could not be afternoon because she had not had her nap. Or a child might say that his friend fell down because he got hurt. The child reasons from the particular to the particular.

4. Limited social cognition

Piaget argues that his description of thought applies to social objects and events as well as physical ones. Our description of preoperational thought hints at this parallel between the physical and the social realms. Examples are deficits in role taking and communication resulting from egocentrism, confusions between natural events and human events, and notions about the identity of persons when physical appearances are changed. In addition, Piaget specifically examines social thought in his work on moral judgments. A preoperational child judges the wrongness of an act according to external variables, such as how much damage was done and whether the act was punished. He ignores internal variables, such as the person's intentions. Thus, the boy who breaks fifteen cups while trying to help his mother set the table is considered to be more guilty than the boy who breaks only one cup while trying to steal cookies from the cabinet.

Concrete operational period (roughly 7 to 11 years)

Piaget sometimes combines ages 2 to 11 and labels this period as 'preparation for and achievement of concrete operations'. Despite the considerable accomplishments in the preoperational period, in many ways the period is simply preparation for the pinnacle of cognitive development: the operation. Regulations, functions, and identities turn into operations as they become more complete, differentiated, quantitative, and stable. Let us now turn to these operations.

An *operation* is an internalized action that is part of an organized structure. With the ability to use these concepts, the child's representations are no longer isolated or simply juxtaposed, as in the preoperational period. They are brought to life. We can most easily see operations at work in Piaget's famous *conservation* task, which we described as the problem of liquid quantity .Let us consider this task in more detail. The child sees two identical containers equally filled with water and judges them to contain the same amount of water. As the child watches, one container is poured into a container with different dimensions or into several small containers. A 'nonconserver' claims that the amount has changed, usually because the water level has changed. Since the water rises higher in a taller, thinner container, the child concludes that the amount has increased. In contrast, a 'conserver' believes that the amount has not changed. He realizes that quantity remains the same despite changes in appearance. Piaget usually requires the child to give a logical explanation for this judgment before he considers the child to be a true conserver.

Both the nonconserver and the conserver have a basis for their answers. Both think their conclusions are quite reasonable. In fact, if a tester happens to test the same child twice -once when the child is a nonconserver and later when the child is a conserver -he may face the child ' s scorn on both occasions. The child on both occasions is likely to think that the tester is dumb to ask a question when the 'correct' answer is so obvious.

Conservation is an important concept because it gives a certain stability to the physical world. In addition, Piaget assigns a great deal of importance to the conservation task because it reveals the presence or absence of mental operations. It is a diagnostic tool that probes the cognitive structures. Piaget asserts that a child cannot conserve unless he has certain mental operations. These operations can be illustrated by the explanations the children give:

'If you pour it back where it was, they will have the same amount.' (*reversibility*)

'The water goes up higher, but the glass is thinner.' (*compensation*)

'You didn't add any water or take any away.' (*addition -subtraction*)

The preoperational child who lacks these operations centers on states, especially the water level.

Other examples of operations are the common mathematical operations of multiplying, dividing, ordering (greater than, less than), and substituting (one thing equals another thing). Each operation is related to and obtains its meaning from the entire structure of which it is a part. Thus, addition is coordinated with subtraction, multiplication, and division to form a system of mental actions. Piaget's interest in logic and mathematics appears in his attempt to describe these systems of operations in terms of logicomathematical structures. These structures serve as a model for characterizing concrete operational thought.

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Operations apply not only to classes but also to relations. If a concrete operational child knows that John is taller than Bill, and Bill is taller than Henry , he/she can infer that John has to be taller than Henry. In addition, he/she can order a row of dolls according to height and give the dolls sticks ordered according to length.

Operations are also applied to temporal-spatial representations. For example, a preoperational child draws liquid in a container in such a way that it remains parallel to the base or a side. His/her perceptions are influenced by the immediate surroundings. In contrast, a concrete operational child keeps the liquid parallel to the larger context, the surface of the earth.

