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## JEAN PIAGET, EXPLORER OF THE CHILD'S MIND



Jean Piaget is undoubtedly the most reputed French-Swiss scientist of the present day and his pioneering research into the cognitive processes of childhood and genetic epistemology is known and applied on every continent. He was born 75 years ago and has just announced his retirement from the Chair of Child Psychology at Geneva University, where he had been known by two successive generations of students.

He showed an extraordinary scientific precocity, publishing a zoological paper in the Journal of Natural History of Neuchatel at the age of 10. At 15, he had already made a name for himself by his work on mollusks. He studied at Neuchatel, Paris and Zurich and at 22 was a Doctor in Natural History. But his second adolescent passion had been philosophy. From an emotional crisis ensuing from his reading of Bergson, he decided to devote his life to the biological explanation of knowledge. He found, however, that philosophy was in many ways incomplete and lacked the satisfactory experimental foundations. He turned definitely to psychology, and in particular towards the cognitive and genetic aspects of psychology.

He was Professor of Philosophy at Neuchatel in 1926, but taught child psychology at Geneva in 1929 already. Among the numerous other academic responsibilities which he has held during his long career he was Leader of Studies of the Jean-Jacques Rousseau Institute in 1921, Professor of Genetic Psychology at La Sorbonne in 1952 and founder in Geneva of an international centre for genetic epistemology.

A first understanding of his momentous work can be gathered from the titles of his major books. These are: *"Judgment and reasoning in the child"*, *"The moral judgment of the child"*, *"The origin of intelligence in children"*, *"Language and thought in the child"* and *"The child's conception of geometry"*.

### The meaning of Piaget's work

Piaget has sought to find out how a child gradually visualised his environment as he grew up. He believed that an understanding of the cognitive processes of the child was the clue to a general understanding of the human mind. Much of his work, particularly as regards the problems of perception, logic and speech are quite abstruse and refer frequently to works of physics, mathematics and biology.

The understanding of abstract ideas, the acquisition of the concepts of causality, space and time, of physical notions such as force, of morality and other notions belonging to the human mind emerge in the sequence of childhood years. Piaget recognises four main stages in this evolution. From birth to about two years, the child acquires motor control and distinguishes objects of one class from those of another. This is the *sensorimotor* stage. Then from two to seven years of age, the *preoperational* stage, the child reasons intuitively rather than deductively and can name objects but not classes (he recognises a table but doesn't know that it's furniture). From seven to 11 the child traverses the

*concrete operational* period. He is able to respond logically to objects, classes and relations but not to verbal propositions, and cannot formulate concepts verbally. This means in practice that he can act more intelligently than he can think.

From 11 to 15 the child matures in the *formal operational* period during which he is able to define concepts, reason logically, systematically and symbolically. In other words, he is able to have a *notion* of such things as say wealth, justice, economics, etc. His argumentation is no longer fortuitous and he is able to understand the meaning of algebra. At the end of this period he has acquired the ability of abstraction and has an understanding of his environment. The mainly physical acts of his earlier years are replaced or anticipated by mental ones. The child's brain is formed and he now has the intellectual equipment of an adult.

### Not for the psycho-analyst

Psychology usually conjures up the works of Freud and Dr. Spock as well as well-worn expressions like "libido", "complexes" and "repression". However, Piaget's is a completely different psychology. A young minister formerly in London who thought that a course in psychology would help him in his pastoral work failed to see this and embarked on a wasted year with Piaget in Geneva.

Although Piaget's work is widely used by educationists interested in the learning abilities of children, it is not concerned with their subconscious life and emotional problems. Piaget cannot be applied to personal psychiatry, because his work can roughly be described as "*genetic epistemology*". By "genetic" it is meant that the processes under study belong to the whole human race and are not primarily dependant on a child's individual experience. As for "*epistemology*", the Oxford Dictionary defines it as the "theory of the grounds and methods

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of knowledge"—which is not immediately relevant to the care of a troubled human soul.

Piaget's experimental method is described in a readable introduction to his work entitled "Six Psychological Studies". The ones which we are going to describe belong to the preoperational period (two to seven years). When a child reaches the age of three or four, he begins to ask many questions about the world he sees around him. He always asks *why*? . . . and these *why*'s are often awkward for the parents because the meaning of the question is not always clear to the adult mind. This is because the two purposes of the question "why" (the wish to know either the *cause* of a puzzling fact or its *aim*) are confused in the child's mind.

A six-year-old, seeing a marble roll on an inclined surface, asked his nanny "Why does it roll?". She answered, "Because there is a slope". But the child was not satisfied with this simple, causal explanation because

his question had embodied the *aim* and he asked therefore "does it know that you are there?".

