

Quantitative Ethology. Edited by P. W. COLGAN. New York: Wiley (1978). Pp. xiv + 364. Price £19.40; \$34.95.

Without doubt quantification is the characteristic of any reasonably advanced empirical science. Thus it is not surprising that ethologists have made efforts to count and measure behaviour. Mostly the subsequent data analysis has been directed at inductively deriving insights about the processes responsible for the behaviour. The deductive endeavour of developing quantitative models and comparing their predictions with actual behaviour has been attempted less often. If the reader is expecting this book to present the consolidated results of these efforts then he will be disappointed. The title is misleading; 'Methods for quantitative ethology' would have been a fairer description. Within the space allotted the various contributions can not do more than present, often somewhat sketchily, a number of quantitative methodological approaches that have been applied or might be applied to ethological data. Palpable results are rarely in evidence. It is not even clear what kind of scientific questions some of the very involved and laborious types of analysis might actually be capable of answering. Often the authors seem to sidetrack on to technicalities concerning these methods that take one away from the basic task of understanding behaviour.

That of course is the trouble with many advanced methodologies in the behavioural sciences: the behaviour of the methods for many becomes more interesting than the behaviour of the organism they should be elucidating. This criticism having been stated it must be conceded that it would be difficult at the present time to do much better than the book does: the career of quantitative ethology has been brief, the field suffers from a lack of experience.

Turning to the individual contributions, Slater's on data collection suffers from an exceeding briefness. Treatment of the sticky problem of observer reliability and some introduction to the technology of behaviour recording, for example, would have been useful additions. The chapter by Fagen on repertoire analysis deals with a restricted issue but it yields some concrete results, which makes it quite interesting. The chapter on information and communication theory is less satisfactory, being logically disjointed and inconclusive, not managing to make distinct the quite different uses of information measures in the context of animal behaviour.

Temporal patterns are treated by Fagen and Young, whose chapter is one of the more rewarding readings in the book because it examines in some detail why a certain type of frequency distribution of intervals between behaviours is so pervasively found in nature. At the same time it manages to introduce a number of methodological approaches. Contingency tables with more than two dimensions come up quite often during research and Colgan and Smith usefully explain how to deal with them.

The following chapters on cluster analysis, multi-dimensional scaling, factor and kindred analysis, multivariate and discrimination analysis all have a similar quality in that they tend to get bogged down into a kind of 'buffs' small-talk. The issue of what kinds of ethological problems these techniques might be able to solve is inadequately treated. The track record of factor analysis, for example, is less than impressive, not only in ethology but generally in the behavioural sciences. Indeed, it can be argued that it has befuddled many an area of research. Partially this is because its results are very much influenced by the data structures to which the analysis is applied. They are always correlation coefficient matrices—but correlations between precisely what? The relationship between two behaviours can be measured in a variety of ways. This aspect of data preconditioning receives negligible attention in the various chapters although it affects all the 'advanced' methods.

The various kinds of system graphs are zippily, though not profoundly reviewed by Sustare, and it is interesting to note that with the exception of kinematic graphs, vulgarly known as arrows and balloons, none of the other kind of representations hinge on any of the analytical methods treated in the book. The editor's chapter on modelling does not, and cannot in such a short space, do justice to such a variegated and ramified creative field. Again, none of the modelling mentioned relies in any way on the methodology that the bulk of the book deals with. In summary it is certain that, for the time being, quantitative ethology will continue methodologically to be a catch-as-catch-can and all this book can do is to suggest some possible grips and holds.

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