tion of data—genetic, morphological, demographic, physiological, and other kinds—on many populations. They somewhat underestimate the efflorescent use of sophisticated statistical methods for analyzing anthropological data. In this book well-chosen examples are given of such applications to various populations. Chai uses multivariate analysis to unravel the affinities of the aboriginal mountain tribes of Taiwan. Hiernaux reconstructs the biological history of some sub-Saharan African peoples, discussing problems of sampling and criteria, mating patterns, the actions of selection, migration, and drift, and the interrelation of environmental and genetic components. Penrose handles a morphological study of a number of groups in Senegal. An analysis of the genetic affinities of numerous populations in western Europe is valiantly attempted by Constandse-Westermann. Her paper highlights the need for "real" data to feed the computer.

With new genetic traits being added constantly to the statistical jigsaw puzzle, the necessity increases for developing composite measures to characterize differences in a relatively large number of gene frequencies or phenotypic proportions. Sanghvi and Balakrishnan compare three measures of genetic distance: probability of correct classifications, geometrical distance, and a measure of distance analogous to the χ^2 statistic. In 1964, Edwards and Cavalli-Sforza proposed a measure of genetic distance on the basis of square root transformation of gene frequency. (They found, subsequently, that the principle had been suggested in 1941 by Bhattacharyya.) These two sets of authors see flaws in each other's arguments. In this volume, Edwards and Cavalli-Sforza outline developments in their approach to analyze affinity as revealed by differences in gene frequencies, which they apply rather widely. Attempts to reconstruct evolutionary trees of human populations resulting from random genetic drift are presented effectively and cautiously by Malyutov, Passekov, and Rychkov.

The volume is timely. Marking the end of the five-year period of the International Biological Program, it brings into focus not only the techniques (and their shortcomings) for assessing the affinities between human populations, but also the importance of setting up carefully planned, intensive field programs to obtain those morphological and related data that are essential to the development and testing of analytic mathematical tools.

Although little that is new is presented in this volume, it should encourage physical anthropologists (or those who wish to be called human biologists) to get out of their armchairs and into the field so as to attack more effectively the exciting problems inherent in our global population diversification.

RONALD SINGER
Departments of Anatomy and *Anthropology, University of Chicago, Chicago, Illinois*

Using Social Data Archives

Secondary Analysis of Sample Surveys. Principles, Procedures, and Potentialities. HERBERT H. HYMAN. Wiley, New York, 1972. xiv, 348 pp., illus. $11.95.

Social research today is heavily dependent on the examination of social reality by means of the one-shot sample survey. The sequence is familiar —examination of literature, formulation of hypotheses, development of research instrument, sample selection, data collection and processing, analysis, write-up. This sequence is not essentially different from that followed in other areas of science and its value has been documented in social research; it is, however, beset by certain limitations.

The first stems from the high cost of collecting new data. Despite the considerable thought and ingenuity devoted to reducing the cost of social surveys, it is still rarely possible to obtain inexpensively samples of the size and quality required for sophisticated data analysis. What emerges from survey research is thus bounded by the imagination, theoretical orientation, technical sophistication, and unconscious biases of the relatively small number of investigators who are able to obtain financial support on the necessary scale.

A second major problem is that the single survey, no matter how carefully conducted, cannot establish certified general propositions about social life. If it has true scientific merit, to be sure, it will be engaged in testing general propositions; but in the best of circumstances, the conclusions will be tentative because it is uncertain whether the principles of social life appearing at a particular time in a particular place are firmly predictive of what will happen at another time or in another place.

A third limitation of the single study is its inability to deal with many questions about social change. Most quantitative studies of long-term change have been based on data collected for official purposes. But the sociologist is not interested simply in observing trends over the years in birth rates, suicide rates, divorce rates, and the like. He would also like to study less tangible developments—changes in alienation or anomie or faith in people —and to be able to conduct a thorough analysis of the factors contributing to them. In the absence of such data, systematic research has shown an excessive emphasis on social statics and has given insufficient attention to social dynamics.

"Secondary analysis," if practiced widely and taken seriously, could be of enormous benefit in overcoming these impediments to progress in social research. It could put fresh minds to work examining previously collected data; lead to sounder and firmer social propositions deriving from data gathered in a variety of social, cultural, and historical contexts; and appreciably increase understanding of broader processes of social and historical change.

