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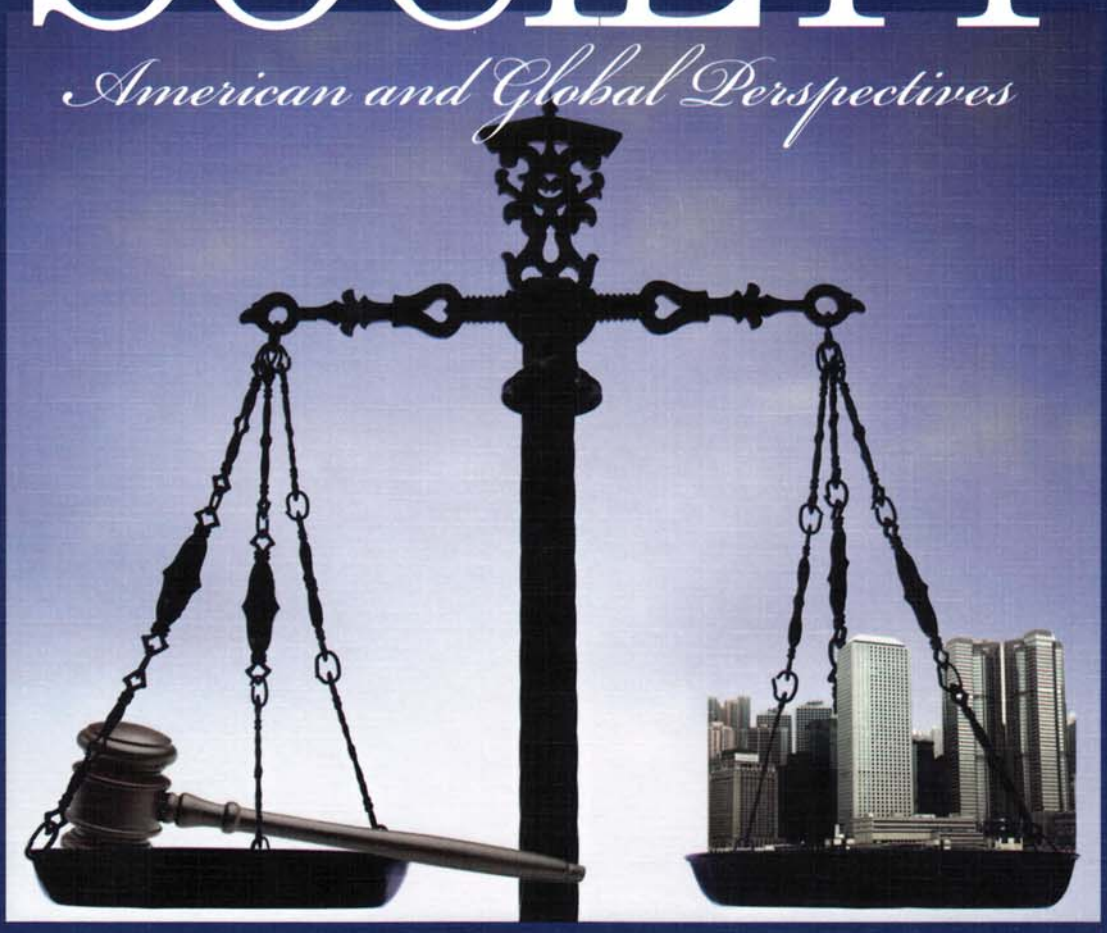
American and Global Perspectives



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as emanating from both infra- and suprastate entities in that world.

—*Martin Krygier*

See also Bentham, Jeremy; Custom and Law; Ehrlich, Eugen; Gap Problem; Hobbes, Thomas; Malinowski, Bronislaw; Morality and Law; Petrazycki, Leon; Pluralism, Legal; Positive Law; Positivism and Legal Science; Rule of Law; Weber, Max

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Statistical Inference

Inference is about using facts one knows to learn about facts one does not know. *Statistical inference* is about examining a small piece of the world to learn about the entire world, along with evaluating the quality of the inference one reaches. Researchers call the "small part" a sample and the "world" a population.

