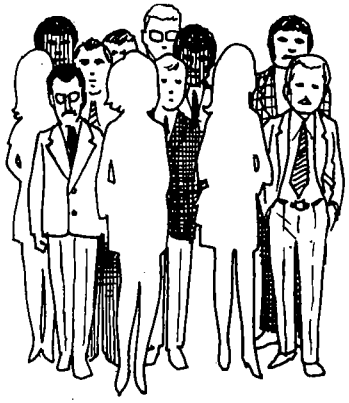

PARKING TICKETS AND MISSING WOMEN: Statistics and the Law

Hans Zeisel *University of Chicago*

Harry Kalven, Jr. *University of Chicago*

THE LAW'S traditional stance toward quantification and statistics was wittily expressed some years ago by one of its great professors, Thomas Reed Powell, who spoke of research in which thinkers don't count and counters don't think. By tradition, the concerns of the law have been qualitative and in large part based on the individual case; therefore, the thinker who would not count has been favored.

In recent decades, however, the law has shown some appetite for quantification, and we shall sketch some ways in which statistics has impinged on contemporary law.

PROOF BY DISPROOF OF COINCIDENCE

Perhaps the most striking use of statistics is to calculate the probability that a given event occurred by chance. The alternative explanation is that the

event occurred by intent or another identifiable cause, and the recourse to statistics is to refute or support the contention that the matter was simply a coincidence. Two examples are offered here, one simple, the other somewhat more complex.

Parking Tickets. The simple example comes from a Swedish trial on a charge of overtime parking. A policeman had noted the position of the valves of the front and rear tires on one side of the parked car, in the manner pilots note directions: one valve pointed, say, to one o'clock, the other to six o'clock, in both cases to the closest "hour" (see Figure 1). After the allowed time had run out, the car was still there, with the two valves still pointing toward one and six o'clock. In court, however, the accused denied any violation. He had left the parking place in time, he claimed, but had returned to it later, and the valves just happened to come to rest in the same positions as before. The court had an expert compute the probability of such a coincidence by chance, the answer was that the probability is 1 in 144 (12×12), because there are 12 positions for each of two wheels. In acquitting the defendant, the judge remarked that if all *four* wheels had been checked and found to point in the same directions as before, then the coincidence claim would have been rejected as too improbable and the defendant convicted; four wheels with 12 positions each can combine in 20,736 ($= 12 \times 12 \times 12 \times 12$) different ways, so the probability of a chance repetition of the original position would be only 1 in 20,736. Actually, these formulas probably understate the probability of a chance coincidence because they are based on the assumption that all four wheels rotate independently of each other, which, of course, they do not. On an idealized straight road all rotate together, in principle. It is only in the curves that the outside wheels turn more rapidly than the inside wheels, but even then the front and rear wheels on each side will presumably rotate about the same amount. (See Zeisel 1968.)

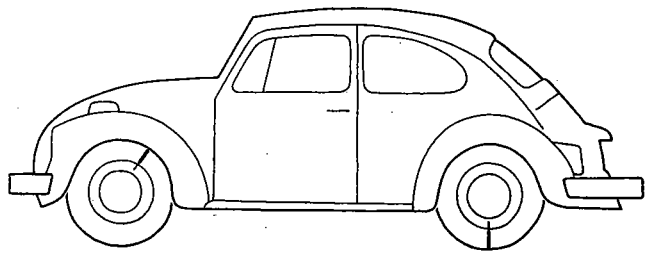

FIGURE 1

Schematic diagram of parked car with valves at 1 and 6 o'clock

Missing Women. The second example arose from the 1968 trial of the pediatrician-author Dr. Benjamin Spock and others in the U.S. District Court in Boston for conspiracy to violate the Selective Service Act by encouraging resistance to the war in Vietnam. In that trial, the defense challenged the legality of the jury-selection method. Although more than half of all eligible jurors in Boston were women, there were no women on Dr. Spock's jury. Yet he, more than any defendant, would have wanted some because so many mothers have raised their children "according to Dr. Spock"; moreover, the opinion polls showed women in general to be more opposed to the Vietnam war than men.

The question was whether this total absence of women jurors was an accident of this particular jury or whether it had resulted from systematic discrimination. Statistical reasoning was to provide the answer.

