

## BOOK REVIEWS

CULTURAL TRANSMISSION AND EVOLUTION. A QUANTITATIVE APPROACH. L. L. Cavalli-Sforza and M. W. Feldman. Princeton University Press. Pp. xiv+388. Price: Cloth £14.00 Paper £5.90.

It was realized a long time ago that the regularity of Mendelian inheritance might make it possible to predict the degree of resemblance between relatives and the rates of evolutionary change. In spite of the difficulties of obtaining unbiased data, geneticists have claimed success in employing genetic models to account for the resemblance between relatives for a variety of human characteristics. Much of this success stems from the availability of a mathematical model which embodies in a simple form the main features of Mendelian inheritance so that predictions can be made about the likely pattern of statistics derived from natural populations. These results have not been embraced widely by behavioural and social scientists because man's intricate social organization and immense capacity for learning ensure that much of the information shaping his behaviour does not come from the DNA of his parents.

The main threat to any attempt to reconcile social and genetic theories of human behaviour was the lack of concise mathematical theory of non-genetic transmission and change which could compete on equal terms with genetic theories and be used to explore the same data with the same statistical methods. During the last ten years several serious attempts have been made to provide such a theory and one of the most influential is that of Cavalli-Sforza and Feldman whose work is summarized and expanded in *Cultural Transmission and Evolution*.

In a single book the authors have tried to develop cultural parallels of quantitative and population genetics in a form which can be used side by side with classical genetic theories both as a way of breaking new ground and as a deterrent to the untested assumption that everything that runs in families is genetic. The work is devoted to a rigorous analysis of what happens when Mendel's laws no longer constrain the pattern of family resemblance and evolutionary change.

The basic approach will be familiar to population geneticists and is likely to strike chords with researchers who believe that developing a consistent and explicit model is the first and most difficult stage of scientific inference. The authors begin with a few simple assumptions which differ very little from those of elementary population genetical theory. Initially, they assume "vertical transmission", that is information transfer from parents to children, of cultural states which exist in two forms. The main difference between the model of cultural transmission and genetic inheritance is that Mendel's laws no longer constrain the probabilities of transmission from parent to offspring. They reiterate the point made by many other authors that vertical cultural transmission can very well stimulate Mendelian inheritance in nuclear families consisting only of parents and offspring. This argues very strongly for experimental designs which focus on more unusual relationships including twins and adoptions. Cultural transmission increases the range of possibilities for evolutionary dynamics

and equilibrium. Even within the restricted domain of vertical transmission the novel possibility of oscillation can be achieved if offspring react against the behaviour of their parents.

Restricting transmission to the family automatically limits the number of people who can be influenced by a cultural innovation and so constrains the rate of evolutionary change. The rate of evolution may be increased dramatically if the nuclear family is not the basic unit of cultural transmission. The authors, therefore, devote much of their discussion to alternative models of transmission. They consider especially "oblique transmission" in which information is transmitted between generations from a teacher and "horizontal transmission" in which transfer occurs between members of the same generation.

Since much of the book employs methods familiar to population geneticists they are likely to be best able to follow the details of the mathematical argument. There is, however, much in the work for the non-specialist because it takes care to explain the crucial results in words and to provide many examples ranging from national differences in pronunciation through the familial transmission of social attitudes to the transmission of religious affiliation. The data serve a key illustrative role in the work, and are fertile sources of suggestions about what should be done next. They would not, however, stand by themselves as supporting a cultural rather than a genetic theory of family resemblance since the authors do not consider the simultaneous contribution of genetic factors.

In the past, statements about the potential importance of non-genetic transmission have been vague and integrated very poorly with the rest of population biology. The intellectual power and appeal of this book lies in the authors' ability to crystallize the essentials of the problem in stepwise form, leading the reader from a few very simple propositions and showing how most of the main conclusions can be reached economically and rigorously by essentially the same rules that are widely accepted among geneticists. It illustrates well how the zest for model-building can bring clarity out of confusion and deserves to be read by any who are trying to interpret data on human populations.

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