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The title given for this morning's symposium seems to imply that we are of the opinion that criminal statistics can be "improved." I hate to start so early in the morning with a semantic point; but clearly it all depends upon what we mean by "improved."

Let me make my own position clear, even at the risk of offending. It is my considered opinion that problems of statistical data regarding crime, criminals, dispositions and outcomes of offenders, not to mention victims, are deepseated. I do not think that minor adjustments of the classifications and new forms of processing alone can provide what is required. The problems are fundamental to the whole conceptual framework of the provision of statistical data which relate to the purposes of the administration of justice and the treatment of offenders. There is no stage in the network -- from the first initial contact between the suspect and the law officers, through to the discharge on parole and surveillance of the person "with a record" -- which should not be given very close attention and thought through in the light of modern social science.

COMPUTER TECHNOLOGY

The availability of high speed data processing equipment changes only the less difficult aspects of the problem of the provision of adequate data. There are many things which the present generation of computers cannot do. Too often these limitations are overlooked and the computer has come to be seen by some as a new general magic -- a sort of philosopher's stone which can turn large quantities of data into solutions which will make completely clear the decisions that should be made.

- The computer cannot:
- (1) set the boundary conditions of a problem;
- (2) define a problem;
- (3) say how worthwhile it is to explore a particular problem in the first instance and hence cannot indicate the rational use of resources of money or persons in work on an original problem;
- (4) imagine the variables or other information which might be relevant to a consideration of a problem;
- (5) decide what to include or exclude in the initial operations on a problem (but see 1 and 2 above);
- (6) select the functions to be explored;
- (7) make decisions regarding the range to be covered by an included variable;
- (8) construct a model;
- (9) select the criteria to be explored

 (although we may program a computer to select the "most predictable" criterion of a number which we previously have noted for inclusion);

- (10) decide how to collect the basic data;
- (11) decide upon a strategy of operations, such as deciding what proportion of resources should be devoted to different stages of a problem, or the means for its solution;
- (12) design or evaluate a sensitivity analysis.

If we are to treat the problem of the form which criminal statistics should take as a research question, it is necessary to transform the question into operational terms. One of the first steps is to set down some boundary conditions.

BOUNDARY CONDITIONS

Presumably we are interested in "crime" for a variety of reasons, but mainly because we are interested in information as it is related to social administration (i.e., control) systems. Such types of information are different from those which might satisfy "idle curiosity." Of course the scientist should be curious, but scientific curiosity is different from that of those concerned with problems of social policy. Let us begin by limiting our consideration to criminal statistical data in relation to questions of social policy. We will not be satisfied if, in reply to our question, "Why do you want to know that?", we can get only the reply, "Wouldn't it be interesting?" In other words, there must be some referent to a purpose other than the personal interest of the individual. I would suggest that this basis of reference might best be stated in terms of decision alternatives. If there is no possibility of any variety in the decisions which must be made, then there would seem to be no purpose in seeking data. If there are decision alternatives, then we may consider what would be the nature of the information which could inform regarding the selection of decisions among them. Moreover, if the same decision would be reached given an estimate of $x \pm 1\%$ and an estimate of $x \pm 10\%$, then the cost (and there must be such a cost) of reducing the error from 10% to 1% is a waste.

THE NATURE OF THE PROBLEM

In the time available to me, I can select only some of the major areas and note some of the problems as I see them. I shall propose no solutions, but I hope to be able to indicate some ways in which the problems I shall raise may be approached for investigation.

It is my view that in considering the matter of large-scale information and organization, such as crime statistics, we cannot expect results from methods of inquiry which differ significantly from those which we have used successfully in smallscale problem solving. I refer, of course, to those means which have been termed "the scientific method." I do not believe that we can sit down and think ourselves through to solutions as did

the old time philosophers. Informed opinion is not adequate; there must be sought the various forms of evidence which will enlighten the problems we can describe. Our first task is to specify the problems. The next is to consider what kinds of data will assist us in their examination. Changes which may be made in criminal statistical data which are not themselves based upon sound research rather than opinion (even expert opinion) are not likely to be sound. I would also claim that it is probable that once we approach the revision of criminal statistics from this scientific viewpoint we shall find that much activity which is necessary will fall within that class of research methodology that is loosely termed "fundamental research" -- applied and even operational research will not be adequate. But let me try to establish the case by some examples of problems. Let me start with some easy examples -- easy in the sense that they can be fairly clearly specified.