In the Boston District Court, jurors are selected in three stages. The City Directory is used for the first stage; from it, the Clerk of the Court is supposed to select 300 names at random, that is, by a lotterylike method, and put a slip with each of these names into a box. The City Directory is renewed annually by censuslike household visits of the police, and it lists all adult individuals in the Boston area. The Directory lists slightly more women than men. The second selection stage occurs when a trial is about to begin. From the 300 names in the box, the names of 30 or more potential jurors are drawn. These people are ordered to appear in court on the morning of the trial. The subgroup of 30 or more is called a *venire*. In the third stage, the one that most of us think of as jury selection, 12 actual jurors are selected after interrogation by both the prosecutor and the defense counsel. Figure 2 shows the percentages of women in some 46 such venires selected by all seven judges of the Federal District Court in Boston.

The average proportion of women drawn by the six judicial colleagues of the Spock trial judge was 29%, and furthermore, the averages of these six judges bunched closely around the group average. This suggests that the proportion of women among the names in the 300-name panels in the jury box was somewhere close to that 29% mark. But Figure 2 shows also that the Spock judge's venires had consistently lower percentages of women, with an overall average of only 14.6% women, almost exactly half of that of his colleagues.

It is *possible,* of course, that the selection method used by the trial judge was the same as that of his six colleagues. But what is the probability that a difference as large (or larger) as that between 14.6 and 29% could arise by chance? Statistical computation revealed the probability to be 1 in 1,000,000,000,000,000,000 that the "luck of the draw" would yield the distribution of women jurors obtained by the trial judge or a more extreme one. The conclusion, therefore, was virtually inescapable: the venires for the trial judge

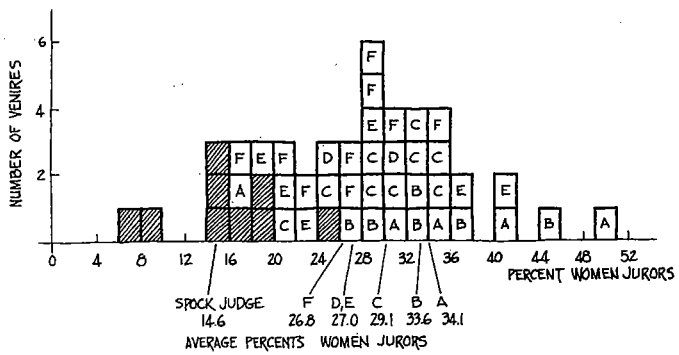

FIGURE 2

Number of venires by proportion of women (shaded blocks are for Spock judge venires; unshaded blocks are for other judges—A, B, C, D, E, F—of the Federal District Court in Boston). Averages are weighted by size of venire (not shown here). Source: Zeisel (1969)

must have been drawn from the central jury lists in a fashion that somehow *systematically* reduced the proportion of women jurors.

Thus the proportion of women among the potential jurors *twice* suffered an improper reduction—first, when the court clerk reduced their share from a majority in the City Directory to 29% in the jury lists and, second, when judge managed to lower the 29% to his private average of 14.6%. In the Spock trial, only one potential woman juror came before the court, and she was easily eliminated in stage 3 by the prosecutor under his quota of peremptory challenges (for which he need not give any reasons). (For further discussion see Zeisel 1969.)

ILLUMINATING DESCRIPTION

A second major use of statistics in the law is careful description. At times, it becomes relevant to measure, or at least to estimate within limits, some frequency, range, ratio, or level. Three examples will be given.

Juries and Judges. There has been perennial debate over the merits of the jury system, in particular over the differences between jury verdicts and the

verdicts that would have been arrived at by the judge alone. If judge and jury hardly ever differed, the jury would be a somewhat wasteful institution; if they differed too often, grave questions might be raised about the rationality of the jury, about the judge, and indeed about the meaning of justice under law.

This debate has been advanced by a statistical analysis of 3576 criminal jury trials in which the presiding trial judges reported how they would have decided the case without a jury. Table 1 shows a two-by-two distribution that was a fundamental outcome of the analysis. The boxed percents refer to the 78% (=14% + 64%) of the trials in which jury and judge agree on the verdict, 14% on acquittal and 64% on conviction. The remaining 22% are disagreements: 3% in which the judge would have acquitted but the jury convicted, and 19% in which the jury acquitted but the judge would have convicted. Note, in particular, that for those cases in which the jury finds guilt, the judge agrees nearly all (96%) of the time, but for the cases in which the jury acquits, the judge agrees only about 42% of the time. Thus the jury tends to have a softening effect.

