The Capacity for Culture

The Evolution of Culture in Animals. JOHN TYLER BONNER. Drawings by Margaret La Farge. Princeton University Press, Princeton, N.J., 1980. x, 218 pp. $14.50.

When biologists turn their attention to the relationships between mankind and animals, they see in mankind the quantitative extensions of qualities present in other species. Social scientists, on the other hand, see the uniqueness of mankind. Biological and social scientists, as a consequence, have often generated sparks of reciprocal stimulation. Claims for unique human attributes, from the social scientists, goad the biologists to discover examples of these attributes, often simple but trenchant, in nonhuman animals. The biologists' successes in turn only spur the social scientists to refine the uniqueness of mankind. In the process, we all eventually learn more about both mankind and evolution. These days, though, biological scientists seem to sniff examples out of the phylogenetic bushes as fast as social scientists can define the quarry.

The capacity for culture is one of these apparently definitive attributes of the human state. Although the capacity for culture has a long history as a criterion of humanity, it has acquired special importance recently in the controversy over sociobiology. The capacity for culture, opponents of sociobiology propose, liberates mankind from the forces of natural selection that affect other species. On the contrary, propose the sociobiologists, the capacity for culture is itself a trait evolved by natural selection. Human capabilities for learning are so prodigious and the consequences of natural selection so compelling that a dispassionate observer hardly knows where truth might lie between the extremes. The time certainly seems ripe for an assessment of the evolution of culture in animals.

Culture is the transmission of information from older to younger individuals by means of teaching or demonstration on the one hand and learning on the other. In *The Evolution of Culture in Animals*, we encounter the surprising array of simple forms of cultural transmission among animals. Bonner's presentation covers all the key examples including traditional locations for mating or nesting and traditional routes for migration. The best examples of cultural transmission in animals are the songs of many passerine birds, species-specific patterns that each generation learns anew from the preceding one. In some species the analogy with human culture extends even to cultural drift and formation of local dialects.

Bonner also makes a good case for the adaptedness of culture and complex learning for a great variety of animals. The advantage of learning, as a means of adapting to immediate circumstances, is its speed. The other major way in which animals transmit information from generation to generation, by replication of genes in reproduction, permits only much slower adaptation through natural selection. By learning, individuals can adjust their behavior to short-term variations in food, habitat, or predators, for instance. In addition, learning permits the acquisition of certain kinds of information that the genome could not possibly encode. For instance, recognition of individual mates and geographic locations of traditional breeding grounds are often inappropriate for genetic coding.

This widely ranging review of the evolution of culture and learning in animals, with its refreshing style and superb illustrations, makes a delectable sampling from the buffet of biology. The fare becomes thinner, though, when we move to the nature of the human advance.

In devising a scenario for the evolution of human capabilities, Bonner makes full application of the biologist's maxim for these circumstances, quantity before quality. The evolution of the human brain, he proposes, involved no major reorganization and few genetic changes. Neoteny, the extension of juvenile characteristics into adulthood, and a long developmental period resulted in a creature with a proportionately larger brain and a longer time in which to learn before maturity. Multiplication of cells in the brain without major reorganization expands capabilities for learning and culture, but this human capability is a quantitative extension of the rudimentary forms of culture found in nonhuman animals.

This all may be so, but there are major problems here begging for sustained, critical assessment. First, the implication that more brain cells mean more of the same behavior is suspect. In any system of interacting parts, the multiplication of parts, even identical ones, can open entirely new possibilities for the performance of the system. The possibilities for higher-order interactions expand with the number of parts. In this sense, quantitative changes can lead to qualitative differences in performance. Second, the continual analogies between cultural evolution and genetic evolution need careful examination. On the one hand, there is the temptation to adopt the mechanisms of one process for the other. Yet these two forms of evolution differ significantly with respect to the storage, transmission, and mutation of information. On the other hand, there is the vexed question of the interaction between cultural evolution and genetic evolution. Biologists emphasize that the capacity for culture has evolved by genetic evolution through natural selection. Some social scientists feel that this "biological" side of mankind places very little constraint on the form of any particular culture.

These problems all come to bear on the central issue, the origin of human cultural diversity. Are different cultures adaptations to different environmental conditions? If so, what are the relative contributions of genetic adaptation and cultural adaptation to the differentiation of human societies? Or are most differences among human societies arbitrary, the result of cultural drift? Bonner asks these questions but suggests a third possibility. Are human cultures alternate stable adaptations? The possibility of alternate stable adaptations in genetic evolution, originally a suggestion of the geneticist Sewall Wright, has attracted much attention among biologists recently. This possibility offers something for everybody concerning human cultural diversity: every culture evolves toward an adaptive peak, but each culture finds itself by historical accident on the slopes of one or another of the possible peaks for its particular circumstances.

The Evolution of Culture in Animals makes an engaging case for the adaptedness of culture and specialized learning in animals. When it comes to these harder questions, though, it steers aside. In comparison with other treatises of sociobiology, Bonner's exposition of the phylogeny of culture takes few controversial positions and stays close to the clear paths.

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