Age and Sex Factors

Everybody knows that the majority of reported and cleared-up crimes are committed by young male persons. Similarly, everybody knows that the probability of death increases with age. It has long been recognized that death rates for cities or other areas or classes of persons are not open to any useful interpretation unless they are age-standardized. Given the crime data which we have available, it is often possible to make some analyses of an age-standardized type; but, of course, such data can relate only to those crimes which are related to a person. Strictly speaking, such rates are not "crime" rates; they are a kind of "person-decision-event" rate.

For all we know about "crime" at the present time, there is bound to be a time-lag correlation between the birth rate and the "crime" rate. This seems all too simple, yet I have seldom seen this factor taken into account when "crime" data are published or even subjected to analysis. But clearly this factor is only one of a type which we may relate to measures of "exposure to risk."

There are certain forms of inference which may legitimately be made on the basis of the crude data, but there are many other forms of inference which we need to make that require a much more sophisticated index. Any inferences regarding the "state of crime" which may be made on the basis of "persons-in-respect-of-whom-a-decisionwas-made-to-make-an-arrest" are unproven.

Exposure to Risk

In analysis of road accident data, much attention has been paid to the problem of obtaining a reasonable estimate of factors which reflect to some degree the various aspects of "exposure to risk." It has been realized in studies concerned with traffic that few sound decisions of policy can be made without some such base to which to relate the crude figures. In this case it is natural to think of such data as estimates of mileage. But what are the factors which it might be reasonable to consider in relation to the "crime" data? And, in any case, what exactly do we mean by the "crime" data? If we consider murders, or with somewhat less justification offenses falling into the category of "crimes against the person," it might be reasonable to use the population as a base for "exposure to risk." But is it equally as reasonable to use the population of persons as a base for offenses against property? If the cost of living (legally) goes up, presumably the cost of illegal living also rises! If persons who live by illegal means increase their productivity proportional to the increase in the cost of living, does this really mean that "crime" has increased?

I have shown elsewhere [1] that for certain offenses where the opportunity (or exposure to risk) increased, the offenses committed followed a very similar pattern over time; indeed the ratio established over a period of twenty-four years (1938-1961) remained almost constant, despite fluctuations in the absolute figures of 800 percent. When there was less in the shops, less was stolen; when there were fewer cars on the road, fewer were broken into. This analysis was necessarily crude because economic data and "crime" data cannot be matched. Larceny from shops and stalls, which was one of the categories used, would exclude "burglary" and probably many or most cases of "breaking and entering" of shops, but it seems difficult to me to commit burglary or breaking and entering in respect of a "stall." Perhaps this example serves best merely to illustrate a point, namely, that illegal economic behavior (crimes against property) cannot be matched and compared with legal economic behavior of an otherwise similar type. I see no utility in data which cannot be compared with other data -- I am not that kind of believer.

In the case of murder, it seems fairly clear that "persons" are at risk either to becoming murderers or victims, but there would be a different rate if we used victims as the base, since murder is not a one-to-one transaction. In the case of property offenses, the connection between the person (owner of the property) and the exposure to risk is distinctly less direct; much property is owned by collectives of persons. Perhaps fluctuations in appropriate insurance rates for certain classes of risk would provide a better indicator of some categories of "crimes" than the data which are available from "criminal statistics." At least, with such data there is a basis of exposure to risk which, in the experience of the companies underwriting the policies, provides guidance for the setting of premium ratings, and we may assume that competition between companies will ensure a good market.

The Concept of Risk and Probability

It must be nearly one hundred years since it was considered to be good statistical practice merely to count things -- a sort of numerical accountancy. Statistics are concerned with probability and decision and related matters. If, then, we use the term "criminal statistics" we might expect to find, at least as raw material, data which could be stated in terms of probability estimates. But can we? Hardly at all. We might think that if the word "criminal" has any meaning we should be able to know how many "criminals" there are. But we cannot obtain even a good estimate of the many possible definitions of that word. If we were to take a random sample of the population, what would be the probability of sampling a "criminal?" Is even that concept sound?

