UNDERSTANDING COGNITIVE DEVELOPMENT - BRUNER'S CONTRIBUTIONS

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Cognitive Development

Bruner presents the view that psychological growth depends upon the mastery of techniques. He feels these techniques are not the inventions of the individual. These techniques are, rather, the skills transmitted by the culture. Language is the prime example of a technique of mastery that is transmitted by the culture.

Bruner presents the concept that man possesses three systems for processing information and for constructing models of his world.

1.) The first system for processing information and for constructing mental models of our world is through action.

2.) The second system for processing information and constructing mental models of our world is through image formation or imagery.

3.) The third system for processing information and constructing mental models of our world is through the development and use of language.

In the course of cognitive growth one can observe acts and sensory-motor activity being integrated into progressively more complex mental models as we proceed from simpler to higher order ensembles. Images and image formation also become integrated into progressively more complex schemes. Action patterns and image patterns form the foundation for language skills.

In the study of evolution one can note that the human brain has become enlarged three times in the past 500,000 years. Bruner postulates that the enlargement of brain size has gone hand-in-hand with, and is somewhat dependent upon tool use and the manufacture of tools. Thus man's brain enlarged because he used tools; tools of action, tools of image percepts, and tools of language and communication.

Along with the enlargement of the human brain one also can note the enlargement of three types of "implement systems". The first type of "implement system" is that of the amplifier of human motor capacities, especially fine motor hand skills and speech skills. The second type of implement system is that of the amplifier of human sensory capacities, e. g. vision, hearing and touch. The third type of implement system is that of the amplifier of human "ratiocinative" capacities. Ratiocination is the act of reasoning or the ability to draw deductive conclusions. Ratiocination is involved in the ability to build language and to construct hypotheses, theories, myths, and other abstract systems of information. Bruner notes that all three forms of implement systems are conventionalized and transmitted by culture. The amplification of human ratiocinative capacities involves the use of symbol systems that for their effective use must be shared with others in the culture.

Bruner points out that man's functioning in terms of movement, perception, and thought depends more on the techniques we acquire from our culture than on internal, inborn, fixed patterns of organization of our nervous system.

Man is capable of complex systems of representation. This ability to represent our world concretely or symbolically is the end product of our systems of coding and processing information. Bruner notes that there are three modes of representation. These modes of representation are outgrowths of the three systems (motor, sensory, and ratiocinative) we have for processing information. 1.) Our motor or action patterns yield "enactive" representation. This is where the memory patterns and body motor functions we possess are based primarily on memory of motor patterns such

as those we perform while driving an auto or going through other habitual patterns of motor behavior. 2.) Imagery yields iconic representation. Iconic representation is where an image or idol or similar sensory representation has many symbolic properties attached to it, e. g. an image has many personal meanings attached because of personal or cultural associations connected with this image. 3.) Language and thought yield a higher order of symbolic representation. No longer do we need the image actually to be present to attach certain qualities to an image. In higher order symbolism one may have certain sound configurations or visual configurations given special meaning. The meaning is usually abstract. The symbolic configuration may in no way resemble the original image or take on any of the qualities of the original image.

In his work with children to understand cognitive development Bruner follows some of the strategies of Piaget. Bruner performed an experiment with children ages 5, 6, and 7 years. In this experiment he had nine glasses of three different diameters and three different heights placed on a grid of nine squares arranged three squares by three squares. He would then transpose two glasses from diagonally opposite corners and ask the children to rearrange the whole scheme so that it resembled the first scheme. He finds that 7-year-old children can do this, but 5 and 6-year-olds cannot. Bruner noted that children described the different glasses in three terms. 1.) Global (that is, in terms of bigger and littler). 2.) Dimensional (that is, in terms of taller and shorter), and 3.) Confounded taller and littler. The third group of children seem to have the most trouble with the rearrangements. Experimental evidence suggests that having the child verbalize the concepts prior to being faced with the problem to be solved helps him to deal with it in a symbolic manner rather than in an iconic or image representation type of manner. In a similar manner, Frank found that by screening the level of water in a beaker from the child's vision, the performance of 4, 5, 6 and 7-year-old children was improved in terms of the concept of conservation of volume.

In dealing with the water conservation problem as to what happens to the water when it is poured from glass to glass of different diameters children may classify the phenomena in three ways:

1.) Visual-perceptual, that is as related to the bigness or smallness of the glass;
2.) By action on the material, such as the duck in the water taking the water to him, or what is done to the water;
3.) By concepts of transformation of shape or size, and also reversibility.

To succeed correctly in his analysis of the problem the child needs style 2 or style 3 to protect himself from simple visual perception. In their analysis of the problem, only 15% of the children who used style 1 were correct, whereas 70% of the children using style 2 or 3 were correct.

When many glasses of varying height and diameter were presented to children, some of them totally full, some half full, and some two-thirds full, the children were asked which glass was fuller. In general, the children tended to respond in relation to water level, volume, or diameter of the glass. When children were asked which was emptier, this generally turned out to be equated with which was littler, not which contained less water. In general, Bruner noted that children tend to group by different methods.

One method is grouping by such attributes as 1.) perceptual features - that is, color, size, pattern, etc., or 2.) grouping by arbitrary functional features such as, "How can I use the object, regardless of the usual use", or 3.) grouping by

appropriate functional features such as, an apple and orange are to be eaten as food rather than thrown at someone because you want to hit them with an object.

Thus we may group 1.) by primary form or color qualities; 2.) by functional use, and 3.) by abstract or symbolic concept. In the course of cognitive development it is evident that level three depends on levels one and two as component parts of the more abstract system.

Bruner also notes that children may group by their own syntactial structure of equivalence sets. This means the child may also develop arbitrary classes or equivalence sets of his own. Such equivalence sets may have some autistic determinants. The child may also classify by:

1.) Heaps - the child puts certain items in the same set just because he classifies that way.

2.) Complexes - here the child uses some rule to classify objects or situations. The objects may be classed as similar to a common object, or have some relationship to a common object. The child may also classify a situation as having some relationship or a similarity to a common situation.

3.) Supra ordinate concepts. Here one universal rule of inclusion accounts for all objects in the set.

Ref. 1.) Bruner, Jerome, "The Course of Cognitive Growth" in Contemporary Issues in Comparative Psychology - Ed. by Endler, N. S., Boulter, L. R., and Osser, H. - Pub. by Holt, Rinehart and Winston, N. Y., N. Y., 1968 pp. 476-494

2.) Bruner, J. S., Goodnow, J. J., and Austin, G. A., "A Study of Thinking", pub. by John Wiley & Sons, Science Editions, Inc. #069-s, N. Y., N. Y. 1962