The figures fall into a range that approaches neither of the extremes; that is, the jury is not superfluous, nor do juries and judges disagree intolerably. If the reasons for the jury's disagreement turn out to be understandable, as indeed they do, the statistics offer basic insights into the viability of the jury as an institution. The range of reasons that move a jury to disagree with the judge is wide: a sense of justice concerning the particular crime that does not coincide with the letter of the law, a different view of the weight of the evidence, special attitudes towards the particular defendant, and so forth.

Quality of Counsel. Another such illumination of a heretofore dark corner pertains to how adequately defendants in criminal jury trials are represented

TABLE 1. Percent Agreement* and Disagreement Between Jury and Trial Judge (3576 Cases = 100%)

	JURY	
JUDGE	Acquitted	Convicted
Acquitted	[14*]	3
Convicted	19	[64]

Source: Kalven and Zeisel (1966).
* Boxed percents show agreement.

TABLE 2. Quality of Counsel in Criminal Jury Trials

	PERCENT
Defense counsel superior to prosecutor	11
Abilities equal	76
Prosecutor superior to defense counsel	13
Total	100
Number of Cases	(3576)

Source: Kalven and Zeisel (1966).

in the courts. In recent years, there has been concern that all criminal defendants be represented at the various stages of the criminal process. Less attention has been paid to the quality of representation, although systematic disparity would be a disturbing commentary on the basic fairness of our administration of justice.

The statistics in Table 2 summarize assessment by the presiding trial judges mentioned above and are reassuring.

As we shall see below, inequality of counsel does affect the outcome of the trial, so it is comforting to learn that in over three-fourths of the criminal jury trials the ideal of the adversary system is realized: roughly equal champions on both sides. It is also reassuring to learn that in the remaining trials, the inequality goes in both directions about the same proportion of times. More complex questions might be raised about characteristics of the defendants who recruit superior or inferior counsel, but we do not treat of them here.

Automobile Injuries. One more set of descriptive data, despite its simplicity, provides insights and perspective on the functioning of a major part of the legal system, this time the law of torts. There is much debate these days over how well the law works to compensate the victims of accidents, especially automobile accidents. A recent elaborate study of auto accidents in Michigan revealed the distribution of reparations shown in Table 3.

The result may surprise those who assume that liability law is overwhelmingly the most important source of compensation for accident victims. As the figures indicate, this is no longer the case, and the importance of compensation from other sources suggests the feasibility of major legal reforms in the direction of insured compensation for damages irrespective of fault on anybody's part. Several states have adopted, at this point, "no-fault" automobile insurance.

TABLE 3. Sources of Reparation for Automobile Injuries in Michigan, 1958

	PERCENT OF TOTAL DOLLARS
Liability of third parties who had negligently caused the accident (mostly insured some uninsured)	55
Injured's own insurance	
Accident	22
Hospital and medical	11
Life and burial	5
Social security	2
Employer and Workmen's Compensation	1
Other	4
Total	100% (= $85,196,000)

Source: Conrad et al. (1964, p. 63).

SAMPLING

The above examples depend mostly on sampling rather than censuslike operations, and in the study of legal as well as other institutions, sampling has enormously facilitated the possibilities of quantitative studies.

Sampling also has invaded the very core of the legal system, the fact-finding process in court trials and in hearings before administrative agencies. An important reason is that sampling can replace the cumbersome, and sometimes impossible, complete count or census. For example, a company's share of the consumer market may be determined by auditing a sample of stores, and the degree to which two competing trademarks are confused may be determined by interviewing a sample of consumers.

The rules of evidence that guide the courts and, to a lesser degree, the administrative agencies, have sometimes made it difficult to bring in sampling and survey data. If the data are collected through personal interviews, the rule against hearsay evidence, coupled with the guarantee of anonymity that is obligatory in most interviewing, may stand in the way. Sometimes the court simply distrusts sampling operations altogether. Thus, in a California case, a department store instituted suit for overpayment of local taxes, and submitted an estimate for the amount in question of $27,000, based on a sample of sales slips. The court insisted on the full count, only to discover that the correct amount was $26,750. On the whole, however, sampling operations have become more and more acceptable.

CAUSE AND EFFECT

The most complex use of statistics in law is measurement of the effect of particular rules or institutions. We conclude with two examples of this kind.