Perhaps even more important, how many "victims" are there in different classes and under various possible definitions? Here we are in a worse state of ignorance. We cannot inform a citizen of the general expectation of his suffering any particular attack upon his property or person. Is there such a factor as "victim-proneness?" Would it not be useful to know? Clearly, without a measure of "exposure to risk" related to the "crime" data in each case, we cannot utilize statistical methods at all -- that is to say, we cannot make reasonable estimates of the probabilities which form our stock-in-trade. The foregoing explains my reason for placing "criminal statistics" in quotes; without an estimation of probabilities we do not have statistics. But why also place "crime" in quotation marks? We may think that there is no doubt about the fact that we do have "crime." I would agree that, as a statement of a social condition, this statement is a good one. But our data do not relate to crime.

What Data Do We Have Which We Call "Crime Data?"

When is a crime not a crime? If we are uncertain about even this dichotomy, can we be very precise about measurement? Clearly, the only crimes about which we can have data are "known crimes." But we have no means of knowing by direct revelation; we have to carry out processes and note the results of the description and classification of these processes. A cursory examination of "criminal statistics" will quickly reveal that we have certain information about:

- (a) persons;
- (b) events;
- (c) decisions;

but in general we have a compounding of two or more of these. In the main we have data relating to <u>decisions</u> -- the policeman <u>decided</u> to arrest, the judge <u>decided</u> to find the person guilty and to make a certain disposal, the parole board <u>decided</u> to parole or to recall from parole, and so on. These <u>decisions</u> have a relationship to an event which we have classified as a "crime," but the relationship is by no means a one-to-one relationship. The "event" which is classified as a "crime" is, in almost every case, not a single event, but is better considered as a transaction. The criminal cannot generally commit the crime upon himself.

I tried recently [2] to make a short statement which reflected the complexity of the problem of criminal behavior. It may not be adequate, but perhaps I can repeat it here as an illustration of this point:

Persons who vary in ways which are in the main unknown (X_1) live in situations (X_2) and are exposed to cultural influences which vary in unknown ways (X_3) , they sometimes commit deeds (X_4) which vary in many ways except that they are classified by the laws of that society as crimes, and these laws (X_5) also vary both in content and

interpretation; some persons are detected by systems which vary in unspecified ways (X₆) and are dealt with by persons or courts which also vary in their policies (X7) and are allocated to institutions or disposed of in other ways usually termed "treatments" (X8). which differ from each other in unknown ways. The persons are committed for varying periods of time (X_Q) and their interaction with the "treatment" (X_{10}) will be expected to vary; in most cases they may be expected to interact with other persons (X_{11}) also undergoing the "treatment." Eventually they are released to situations which vary both in themselves and in terms of the expected interaction with the personality of the ex-inmate (X12).

The twelve variables (and there may be more) would be repeated for each offense where more than one is concerned; that is to say, for most persons who are identified as criminals by our present processes.

It will be noted that the set of variables outlined above considers the process of criminal justice mainly from the viewpoint of the offender and his rehabilitation. There is another viewpoint, namely that of society, and the impact of crime upon the general social condition -- we may call this the macroscopic viewpoint. There are, of course, also other viewpoints between these two extremes. If we are concerned with rational processes then there must be as many networks of <u>information</u> as there are networks of <u>decisions</u> in regard to those processes which have been constructed or have grown up over time to deal with issues of social control.

Clearly the problem is complex. Yet it is strange how many persons, often in high office, see the problem of crime as a simple matter. There is for many still a definite line between right and wrong, and a two-value logic (and not always logic) suffices as an explanation which they find satisfactory; at least it seems to give them satisfaction.

An Analogy

Consider for one moment the very large body of data which are available to economists. (I will not comment upon how well they are able to utilize it!) Now these data, by definition, concern <u>legal</u> economic transactions. Crimes, also by definition, are illegal and frequently economic transactions. (I maintain that we cannot use the scientific method if we consider crime from the moral viewpoint.) Now legal behavior follows laws; thus the variety of behavior is constrained and hence more predictable. The regularity which may be found in illegal transactions is a "law" of a different order, and the process may be expected to be more complex. If this argument is sound, then it would appear that for purposes of examination of illegal (unconstrained by law) behavior we may need more complex data than we need to permit examination of legal economic behavior, and illegal economic behavior is only the larger part of crime. I do not want to press this point, but it serves to indicate that no easy solutions are

NECESSITY OF SEQUENTIAL ANALYSIS

It is, I think, a pity that the advent of the computer has put sampling strategies somewhat in the shade. It is perhaps time to revive considerations of sampling in our strategy of information collection, processing and analysis.