People confront statistical inferences almost daily. When they open a newspaper, for example, they may find the results of a survey showing that 70 percent (95% CI ± 5) of American voters have confidence in the U.S. president. Or they may read about a scientific study indicating that a daily dose of aspirin helps 60 percent (95% CI ± 3) of Americans with heart disease (95% CI ± is explained below).

In neither of these instances, of course, did *all* Americans participate. The pollsters did not survey every voter, and the scientists did not study every person with heart problems. They rather made an inference about all voters and all those stricken with heart disease by drawing a sample of voters and of ill people.

Samples and Sampling

Why analysts draw samples is easy to understand: it may be too costly, time-consuming, or even inefficient to study all the people in the target population—all voters or all people with heart disease. More difficult to understand is how researchers make a statistical inference (for example, 70 percent of all American voters have confidence in the president) and assess its quality (that is, indicate how *un*certain they are about the 70 percent figure, as indicated by the ± 5%). It is one thing, in other words, to say that 70 percent of the voters in the sample have confidence in the president; but it is quite another to say that 70 percent of *all* voters have confidence.

To support the first claim, all the analysts need to do is tally the responses to their survey. To support (and evaluate) the second, they must (1) draw a random probability sample of the population of interest and (2) determine how certain (or uncertain) they are that the value they observe from their sample of voters (70 percent), the *sample statistic,* reflects the population of voters, the *population parameter.*

A random probability sample involves identifying the population of interest (all American voters) and selecting a subset (the sample) according to known

probabilistic rules. To do this, a researcher must assign each member of the population a selection probability and select each person into the observed sample according to these probabilities. (Collecting all the observations is a special case of random selection with a selection probability of 1.0 for every element in the population.) Several different forms of random probability sampling exist, but the important point is that random selection is the only selection mechanism (in large-n studies, where n = number of participants) that automatically guarantees the absence of bias in the sample; that is, it guarantees that the sample is representative of the population. This is crucial because if a sample is biased (for instance, if Democrats had a better chance of being in the pollsters' sample than Republicans), researchers cannot draw accurate conclusions.

Inferences

Assuming researchers draw a random probability sample, they can make an inference about how well their sample reflects the population, or to put it another way, they can convey their degree of uncertainty about the sample statistic. Surveys reported in the press, for example, typically convey this degree of uncertainty as "the margin of error," which is usually a 95 percent confidence interval (or 95% CI). When pollsters report the results of a survey—that 70 percent of the respondents have confidence in the president with a ± 5 margin of error—they are supplying the level of uncertainty they have about the sample statistic of 70 percent. That is, the true fraction of voters who have confidence in the president will be captured in the stated confidence interval in 95 out of 100 applications of the same sampling procedure.

Note that this information does not say exactly where the population (parameter) lies within this range. What is critical, however, is that if the researcher continues to draw samples from a population of voters, the mean of the samples of voters will eventually equal the mean of the population, and if the mean of each sample is put on a graph, the resulting shape would resemble a normal distribution. This is what enables researchers to make an inference—here, in the form of a sample statistic and a margin of error—about how all voters (the population) feel about the president by observing a single sample statistic.

—Lee Epstein and Andrew Martin

See also Causal Inference; Court Caseload Statistics; Crime Statistics; Databases; Empirical Research Stategies; Prediction Studies; Questionnaires and Surveys; Reliability and Validity; Sampling

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Statistics

See Court Caseload Statistics; Crime Statistics

Stigler, George J. (1911–1992)

George Joseph Stigler was born in Renton, a small town near Seattle, Washington. He was one of the greatest economists of the twentieth century, influencing how scholars in every field of social science approached the study of law. One of his many honors, the Alfred Nobel Memorial Prize in Economic Science, was awarded to him in 1982 for his seminal studies of industrial structures, the functioning of markets, and the causes and effects of public regulation. Stigler thought his most important contribution was his theoretical work on the economics of information. Many scholars thought Stigler's most important scientific contributions were in the history of economic thought. Stigler was also a pioneer in the development of public choice economics.

His work exemplified the famous Chicago school of economics, of which he was one of the leading members and contributors. Some of the hallmarks of this school and Stigler's work are the employment of neoclassical