Pretrial Hearings. The first example comes from a controlled experiment, designed to reveal whether the worrisome number of cases requiring trial

TABLE 4. Obligatory Versus Optional Pretrial

	OBLIGATORY	OPTIONAL
Average length of trial time of the cases that reached trial	8¼ hours	7¼ hours
Percent cases not settled, hence reaching trial	24%	22%

Source: Rosenberg (1964).

is being reduced by the procedure known as pretrial hearing. This is a hearing in which, prior to the trial proper, the litigants and their counsel are requested to appear before a judge to attempt to prepare the case so as to reduce the time required for its trial or to settle it there and then.

To learn whether pretrial hearings accomplish these aims, the state of New Jersey authorized an experiment: a random half of the filed suits were pretried as usual, but the other half were pretried only if one (or both) of the litigants requested it. This happened only in 48% of this half of the cases. The results of the experiment are summarized in Table 4. *Obligatory* pretrial achieved neither of its purposes and consumed court time, so the state of New Jersey decided to abolish it.

Effect of Counsel Quality. As a final example, we shall discuss a survey that gauges the effect of superior counsel in criminal trials. (A more detailed discussion appears in Kalven and Zeisel 1966.)

The survey data come from the real jury trials mentioned above; after each trial the presiding judge told us in confidence how he would have decided the case if it had been tried without a jury. We use the judge's private decision as a base line against which to compare the jury, under the working assumption that the judge is far less affected by the skill of counsel than is the jury. Table 5 summarizes the results of the survey.

The 88% in the upper left-hand corner of Table 5 has the following meaning: in those trials in which the judge would have acquitted and in which the defense counsel was superior to the prosecutor, the jury also acquitted

TABLE 5. Effects of Counsel Ability on Jury Verdicts in Criminal Cases

	DEFENSE COUNSEL SUPERIOR	ABILITIES EQUAL	PROSECUTOR SUPERIOR
Percent of cases where the judge would have *acquitted* that the jury acquitted	88%	82%	76%
Percent of cases where the judge would have *convicted* that the jury convicted	60%	78%	86%

Source: Kalven and Zeisel (1966).

in 88% of the cases. (In the remaining 12%, the jury convicted, thus acting in disagreement with the judge's private conclusions.) Moving one step to the right, we see that when the judge would have acquitted, but the defense counsel and prosecutor were equal in ability, the jury also acquitted less often, in 82% of the cases. That is in conformance with intuition because for this group of cases we would expect the jury to be less swayed in the direction of acquittal by the skills of the defense counsel. Moving one step more to the right, the 76% in the upper right shows that a superior prosecutor sways the jury away from acquittal by about the same amount that a superior defense counsel sways the jury toward acquittal (for cases in which the judge would have acquitted). The arithmetic is direct: $88 - 82 = 6$, and $82 - 76 = 6$.

The bottom row gives analogous information for those cases in which the judge would have *convicted*. When the defense counsel is superior, the jury also convicts in 60% of the cases; when the abilities are equal, the jury convicts more often, in 78% of the cases; when the prosecutor is superior, the jury convictions rise to 86%. Here the changes in percent agreements with the judge are larger than before and unequal, 18% and 8%.

We note also what we saw earlier, that when the judge would have acquitted, the jury agreed with the judge more often than when the judge would have convicted. For a symmetric comparison with respect to defense or prosecution superiority, it may be seen that 88% is greater than 86%, 82% greater than 78%, and 76% greater than 60%.

To temper the force of these estimates of counsel ability, it is useful to keep in mind Table 2, which showed that in most jury trials (76% of them) the quality of counsel on the two sides is about equal. Hence the *overall* impact of superior counsel on the outcome of jury trials is modest. Still, that is small consolation to the defendant with counsel of inferior ability who loses his particular case.

FINAL REMARKS

The foregoing examples illustrate the many ways in which statistics has begun to illuminate legal problems. Yet this compact recital of examples should not leave the impression that the law is quick to appreciate the power of statistics. On the contrary, statistics is only just beginning to enter the legal realm at rare and selected points. It finds its most ready acceptance in the trial courts and before the administrative agencies, in litigation in which the issues depend on counting and measurement. In constitutional adjudication and legislative action, however, the law typically states its issues in terms of principles that at least superficially appear to be less accessible to a statistical approach, but even here some progress is being made. (See the essay by Alker.)

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