It is not possible to ask all the questions which we will want, at some time, to ask about problems of crime, criminals and the processes of justice. Answers to questions provoke more satisfactory questions. We should not attempt an "ideal" solution, but rather set up a system which can be continuously modified as our ideas of appropriate questions change. I think we can get from economics some guide lines to the methods which might be useful. In economics macro and micro methods are well distinguished. So far there seems to be no similar distinction in the thinking or the data regarding illegal transactions. Nonetheless, similar distinctions will eventually have to be made, and different types of models will have to be applied to the two frameworks. The setting of rational budget allocations for crime prevention and control would seem to require models similar to those provided by macro-economics, while evaluation of penal treatment/punishment probably would require being approached by the "black box" model.

Decision "Gates"

The judicial system can be pictured as a network of decisions -- rather like a branching tree, with each branch having a "gate" (decision). It would appear to be an easy matter to fit each of these gates with a simple counting device. At present only a few of these gates are covered by counting systems, and I doubt that all the gates have been systematically identified. Where we have such "gate counting," we do not know how many of the persons passing through any one gate have passed through other types of gates previously on their route through the system.

Adequate counting systems at each of the decision gates should be related to a sampling frame and to a means whereby good probability samples could be drawn as and when required. There is no need to try to solve all the problems all the time! Sampling could suffice for many of the "macro" models as well as being the general method for testing "micro" analyses.

All too often an attempt at 100% data collection falls short of a complete enumeration. In such cases it is normally better to have a good probability sample than to have empty cells in the tabulations. In a recent study I found an almost complete enumeration (92% of the universe of interest) totaling about 20,000 cases. It was believed by the office concerned that the missing data were not biased. Nonetheless, I decided to utilize high order interactions as an empirical estimate of error. It was found that the power of the 92% enumeration was approximately equal to a random sample of only 2,000 cases. This was due to the increased error variance of nonresponse. In this case it might reasonably be inferred that the agency concerned was wasting

90% of its effort in collecting 92% of the data, since a 10% sample would have been equally as efficient as the attempted complete enumeration, and would certainly have been less misleading.

NEED FOR SPECIFIC DATA

Discussions of general statistical data seem to assume that if only one could collect "sound" and appropriate data, such data would serve all kinds of purposes. I do not take this view. Specific needs require specific types of data. The publication in the press of "criminal statistics" does not, I fear, inform the public. The perception of "crime" by the average layman does not coincide with the technical legal definitions. The layman may be pardoned if, when he hears about the annual increase in "crime," he places a summation sign in front of the various news headlines which he has seen and can remember. Headline or, indeed, newspaper reported crime has specific characteristics related to the selling of newspapers rather than to the control or treatment of offenders.

If we could tell members of the public what was the probability of their being the victims of various types of crimes and if we could amplify this by indicating different classes of risk situations, they would be better informed and able to adjust their behavior accordingly. The information we give the public at present does not enable them to do anything, except become more fearful in a vague sort of way. Ill-informed behavior may, by indirect means, serve only to provide a situation which makes crime more probable or profitable.

The provisioning of prisons, estimation of future inmate populations and many other administrative decisions require data each of a specific kind and adapted to the specific need. Many decisions are made at present on the basis of what Huff in his delightful little book, <u>How to Lie</u> with Statistics, calls the "semi-attached figure." [3]

Doubtless, much data could be obtained as a by-product of the ongoing decision processes (the gates"). It would seem to be useful to survey the kinds of information which are at present available and used (or said to be used) as a basis for current kinds of decisions. But first we should have to map out the decisions. I do not know of the existence of any such complete decision map. Without knowing what decisions are being made, how can we discuss what information would the better inform those who make them? Moreover, it is not always those who are held responsible for the decisions who in fact make them. The higher in the hierarchical decision-making structure a person is, the smaller the proportion of "his" decisions which are in fact made by him; rather he is a decision ratifier who takes responsibility for his ratification. In a recent study with my colleague Carter [4], I have shown that judges in the Federal courts (surely persons who usually are assumed to make decisions) may more reasonably be seen as mainly ratifying decisions -- the "decision" is mostly contained in the "recommendations" of the probation officer. To what extent we consider a recommendation (which is more often than not accepted) as a "decision" or

the ratification as the decision, depends upon semantics rather than a model of the decisionmaking process, but it is a key issue in considering who should have what kinds of information.