Another child once asked "Why doesn't Lake Geneva go up to Berne?". Not knowing what answer to give, the experimenter put it to other Geneva children of the same age, asking them what their reply would have been. They were unanimous in saying that if Lake Geneva didn't reach up to Berne, it was because each town had to have its own lake. This reply showed that there was an answer to a puzzling fact devoid of any physical cause because it had an *aim*. There is no hazard in a child's work where everything is "made for" men and children according to a wise plan of which they are at the centre.

## The moral conscience of the child

Piaget made innumerable experiments on the moral understanding of children and noticed that the gravity of an offence was commensurate with its visible consequences and not with the wrongfulness of its intention. A child is asked to compare two lies: Tell his mother that he has obtained a good note at school when he has not even been questioned or tell his mother that he was frightened by a dog larger than a cow. He will understand that the first lie is a means of getting an undeserved reward from his mother, whereas the second is only an exaggeration. Yet this second lie will be deemed more "nasty" by him because "a dog is never as big as a cow".

Piaget has established that this kind of reaction was universal among children at a stage when they could only keep the letter of the moral rules copied from their parents in their one-way respect, and that a proper lie became more reprehensible only when their encounter with playground friends had permitted them to have an independent conscience of their own.

Another interesting finding was the different behaviours at the game of marbles of children in the preoperational and the concrete operational period.

Children of four to six have a fragmentary notion of the many rules of marbles and try to imitate their elders. They play in a haphazard way and are quite astonished when asked at the end of their game who had won, because everybody wins simultaneously and to win for them means to have had a good time. Children over seven show a marked progress. Although they may not know all the rules of the game of marbles, they are able to agree on a common set of rules during a game and the words "to win" make sense because it involves success in an organised and collective undertaking requiring preliminary and aim-directed discussions.

The question put by a child to his nurse in the example of the rolling

marble given above shows that children have a partially animistic understanding of physical reality. The marble had a "will". "Things are like people"—which is naturally evidenced in children's books. This outlook begins to change after the age of seven when children begin to develop a properly autistic understanding of the material universe. This is demonstrated in the sweet water glass experiment, one of Piaget's most famous.

## The sweet water experiment

Take two glasses with an equal amount of water, place a lump of sugar in one of them (in which the level rises), weigh the two glasses to show to the child that the one with the sugar has become heavier. While the sugar dissolves, three questions are put to him: When the sugar is dissolved, will there be anything left of it in the water? Will the weight of the water increase or will it become equal to that of the pure and clear water? Will the level fall down to that of the unsweetened water? The answers and the reasons given to the three foregoing questions have proved to be remarkably regular.

Below the age of seven, nearly every child will say that the sugar has simply disappeared. The bare fact that it has melted away implies that it has vanished from reality. At seven, children are aware that the dissolved sugar must somehow remain in the water. For some it has been transformed in a syrup mixed to the water. For the more advanced, who have noticed that the lump broke up "in little bits", it is sufficient to admit that these little bits have become smaller and smaller so that they are "small invisible balls". However, they won't be able to state anything on the weight of the sweetened water because those invisible little balls are weightless.

It is only towards nine that the children will realise that each little bit of sugar has its weight and that if all these weights were added together the weight of the original lump would be found and that therefore the weight of the sweetened glass shouldn't change.

They have therefore acquired an *a priori* notion of the conservation of weight.

Another three or four years are necessary for them to argue that these small "balls" occupy space and that their sum should be equal to the original volume of the submerged lump of sugar, and that the level of water won't therefore change when the sugar melts.

These experiments are an illustration of the ways with which Piaget and his co-researchers could probe in the understanding of the child. Piaget worked extensively with his own two children. A current joke among academic circles was that they had become dotty from this treatment. This is

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fortunately not so and they have apparently become normally constituted and successful human beings. Asked by a family man how he brought up his children, Piaget said that he had to admit to his incompetence as an educator because his paternal fibre often contradicted his pedagogical theories.

(PMB)

# COMMENT

## A NEW PROPOSAL FOR THE "PEACE OF HOUSING"

Perhaps the only major source of social discontent in Switzerland is the high cost and shortage of housing. Council estates of the British kind are unknown in Switzerland and cheaply-built housing of a social nature is financed in the main by private institutions and submitted to the constraints of a free economy. The rent of an ordinary flat in any major town amounts to 100 francs a room per month which means that a working man may have to pay a third of his income in rent.