Hyman defines secondary analysis as "the extraction of knowledge on topics other than those which were the focus of the original surveys." The idea is of course not new; Hyman himself began teaching a course in the subject at Columbia in 1951. What has been lacking to this point is an organization and systematization of the principles underlying secondary analysis, a consideration of the new types of research design which arise in it, a discussion of both the new problems and the rich potentialities of the data, and a concrete guide to sources of data. Hyman treats each of these matters with the thoroughness and competence social researchers have come to expect of him. He does not underestimate the complexities. One of the major contributions of this book is to clarify and specify the variety of research designs which have been used in secondary analyses to date, for example, pooling of data from multiple surveys, internal replication with multiple surveys, external replication by secondary analysis of a single survey, intrasurvey replication using multiple indicators, exact counterpart design, trend analysis,

cohort analysis, cross-cultural comparisons, and others. Each of these designs is clarified and illustrated by means of detailed case studies; scientific and practical problems distinctive to each design are noted and helpful suggestions presented. In addition, there are numerous illustrations of how secondary analysis has been used to enhance our understanding of the significance of social structure and social experience for human thought, feeling, and behavior.

Hyman deals also with the perennial problem of finding satisfactory indices for one's concepts, the inadequacy of data bearing on certain essential theoretical questions, the noncomparability of samples from which similar data have been collected, the very special difficulties involved in cross-cultural research, and so on. These problems are not easily solved, but Hyman is able to provide some sound and reasonable solutions. What is *not* a problem is the claim made by some social scientists that they have analyzed or should analyze "all their data," and that nothing is left for the secondary analyst. No analysis is ever completed; it just stops. It is always possible for others with different interests, different theories, different perspectives to find valuable new material in any reasonable survey study.

It would be excessive to claim that secondary analysis constitutes a comprehensive solution to all the problems of social science, but it is a powerful weapon in the social research armamentarium which has been unduly neglected. I believe it offers one of the most promising hopes for social science in the years to come. What has been needed all along is a systematization of the subject, and Hyman's excellent book fills this need in exemplary fashion.

MORRIS ROSENBERG
Laboratory of Socio-environmental Studies, National Institute of Mental Health, Bethesda, Maryland

Kinetics

Reactions of Molecules at Electrodes. N. S. HUSH, Ed. Wiley-Interscience, New York, 1971. xiv, 498 pp., illus. $24.50.

A general aim of kinetics is to gain an understanding of chemical reactions from molecular properties. In the liquid phase, however, the difficulty of describing the interaction of the reactants with the surrounding medium presents a serious obstacle to the achievement of this aim. The problem is even more complex in the case of electrode processes, where the reaction takes place at the interface between a solid and a liquid, the detailed structure of which is unknown.

Under these circumstances the possibilities of treating electrode reactions from a molecular point of view might appear to be rather limited. Fortunately, however, electrostatic interactions are sufficiently predominant in electrode processes that molecular models which chiefly emphasize this aspect can greatly contribute to the understanding of kinetic processes.

In the last decade the advance in experimental techniques has been paralleled by the development of theoretical models on a molecular basis for the description of electrode processes. The editor of this book has rendered a valuable service by conveying the usefulness of this new approach. This he has achieved by carefully selecting certain areas where the molecular approach has reached a satisfactory degree of sophistication and bringing together competent contributors in all these areas to give an account of them.

The electrostatic model can be applied with great success to the adsorption of molecules at electrodes and its dependence on the structure and charge distribution in the double layer (discussed by B. B. Damaskin and A. N. Frumkin). Furthermore the electrostatic model is invaluable for an understanding of ion solvation (reviewed by B. Case). A particularly valuable chapter (by R. R. Dogonadze) reviews the quantum mechanical description of electron transfer processes developed by the Russian school of Levich. In this treatment the activation of the electron acceptors or donors prior to electron transfer is assumed to be due to the electrostatic interaction with the polar solvent. This theoretical approach is accompanied by a comparison between calculated and measured rate constants for electron transfer in various redox reactions (worked out by J. M. Hale). In these calculations, which yield surprisingly good agreement with experimental values, the purely electrostatic approach is supplemented by the inclusion of the contribution of the vibrational modes of the ligands in the inner coordination sphere to the activation energy.

Organic redox reactions offer a wide field for the application of molecular concepts. Here the discussion must follow on the same lines as generally used in organic chemistry. A systematic analysis of the most important types of organic electrode reactions is given (by M. Fleischmann and D. Pletcher), and some particular systems, such as the aromatic hydrocarbons, which have been intensively investigated are described (M. E. Peover).

One chapter (by W. Mehl) is devoted to a discussion of organic semiconductor electrodes. The behavior of these solids can be adequately described by analogy with the properties of the isolated molecule. This makes it possible to include the role of electronically excited states in the molecular description of electrode processes.

This collection of examples of the application of molecular models will not only prove stimulating to electrochemists but also will give to others an indication of the degree of sophistication already achieved in the discussion of electrode processes. The information available in this field can find a place in the discussion of many other problems in reaction kinetics.

H. GERISCHER
Fritz-Haber-Institut, Max-Planck-Gesellschaft, Berlin

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(Continued on page 1222)