THE LAST QUESTION

What information should be available? This is the final question, not the initial question. What decisions can be made (what are the decision alternatives)? What information may relate to these decisions? What is the pay-off sought? What is the probability of pay-off from various decisions? These are more primary questions. I would contend that we cannot get anywhere by asking the last question first. Statistics is a method, not a belief system. Statistics can be used in studies concerning agriculture, astronomy to zoology, zymosis and many things in between, but statistics is not agriculture, astronomy or anything else. Criminologists, lawyers, sociologists, administrators and all others concerned in whatever manner with what they term "crime" cannot look to statisticians to tell them what data they require, without their first telling the statisticians exactly what are their concerns. Even when the concerns are expressed, they must be in a form related to "rational" decision processes. This is, perhaps, the major problem.

RATIONAL DECISIONS?

I suggest that many of the procedures which are followed in relation to behavior which is classified as "criminal" are probably not even intended to be "rational." Certainly not "rational" as the statistician may use the term.

Statistical methods cannot inform the artist or musician (except perhaps the composer of electronic music) and there are, I think, many situations in the operations of the processes of justice which are more analogous with an art form than with a "rational process." To say that the courts are not "rational" may be considered both incorrect and somewhat irreverent. I do not have any intent to be irreverent; rather, the perception of the judicial process as an "art" seems the more closely to accord with the ways in which some of those closely concerned in the process see their function. Fink [5], for example, specifically rejects mathematical estimates of recidivism and says that he "is inclined much more to the judgment of a judge who is wise, humane and just than to the efficiency of prediction tables." The "human touch" is greatly respected in the assessment of the work of the courts and the "human touch" is, I think, an "art form." But the "art" aspect of the work of the courts goes much further. Imagine the courts stripped of all their ceremonial and symbols; would not justice then be seen as a rather different thing? [6] Hardly a church exists without ritual and some pomp and circumstance. Even the military machine utilizes the parade. How would we rationally and statistically assess the flag? Could there be justice as we know it without drama? Is the drama not part of our very concept of justice? If so, then we must ask how rational decisions mix with drama.

Information regarding crimes and the judicial process which reaches the general public through the mass media is frankly stated to be "drama." "DRAMATIC SCENE IN COURT," runs the headline. But the dramatic event is also a rare event. That which happens every day and everywhere is not dramatic in the way in which the newspapers use the word.

The medieval morality play provided a form of social information and control for the layman and, I suppose, looking back on those times we may consider that it was a useful piece of symbolism. We have not attempted to collect statistical data with respect to prayer and sacramental performances in our various religious organizations. Statistical data can tell us how long candles of different types may be expected to burn, but we cannot assess the impact of their burning upon the worshippers or the immortals their burning is supposed to impress. In many respects, today the courts are providing a morality play for the information of the public.

As statisticians, however, we would seem to be committed to the belief that the dramatic incident is not a valid guide to public policy decisions. This is a belief which emerges from our discipline. People with other disciplines (or lack of disciplines) may have other beliefs.

The value of the burning of candles is today in doubt. The value of the operations of the courts in the role of safeguarding the necessary functions of society is also coming into doubt. The moral absolutes based on beliefs no longer underpin our social system with a firm consensus. Yet we wish to find a means for the operation of those social controls which are essential to the development of man. Our questions should encompass not only the phenomena which we have come to term "crime," but should extend to investigations of morals and public policy. The data we may obtain from the operations of the various aspects of the judicial processes may be useful raw material for the study of some aspects of the social control system. But the judicial system is only a very small part of the total social control system which has developed as man has attempted to live in societies with other men, and the learning process has been slow.

The priority in criminal statistics is to provide a basis and a set of references for the study of social control processes, and this study is, I think, best attempted at this time by <u>sampling techniques related to basic research</u>. Perhaps such research could reveal the questions we should be asking. At this moment I cannot claim to know even the questions.

I look forward to enlightenment from other speakers this morning.

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