accountable for actions that reach far beyond the immediate objectives? How can we incorporate actual costs into price? How can we give the exploiter of any resource some direct interest in restraint? There is no real alternative to effective governmental control. But *Quis custodiet ipsos custodes?* is the ancient and persistent question, and Hardin explores with characteristic flair both the reasons why regulatory agencies are so easily corrupted and steps that might be taken to change the tendency. One of the most salutary changes in government in recent years has been the National Environmental Policy Act with its requirement of "environmental impact" statements. The statements not only force accurate reporting, often under pressures from the courts, but also offer a legal lever to bring restraint of action until the full effects can be appraised. The law is so effective that one wonders whether the growth interests would have allowed it to pass if they had realized its impact, or will allow it to stand for long. In parallel with this device has been the rapid evolution of privately financed public-interest groups, such as the Nader organizations, the Environmental Defense Fund, and the Natural Resources Defense Council, that have the effect of compelling accurate reporting and move public issues out of the hands of the exploiters and into wider public scrutiny.

Concerning control of population growth Hardin reiterates much of what he and others have said before: without it there will be no future of interest. He makes the cogent but poorly recognized point that policy on population does not constitute control, that there are many steps that can be taken to implement a policy before any action is considered that might be thought coercive. But Hardin is emphatic that time is short and, if lesser steps fail, strong action will be necessary to prevent births from exceeding deaths. Hardin likes Kenneth Boulding's half-humorous suggestion that each person be endowed at birth with the right to have one child and that that right be marketable. Of all the suggestions that have been set forth this one seems to incorporate the largest degree of egalitarianism and the least governmental control. Price would be set by the market. Of course, for such a plan to work it would have to be publicly acceptable and enforced in some reasonable way.

Part of this book is devoted to what could have been a second book, a fantasy Hardin calls "The Voyage of the Spaceship *Beagle*," in which he explores in hyperbole the implications of some of the more dreamy ethics of our time. It is in this section that he quotes an elusive and unpopular paragraph from Malthus that brought severe criticism and was omitted from later editions of Malthus's book. It bears scrutiny now:

> A man who is born into a world already possessed, if he cannot get subsistence from his parents on whom he has a just demand, and if the society do not want his labour, has no claim of right to the smallest portion of food, and, in fact, has no business to be where he is. At nature's mighty feast there is no vacant cover for him. She tells him to be gone, and will quickly execute her own orders, if he does not work upon the compassion of some of her guests. If these guests get up and make room for him, other intruders immediately appear demanding the same favour. The report of a provision for all that come, fills the hall with numerous claimants. The order and harmony of the feast is disturbed, the plenty that before reigned is changed into scarcity; and the happiness of the guests is destroyed by the spectacle of misery and dependence in every part of the hall, and by the clamorous importunity of those, who are justly enraged at not finding the provision which they had been taught to expect. The guests learn too late their error, in counter-acting those strict orders to all intruders, issued by the great mistress of the feast, who, wishing that all guests should have plenty, and knowing she could not provide for unlimited numbers, humanely refused to admit fresh comers when her table was already full.

Continuing in the same vein, Hardin quotes William Foster Lloyd:

> To a plank in the sea, which cannot support all, all have not an equal right; the lucky individuals, who can first obtain possession being justified in appropriating it to themselves, to the exclusion of the remainder.

Hardin's venture is a welcome antidote to the wishful thinking concerning population growth that has been encouraged by Commoner's *The Closing Circle* and to the attacks on the thesis of *The Limits to Growth.* It is the product of much thought by one of the intellectual leaders of our time concerning what should be the central issue of these closing decades of the century. While there are many aspects of the Darwinian revolution that remain to be examined, Hardin here examines enough of them to set off a new avalanche of vigorous discussion. I'm for it.

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Studying Human Populations

The Assessment of Population Affinities in Man. J. S. WEINER and J. HUIZINGA, Eds. Oxford University Press, New York, 1972. xii, 224 pp., illus. $20.50.

The outcome of another symposium organized by the Wenner-Gren Foundation for Anthropological Research, this time jointly with the International Biological Program, this volume is aimed at providing guidance in the analysis of human population data.

For more than a dozen decades, physical anthropologists have pursued an interest in classifying and comparing human populations for a variety of reasons. Similarities or differences were evaluated on the basis of morphological and metrical data. Some dogma resulted from the misconception of a few that accurate measurements invoked exact and finite conclusions. Fairly recently, the recognition of the effects of environmental factors on growth and the rocketing progress of human genetics, especially in serology, linked with the application of electronic computer methodology have combined in restoring an objective order in the somewhat subjective racial marketplace.

As Gower notes in his chapter "Measures of taxonomic distance and their analysis," anthropometricians have pioneered the use of statistical and mathematical methods in taxonomic biology for about 70 years. In the latter half of this period professional statisticians, such as Pearson, Mahalanobis, Fisher, and Rao, increasingly applied the methods, primarily developed with human osteometry, to investigations of the variation of quantitative characters in many groups of animals and plants. With the evolution of electronic computers Sneath, Sokal, Williams, and others rapidly developed new techniques. Fundamentally, taxonomic distance between two groups or two individuals must be defined and analyzed. Gower elegantly traces the history of the development of the techniques measuring similarity and dissimilarity between pairs of individuals and pairs of populations, and he points out that as attempts are made to solve old and new problems further statistical problems are generated. Real sets of data are needed to properly evaluate new methods. Without good data statistical methods and computer programs are not of much use.

In the preface, the editors emphasize the importance of the judicious collec-

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.

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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,