ANTHROPOLOGY

How to Transmit Culture

The understanding of how cultural patterns are determined and how they are transmitted from one generation to the next would have great impact—Nobelist Beadle.

➤ THE WAYS in which cultural traits are transmitted from generation to generation is one of the great future discoveries of science.

Nobelist George W. Beadle, president of the University of Chicago, told the American Association for the Advancement of Science meeting that cultural inheritance consists of information recorded in the nervous system in ways as yet undiscovered. It is "transmitted from generation to generation in a cumulative way through various channels of communication."

It is different from the other method of inheritance, which is biological. In part biological inheritance consists of molecular information transmitted from one generation to the next through deoxyribonucleic acid (DNA).

"Within the past two decades there has been an enormous increase in our understanding of the structure and role of DNA in heredity," Dr. Beadle said. We are finding how it carries information that guides development and function, how it is replicated, how its information is used in the synthesis of proteins, and the nature of the mutational changes that are in large part the basis of organic evolution.

Cytoplasm, which is regularly transmitted from parent to offspring in cellular plants and animals, is also an essential part of biological inheritance.

The brain, which is constructed and functions largely according to DNA information, makes possible consciousness, awareness, memory, insight, reason, language, music, art, religion, literature, technology and science.

Dr. Beadle visualizes that the invention and use of primitive tools, for instance, gave their users a Darwinian selective advantage and thus stimulated biological evolution. At the same time they initiated an exponential-like growth of culture—at first, slow, then, with occasional setbacks, ever more rapid, until today's frightening pace.

Many of the most significant steps in the evolution of human culture have occurred sporadically in time and space, as if dependent on rare accidental circumstances Dr. Beadle said, in part:

Thus it is believed that the technology of the wheel goes back to a single discovery. This could also be true of the concept of the written language, and is almost certainly so for many other important cultural advances.

While it is clearly true that the growth of cultures was and is dependent on genetically determined mental competence, it does not follow that those societies that have lagged culturally—by our definition, that is—were or are genetically less capable, he said. Since growth and decline of cultures are so much more rapid than we assume genetic change to be, it seems highly probable that other factors such as chance combinations of circumstances—a right person in the right setting at the right time—have been of overriding importance in cultural evolution. Then, too, we know that an idea can spread far faster than a favorable genotype can be multiplied.

Most of man's present technology and culture has developed within 10,000 years—agriculture, metal working and written communication, for example. Yet we have evidence of human toolmaking going back two million years.

Although communication must have been very slow in the early days of the genus *Homo,* we do know that he moved with some freedom through large parts of Africa, Europe and Asia, for remains of *Homo erectus,* Neanderthal man and prehistoric modern man are found in all these regions.

Still we must admit that the question remains open as to whether there are significant differences in inborn abilities of races or other large population groups to acquire the components of a given pattern of culture. Why? First, no one has yet been able to devise an entirely culture-free measure of such competence. Second, while it is theoretically possible to create essentially identical cultural opportunities from birth, in practice this is extraordinarily difficult, for the simple reason that maternal care and affection are from the moment of birth an important part of cultural development. This mother-child interaction cannot easily be controlled. Thus, although clear genetic differences exist among individuals within all groups, there is no clear answer to the more significant question.

Our knowledge is now such that we can and do exercise a large measure of control and direction over the biological evolution of plants and animals in which we have cultural interests. The same knowledge is applicable to man himself, but the moral and ethical questions raised in contemplating any extensive program of such control are frighteningly difficult.

We now encourage certain measures for correcting the symptoms of genetic disease (euphenics) and for reducing their frequencies (eugenics). Both measures can be extended and should be with a generous measure of discretion and good judgment, especially in the case of eugenics.

The more positive eugenic approach of encouraging preferential reproduction of persons of superior genetic constitutions through the use of sperm banks and artificial insemination, for example, is fraught with the seemingly insuperable difficulty of determining who decides on genetic superiority. With dairy cattle it is easy; we favor maximum milk production per unit cost. But what do we want in man?

In contrast to the difficulties of modifying man's biological inheritance in acceptable ways, cultural inheritance is acquired anew each generation and therefore theoretically could be easily and quickly modified if the parent-to-child and generation-to-generation chain of transmission could be modified or replaced.

In practice, of course, this is done to some extent in our formal educational systems, but not to the maximum extent possible for the reason that parental affection and influence, which are known to be of great importance, are so subtle in nature that they are difficult to modify or replace without the possibility of lasting harmful effects. Nevertheless, modification of cultural patterns (cultural euphenics) is not only more easily and rapidly achieved than is genetic change, but for the same reasons can be more readily reversed. Thus any mistake that might be made is more easily and quickly corrected.

It is only within recent years that we have recognized the great significance of cultural influences during the preschool years in determining the course of later development.

An understanding of this is, of course, of basic importance in planning educational programs that aim to change cultural patterns, whether these programs are designed for developing nations that desire cultural change, or for smaller population units in which cultural enrichment and modification are the goal. Our nationally supported Headstart Program is a significant and important attempt to achieve the latter.

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METEOROLOGY

Rain Decrease Follows Seeding Sometimes

➤ SPRINKLING CLOUDS with silver iodide or other chemicals to wring rain from them can sometimes decrease rainfall instead of increasing it.

On the other hand, flinging huge quantities of silver iodide into the air to prevent hail may actually increase the number of hailstorms.

Such contradictory results of rainmaking attempts were reported to the American Association for the Advancement of Science by Dr. Jerzy Neyman, director of the University of California's statistical laboratory.

Detecting the physical properties of storms in which cloud seeding gives positive results and those in which it gives negative results may be an "important step toward mastery of the weather."

Dr. Neyman said that four major experiments on rainmaking have been conducted in the United States. Contrary to the optimistic reports of commercial companies, three of these experiments indicate that, if anything, cloud seeding decreased precipitation. The fourth showed either an increase or a decrease, depending on how it was evaluated.

These results contrast with the seven-year experiments in Switzerland conducted primarily to suppress hail. However, analysis of the results showed that the incidence of hail was actually increased.

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