A CULTURAL ROUTE TO BIOLOGICAL FITNESS

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Received December 9, 1977

ABSTRACT: A cultural organism can increase its biological fitness without having any offspring or increasing the offspring of its relatives, by altering the selective pressures operating on the population in favor of its own genotype.

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Evolutionary theory predicts that all organisms act to increase their biological fitness—their genetic representation in future generations. One would expect this principle to hold as forcefully for humans as for other organisms, but at least superficially it is difficult to see how much of human behavior is related to biological fitness. Many arguments have been advanced to explain this discrepancy. Perhaps we are adapted to a past age, and the evolution of our behaviors cannot keep pace with a rapidly changing cultural environment (e.g. Ardrey 1976, Martin 1973). Perhaps culture represents an autonomous evolutionary process that selects for behaviors regardless of their effect on biological fitness (e.g. Cloak 1975, Richerson and Boyd 1977).

Alternatively, it is possible that human behavior really is directed toward the maximization of biological fitness, but in a more subtle way than recognized by simple evolutionary theory. This note suggests a process whereby a cultural animal can increase its genetic representation in future generations without having any offspring or increasing the offspring of relatives.

One of the most fascinating aspects of culture and biological fitness is the intense degree of feedback that goes on between them. A cultural innovation can so change the animal's relation to its environment that the entire pattern of selective forces operating on the genetic composition of the population also changes. In this way the coefficients of selection that direct biological evolution are largely of the animal's own making.

Many authors have appreciated this (e.g. Caspari 1963, Dobzhansky 1961) but a corollary has not been sufficiently emphasized. Consider an individual that possesses a cultural innovation. Assume that the establishment of this innovation within the population requires energy that subtracts from reproductive activity. If successfully established, then the innovation will shift the selective forces operating upon biological fitness. Some genotypes will be more favored than before and others less favored.

In particular, consider the case in which the innovation shifts the patterns of selection in favor of the innovator's own genotype. Insofar as many innovations are created to improve the environment for the innovator, this is not an unreasonable assumption. The innovator is then faced with a choice. It may devote most of its energy towards reproductive activities, in the extreme case neglecting the innovation entirely. Its reproductive efforts will increase the proportionality of its genes in the next generation—the definition of biological fitness. Alternatively, it may devote most of its energy towards the establishment of the innovation, in the extreme case neglecting reproductive activities entirely. This will also increase the proportionality of its type of genes in future generations. This conclusion even holds when the innovator has no offspring and contributes nothing to the offspring of relatives, because once the patterns of selection are altered the actual genes can be recruited from the pop-

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Evolutionary Theory 3:235-236 (March, 1978)
The editors thank G.S. Krantz and V.C. Maiorana for help in evaluating this paper.

ulation at large.

As a hypothetical example, the developers of the computer introduced a cultural innovation that is fast becoming a ubiquitous part of the human environment. Those individuals especially proficient at working with computers have a resource acquisition advantage (e.g. jobs) that did not exist a century ago. If, a) proficiency with computers has a genetic component, and, b) a relationship exists between resource acquisition and reproductive success (now or in the future), then the developers of the computers increased the prevalence of their genotype far more by their cultural than by their reproductive activities.

To summarize, it seems possible that two separate 'routes' to biological fitness exist in the evolution of a cultural animal. The first may be termed the "reproductive route" and it is the standard pathway of evolutionary theory, in which the invididual seeks to maximize its genetic contribution to the next generation through numbers of offspring (with the proper consideration to inclusive fitness, etc.). The second may be termed a 'cultural route' in which the individual seeks to maximize its genetic contribution to future generations by altering the patterns of selection in favor of its own genotype. It should be added that the cultural route requires not only the existence of culture, but also the ability to transmit culture with ease. If it exists at all, it is probably uniquely human.

ACKNOWLEDGEMENTS

I thank A. B. Clark, M. Leighton and P. J. Richerson for helpful discussion.

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