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INTRODUCTION

Statistical decision theory and probability theory stand on the verge of being capable of making significant contributions to legal decisionmaking. Increasingly more we are seeing statisticians providing the conceptual framework, research designs and expert testimony for cases related to both criminal and civil law. For the most part, those in the legal profession can be regarded as laymen in terms of social measurement. Thus the social statistician must be concerned with presenting findings in a manner and mode which is understandable to an audience of legal personnel. The lesser the ability to communicate findings (and how such findings were derived) then the less likely is it that social statistics will influence legal decision-making. Thus the findings should be both detailed and comprehensible. The graphics accompanying the findings should allow for emphasis and analysis.

In February 1976 issue of the American Statistician, Joseph Van Matre and william Clark note that: [However], statistics has not been

[However], statistics has not been utilized to any significant degree in some areas; the legal system, particularly the litigation process, would be included in such category...It is nevertheless, the authors' view that the statistician in the role of the expert witness will attract increased utilization from the legal profession in the future. After all, in many respects the trial is simply a search for probabilities. (p.2.)

Van Matre and Clark further note that jury discrimination cases are examples of legal problems that lend themselves to statistical inquiry. Finkelstein goes on to note that "in the more difficult jury discrimintation cases an informed judicial decision cannot be made without mathematical analysis of the underlying data."¹

In a paper delivered to the 70th Annual Meeting of the American Sociological Association, Nijole V. Benokraitis (1975) reminds us that although social science research has been limited in the area of jury service, there has been some empirical evidence of minimal black participation on juries (Stephenson, 1910; Hearings, 1966; Boags 1971; Broeder, 1965). Benokraitis also notes that since 1966 there has been a tremendous upsurge in filing affirmative jury suits, especially in the South and primarily by the American Civil Liberties Union. Thus, black participation in the jury selection process remains a problematic and controversial issue. This area of concern has been a source of interest primarily for attorneys and jurists, attracting minimal interest from social scientists.

According to David Kairys (1972) successful litigation challenging juror selection procedures arose after the Civil War and its progeny, the fourteenth amendment. Shortly after amendment ratification, the absence of blacks from state jury boxes was challenged on constitutional grounds in cases arising in the border states as well as states making up the Confederacy. Jury discrimination challenges until 1946 dealt with instances of racial exclusion or underrepresentation. The first case to expand the concept of unconstitutional exclusion to include other groups or classes within the population was <u>Thiel v</u>. <u>Southern Pacific Co.²</u> Kairys further reminds his readers that:

> Discrimination on the following bases other than race and ethnic background has been prohibited: economic, occupational or social status; religious belief; sex; political beliefs or values; age; and geography (p.780).

Thus, we can see that social statisticians and social scientists have played a limited, yet recently emerging role, in relation to legal decision-making. However, as noted by Van Matre and Clark:

> One may observe that certain types of cases often involve the consultation of statisticians; these include jury discrimination, anti-trust, trademark infringement, and litigation involving injured tort victims (p.2).

The principal focus in this paper will be on jury discrimination cases.

A FOCUS ON JURY DISCRIMINATION CASES Although everyone generally agrees that a fair jury, fairly chosen, is fundamental to our historic tradtions of justice, a former President of the American Bar Association remarked a few years ago that the subject of jury selection had, "in some inexplicable fashion," escaped the attention of the legal profession.³ Even judges are often not fully aware of the selection methods employed because they delegated broad powers to the court clerk or jury commissioner; and in practice these officials often operate independently of the judges so as not to impose additional burdens on already overextended courts. As further noted in the Committee on the Operation of the Jury System report:

> The principle that the courts should be vitally concerned with ensuring fair jury selection cannot be challenged. We note in this connection that the President's 1967 Civil Rights message to Congress stated, "creating respect for legal institutions becomes virtually impossible when parts of our judicial system operate unlawfully, or give the appearance of unfairness." (p.17).

In this regard, Kairys notes that the "history of jury selection in this country quite clearly reveals that vast segments of our population have been denied the right to serve on juries. Juries have become representative of the white, middle aged, suburban/rural middle class. Black, poor, and young people, and anyone who sees a need for basic change in the society find virtually no peers on our juries."⁴ This phenomenon is further compounded by the fact that the courts have not developed or formalized any measures of discrimination within the legal system. Instead, decisions about discrimination have been based largely on inferences drawn from the results of the jury selection process. Benokraitis notes that:

In <u>Blackwell v. Thomas</u> (4th Circ., 1973), however, the court accepted a more specific measure of discrimination based on the discrepancy between percentage blacks on the list, panel or box and percent black population: "...a disparity of 10 percent underrepresentation is sufficiently great to warrant an evidentiary exploration of how the jury selection statues are administered." (p.4).