It is not surprising therefore that the majority of people are complaining against rich landlords and "speculators" whom they believe are amassing unmerited fortunes. Although rent control has been abolished the law forbids real estate companies to get the return on their investments in less than 15 years. The soaring costs of land and building have partially accounted for the high cost of new accommodation.

A Radical National Councillor from Zug, Mr. Brunner has had the peculiar idea of instituting an obligatory control by tenants of their landlords' books. He has presented this formula in an individual initiative. Needless to say, many house owners and "bourgeois" Swiss will reject this notion outright. The most radical-minded workers may also spurn it as an attempt to withhold rents from the control of the State. Yet the idea put forward by Mr. Brunner resembles the recent initiative by trade unions in favour of worker participation in management.

Workers, it is said, should have an eye in their company's books so that they can see for themselves that they are being offered a fair deal. Likewise, irate tenants struggling to meet their rent should be shown the proof that their landlords are justified in claiming the rents they do.

It should be interesting to see how the population will respond to Mr. Brunner's suggestion. If the National Council, which has first to examine the initiative, allows it to go through, then one can expect a majority of voters in the large towns to give their support.

(PMB)

# SWISS NEWS

## RUSSIAN-SWISS CONFRONTATION

### The costly naivety of a Swiss teacher

The Bernese biology teacher Francois de Perregaux, 33 years of age, has been sentenced to three years imprisonment for having given his passport to a 28-year-old Russian physicist, Mr. Dmitri Mikheyev, who had sought to flee to the West. Mr. Perregaux was arrested on 3rd October, 1970 and it is not yet known whether these 11 months of detention will be subtracted from his sentence.

Everything had been undertaken for his defence. The Swiss Embassy in Moscow was represented at his trial (held in camera) as well as his father. The trial lasted for five days and the western journalists who attempted to penetrate the building were forced back by police in civilian clothes. Mr. Mikheyev had been arrested as he was about to board a plane at Vienna. He was sentenced to eight years of hard labour.

## NATURAL DISASTER

### A tornado devastates the Joux Valley

A tornado fell upon the Joux Valley in the Jura and damaged or destroyed dozens of houses in the villages of Le Brassus, Orient and Envy. Its force was such that several hectares of forest were uprooted, 100,000 cubic metres of debris and earth blocked the Molandruz Pass, and 20-ton lorries were tossed for tens of yards by the depression.

The tornado caused havoc in a camping site, blowing tents away and overturning caravans. Fortunately there were no death casualties, but six were wounded, two seriously. The tornado swept through most of the Swiss Jura. It uprooted woods at Romainmotier. It struck a saw-mill at Le Brassus and piles of logs were strewn over acres like match-sticks. The cost of the disaster was expected to run into millions of francs. Rescue teams were soon in the worst hit areas and organised the transport of tarpaulins to cover the many roofless houses.

## THE DOLLAR CRISIS

### Taking the necessary steps

The Swiss government saw the recent monetary crisis not unfavourably because it demonstrated the unhealthiness of the international currency situation, in particular the fact that the dollar was no longer convertible against gold. The Swiss National Bank had in the course of the previous months to mop up some two billion dollars. It acted concurrently with

other central banks in suspending further acquisition of dollars and closing the foreign exchange market. There was an exception for the benefit of stranded American tourists, who were allowed to exchange 30 dollars a day at a rate guaranteed by the National Bank of four francs to the dollar, marginally less than the rate of 4.08 francs to the dollar that had prevailed on the money market a week before the crisis.

The dollars that were circulating for free capital transactions were negotiated at the unexpectedly high rate of a dollar for 3.80 francs owing to the ruling disfavour of Euro-dollars and the expectancy of a settlement of the situation. The Swiss stock exchange suspended dealings in foreign stock in awaiting a clearing up of the situation. Swiss investors on the American stock market were uneasy about this lack of confidence and failed to follow the optimism of a market made buoyant by President Nixon's measures.

Swiss trade was expected to suffer from this presidential package, in particular the hard-pressed watch industry, which exports 20 per cent of its production to the USA. The machine industry, which exports about 8.5 per cent of its production to America, its third customer after Germany and France, viewed the surcharge with concern. The chemical giants of Basle had little to fear, since they are firmly implanted in America.

In the main, commentators deplored the slowness of reforming the monetary system and urged an early international consultation, striking the metal while it was hot. The Swiss National Bank has always maintained a policy of not being strapped with too many dollars, and the Swiss franc is still one of the only currencies entirely backed by gold. If gold is to be revalued then Switzerland's reserves, now already comparable to those of Great Britain, will get a serious boost.

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