We have seen the child move from an understanding of the world based on action schemes, to one based on representations, to one based on internalized, organized operations. Thought now is decentered rather than centered, dynamic rather than static, and reversible rather than irreversible. For the first time, the lawful nature of the world seems to be reflected in a logical system of thought. Thought is in tune, in equilibrium, with the environment. However, the concrete operations are still 'concrete'. They can be applied only to concrete objects -present or mentally represented. They deal with what 'is' rather than what 'could be'. The final step is to apply the operations to purely verbal or logical statements and to the possible as well as the actual. This story unfolds as we turn to formal operations.

Formal operational period (roughly 11 to 15 years)

During the concrete operational period, mental operations are applied to objects and events. The child classifies them, orders them, and reverses them. During formal operations, the adolescent carries concrete operations one step further. He can take the results of these concrete operations and generate hypotheses (propositions, statements) about their logical relationships. Thus, we now have operations on operations: thought has become truly logical, abstract, and hypothetical.

Formal operational thought resembles the kind of thinking we often call the scientific method. The child formulates a hypothesis about a present or potential event and tests this hypothesis against reality. If necessary, he can generate all possible outcomes or all possible combinations at the beginning. Piaget typically presents a problem from physics or

chemistry and observes how the adolescent goes about solving it. The problem-solving process, rather than the correct answer itself, is what is of interest. A prototypic task is the pendulum problem. An adolescent observes an object hanging from a string and attempts to discover what determines how fast the object swings. He is shown how to vary the length of the string, the height from which the pendulum is released, the force of the push on the pendulum, and the weight of the object. One or several of these variables could control the speed of the swing. A concrete operational child experiments with the variables and may even arrive at the correct answer, but his/her approach is haphazard; he has no overall plan. He does not vary one factor while holding the other factors constant. For example, he may compare a long, light pendulum with a short, heavy one and conclude that both factors are important. In fact, the length of the string is the main determinant of the rate of oscillation.

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In contrast to the concrete operational child, the formal operational adolescent imagines all possible determinants of the rate of oscillation before he/she begins, systematically varies the factors one by one, observes the results correctly, keeps track of the results, and draws the appropriate conclusions (identifies which factor controls the rate of oscillation). He has systematically isolated the critical factor and dealt all the while with propositions, not objects. By testing predictions from each hypothesis, he has demonstrated hypothetico-deductive thought.

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The ability to consider abstract ideas, the future, and various possibilities is evident in the adolescent's social world. He/she dreams about her future and imagines himself / herself in various occupational and social roles. He/she may experiment with some of these roles just as she experiments with hypotheses about physical events. He/she is concerned with the world of ideas. In sessions with friends, the adolescent debates various moral and political issues, such as whether wars can ever be moral, whether abortions should be legal, whether there are basic inalienable human rights, and what an ideal community would be like. He/she can consider these issues from a number of different perspectives and see how the issues are related to a larger set of social relationships. However, there is still a lingering egocentrism. The adolescent is impressed with the power of thought and naively underestimates the practical problems involved in achieving an ideal future for himself/herself or for society. He/she feels that the sheer force of his/her logic win move mountains. Piaget notes that this starry-eyed egocentrism is squelched when the adolescent undertakes his/her first real job.

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By achieving formal operations, the adolescent completes her cognitive structures. The various concrete operational logical systems have been combined to create a single, tightly organized system of thought -a unified whole. Thought is logical, abstract, and flexible. Thinking continues to develop throughout adulthood as the formal operations are applied to more and more content areas and situations. Egocentrism continues to decline as the person broadens his/her experiences in the world of work and social relationships. However, these changes after age 15 entail a change not in the structure of thought but only in its content and stability.

Source: Miller, P. H. (1989). *Theories of Developmental Psychology,* pp. 56-68. New York: Freeman.