Social scientists are thus playing a larger role in relation to challenging current jury selection procedures at various court levels. This level of applied research is principally concerned with determining the representation of particular cognizable groups in a specified geographic area and comparing this figure with the representation of these same cognizable groups in the juror pool for the same area. The intent then, is to note disparities if they exist, compute the statistical significance of such disparities, and to challenge the selection and representation of the system where such disparities do signal a statistically significant finding.

The focus in jury challenge work is on the <u>source</u> of the jurors, the <u>process</u> of selection, and the <u>results</u>. In isolation, and in toto, these three factors can be used to develop a <u>prima facie</u> case of discrimination in the selection procedure.

The primary audience of work done in jury selection and representation cases are legal personnel including judges, lawyers, court clerks, etc. For the primary audience a particular problem is related to comprehending the intrusion of statistical decision theory into legal decisions. Currently the court system has rather ambiguous standards for determining if a disparity is significant. The social scientist has the conceptual and methodological tools which can contribute to the development of reliable and valid standards. However, as noted by this author in another document⁵:

A particular problem for the social scientist is related to communicating in an understandable way with the primary audience of legal personnel (p.5).

ROLE OF STATISTICIAN

Relative to social scientists and statisticians working in concert with legal personnel to select "sympathetic" juries a number of charges have been made that the jurors thus chosen are "sociologically loaded dice" and that the procedure amounts to social science jury stacking. One of the initial efforts to make systematic use of the social sciences in jury selection was in federal court at Harrisburg, Pennsylvania, in 1971 and 1972, in conjunction with the trial of Daniel and Philip Berrigan. The social scientists involved designed a four-stage project consisting of the following:

- A random telephone survey of 840 residents to determine if the current pool of prospective jurors for the trial actually represented a cross-section of the community.
- (2) In-depth interviews with 252 people from the group of 840 to determine the attitudes and characteristics of the types of people likely to show up in the jury pool.
- (3) Observing the jurors during the trial.
- (4) A follow-up study to be conducted after the jury disbanded to reconstruct how each juror had felt about the defendants and how he had voted.

The other role that social scientists have played is in relation to challenging current jury selection procedures at various court levels. The work of such individuals as: David Kairys in Philadelphia County, Pennsylvania; Hayward Alker in the district court of Eastern Massachusetts; Philip Hart in Suffolk County, Massachusetts; Jay Schulman in Erie County, New York; and George Bardwell in the district court of Eastern Colorado, is instructive in this regard. The work of social scientists and statisticians in jury challenge cases has principally consisted of developing the conceptual framework, research designs, providing expert testimony, and supervising graphics presentations.

Van Matre and Clark further note that in addition to actually testifying as an expert witness the statistician may also be called upon to provide other expert assistance

> ...which is equally as valuable, such as (1) listen to the cross-examination; (2) study the deposition of an opposing expert; (3) assist the examiner in preparing questions for the opposing expert; (4) prepare reports explaining sampling and other statistical issues (5) collect and analyze related data derived from an independent source; (6) give the examiner positive and clear-cut recommendations and decisions with regard to such basic aspects as the adequacy of the sampling plan and the trustworthiness of the data derived from the sample (p.4).

As a specific example of tasks associated with jury challenge work, the following outlines the study procedures in Suffolk County, Massachusetts.⁶ The first step in the study was to establish a research design that would allow systematic study of the actual results of the juror selection process. Specifically, we wished to compare each of the relevant populations, i.e., census, resident list, jury lists, and persons actually summoned for jury duty for the most recent possible year.

The next step was to translate the 1970 census tract data into ward data. While the census tracts often coincide with wards, often they do not. To facilitate comparison with the resident list which is compiled by wards, the study team recompiled the census data by ward. Next a one

percent representative sample of the 1973 resident list was drawn. The sample was drawn pursuant to the order of Judge Kent Smith which granted the study team access to the city computer resources. Next a 5 percent random sample of the 1973 jury list was drawn. The final sampling step was to draw a 5 percent sample of the September 1973 to June 1974 juror pool. The sampling results were then compared with cognizable group representation in the universe comprised of the 1970 U.S. Census and statistical tests applied at the .01 level to determine whether disparities found were consistent with chance occurrence. Social graphics were then prepared and a courtroom presentation made which in combination with the Supreme Court ruling on barring women from jury duty, facilitated changes in the Suffolk County juror selection process.

Once the statistician-as-expert has satisfied himself that the area of interest is one which calls for his particular expertise, he must then prepare for his testimony. Careful cooperation between the expert and lawyer is essential to efficient use of the statistician-as-expert-witness. The questions directed to the expert in the courtroom will either be hypothetical or based upon the actual facts. In sampling-related testimony, the expert might be asked such questions as:

- How can you tell when you have good results and when you have bad results from a sample?
- 2. Did your client give you any instructions regarding what the results of your study were expected to be?
- 3. How was the sample size ascertained?
- 4. A wide confidence interval is really a large margin of error, isn't it?

David Kairys notes that the role of the expert is not confined to checking the accuracy of the mathematical computations. More importantly, an expert is necessary to explain the principles involved and to present the statistical evidence. The presiding judge must be convinced that the statistical principles are valid and be persuaded to receive the evidence. A court may balk at expert testimony which appears to be conclusive of the legal issues.

The expert witness must also be concerned with and aware of the ethical implications attendant to such work. The statistician faces the dilemma of whether he has an ethical responsibility to be totally neutral. Gibbons points out that:

It is essential that the statistician inform his employer of his neutral position on all strictly non-statistical aspects of the study before agreeing to undertake an investigation, as his position as an independent agent is considerably weaker once the study commences. (p.74).

The question of fees is also related to questions of ethical considerations. The statistician may consider serving as an expert witness on a contingent fee basis. However, one's objectivity may be questioned by the opposing attorney and jury if the expert has a financial stake in the outcome. The statistician should not act as an advocate, that is the lawyer's role. The statistician-as-expert witness can best serve himself and his employer by being neutral.

PUTTING TOGETHER THE REPORT

As noted earlier, to date the courts have not explicity defined at what point a disparity is significant. The role of the statistician should be to aid the courts in establishing standards which have as their basis sampling theory and statistical decision theory.

Three indispensable variables must be accounted for in determining the significance of a disparity. These variables are:

- The quantitative disparity between a group's representation in the population and the jury pool.
- (2) The size of the sample used to determine the proportions of the pool.

(3) The range at which the disparity occurs. Further, as Kairys notes in this regard:

There are simple, mathematically precise methods for making this kind of comparision and accounting for all relevant variables. These methods are neither new to the science nor so complex or advanced as to be impractical for use by the courts...

The mathematical method provides a means of defining the point at which a disparity between the population and the juror pool becomes significant by a computation of that disparity resulting if the

process were in fact unbiased. (p.786). The statistical inquiry thus usually involves sampling techniques, inferential statistics including non-parametrics, and partial correlation analysis. The chi square and binomial distribution are computations commonly used in jury challenge work.

However, the statistician must be concerned with these simple, yet precise, methods playing a role in legal decision-making. Mathematician, film-maker and graphic artist Ugo Torricelli has outlined a seven-step approach to visualizing complex statistical data⁸ which is of import here. The approach is outlined as follows:

- (1) Interaction
- (2) Graphic exposition
- (3) A two-dimensional visual field
- (4) A three-dimensional visualization
- (5) Dynamic evolution
- (6) Collateral documentation
- (7) Dramatization

The goal of this visualization of the simple, yet precise, statistical data generated in jury challenge work would be to enhance comprehension on the part of legal personnel as laymen in social measurement. For as Katz states in the February 1975 issue of the <u>American Statisti-</u> cian:⁹

It is to be hoped that in the future attorneys and judges will become more knowledgeable about chance, uncertainty, probability, statistical procedures, and statistical inference in the presence of uncertainty, so that the instructional phase of the statistician's testimony might be shortened (p.142).

Thus the report, and testimony, should be addressed to making clear the findings, how the findings were derived, and the accompanying tables, charts, maps, and graphs. The oral and written word should emphasize visualization and comprehension.

For example, in terms of sample selection the goal should be to explain the theory and process of sampling, in addition to attending to questions of the sample's relevance to the universe from which it was drawn. Katz notes that the presentation of the estimates of the prevalence of some condition in a large population derived from a sample survey requires extremely stringent application of the principles of sample selection, particularly of the treatment of nonresponse.

> Traditionally, opposition counsel have been quick to attack open possibilities, regardless of likelihood, as conceivable alternatives (Katz, p.138).

The social scientist or statistician should then be prepared with visual aids depicting the sampling process and sampling theory. Such visual aids as part of a courtroom demonstration should be reviewed with the attorney prior to courtroom implementation. This method of continuous interaction with legal personnel should begin with the employing attorney and continue through interaction with the presiding judge and cross examining attorney. The goal of the statistician in a neutral role should be to enhance comprehension on the part of all legal personnel concerned.

Likewise, an important consideration in any case is whether evidence derived from a sample survey is admissable under existing rules of evidence, the principal objection having been that the evidence is hearsay. As Katz notes, courts now admit samples or polls over the hearsay objection (a) on grounds that surveys are not hearsay and (b) on the grounds that surveys are within a recognized exception to the hearsay rule, or (c) without stating the grounds for admitting a survey.

The rules of evidence are thus important to know and understand by the statistician. Whether evidence is admissable if gathered through a sample survey, telephone polling, estimation procedure, etc., are items to know prior to beginning work. In this regard, the statistician should be aware of the distinction made between a sample of "objectively observable facts" and a poll of "views or attitudes."

The report should also clearly explain statistical tests of significance. A tendency here on the part of the statistician to utilize more elegant tests may work to his disadvantage. This problem may be addressed by finding the manner and mode of combining scholarly accuracy and complexity with the need of communicating results to audiences of non-specialists in social measurement,¹⁰ A more dynamic visualization of statistical tests and significance levels may provide a bridge between these antithetical stools.

Well conceived and designed social graphics can be useful in terms of aiding the visualization process. Once the source, process, and results have been determined, these findings can be formulated into a social graphic presentation aimed at making the selection process and resultant data comprehensible to the court. As noted by the author in a recent monograph:

> For the most part the graphics presented in jury challenge cases to date have been fairly standard twodimensional bar graphs, charts and tables. Because of the increasing importance in encouraging the court system to set standards for disparity, social scientists should become more aware of various forms and mediums for graphic presentation. An assumption here is that with more visual graphics comes a heightened level of comprehension, thus increasing the likelihood that standards for disparity will be adopted in the court system. (p.7).

CONCLUSION

The presentation of statistical evidence to a court composed of statistical laymen is often a challenge in itself. It is hoped that in the future attorneys and judges will become more knowledgeable about statistical decision theory and probability theory. Social graphics which enhance visualization may contribute to bringing about this knowledge. The findings should be both detailed and comprehensible. The graphics accompanying the findings should allow for emphasis and analysis.

In that legal personnel have primarily been in the role of information receivers, the social graphic format and medium should be designed so as to expand this role. For it will be at the point of comprehending the data and manipulating the data that legal personnel can "supply" the standards necessary to move the criteria for decision-making from the subjective and intuitive to the objective and quantifiable. As Benokraitis notes:

Since the "causes" of racially unrepresentative juries are seen to be residing in institutions rather than individuals, remedies for change must also be focused on institutional and situational arrangements, rather than seeking corrective programs or strategies for individual characteristics (p.18).

Thus the applied use of social statistics discussed in this paper can move to facilitate institutional change in the court systems. A prudent, clear, and effective use of social graphics can contribute to this movement to adopt objective standards for jury selection procedures.

NOTES

1. Finkelstein, Michael O. "The Application of

Statistical Decision Theory to the Jury Discrimination Cases," <u>Harvard Law Review</u>, Vol. 80, 1966, p.340.

- 2. 328 U.S. 217 (1946).
- As noted in <u>The Jury System in the Federal</u> <u>Courts</u>. Works of the Committee on the operation of the Jury System of the Judicial Conference of the United States (1966-1973), p.17. 1973.
- 4. Kairys, David. "Juror Selection: The Law, A Mathematical Method of Analysis, and a Case Study," <u>The American Criminal Law Re-</u><u>view</u>. Vol. 10, no. 4. (Reprint). p.801. Dec. 1972.
- Hart, Philip S. <u>Toward Social Graphic Approaches for Jury Selection and Representation Problems</u>. Monograph prepared with support of the Bureau of Social Science Research, Inc., Graphic Social Reporting Project. May 1975, p.5.
- <u>Report of Jury Study Suffolk County</u>. Commonwealth of Massachusetts, Superior Court Nos. 80793, 80794, and No. 75662, Dec. 1974.
- 7. Sources: Joseph G. Van Matre and Wm. N. Clark, "The Statistician as Expert Witness," <u>The American Statistician</u>, v. 30, no. 1, Feb. 1976; and transcript from the <u>Hearing</u> on Amended Motion to Dismiss the Indictment and to Strike Traverse Jury Venire. Commonwealth of Massachusetts, Suffolk Superior Court, December 2, 1974.
- As reported in Feinberg, Barry M., <u>Kinosta-tistics</u>: Communicating a Social Report to the Nation. Bureau of Social Science Research, Inc. December 1972.
- Katz, Leo. "Presentation of a Confidence Interval Estimate as Evidence in a Legal Proceeding," <u>The American Statistician</u>, v. 29, no. 4, November 1975, pp. 138-142.
- 10. See Biderman, Albert D. "Kinostatistics for Social Indicators," <u>Educational Broadcasting Review</u>, v. 5, no. 4. (Reprinted from October, 1971.) Biderman notes that an "important source of the failure (of social reporting) appears to be the tendency of the attempts to fall between two antithetical stools..." (p.14).

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- 9. Des Raj. <u>Sampling Theory</u>. McGraw-Hill, New York, 1968.
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- Note: This paper was accompanied by a 5-minute slide show depicting social graphics presented by social statisticians in various court cases.