

CONTENTS

1. *Inventing Social Measurement* 1

Some time between Homer and Herodotus the Greeks invented voting to replace earlier methods for ascertaining the collective preference. First contributions to a theory of voting, and the discovery of paradoxes in consequence of such inquiry, emerged only a few years before the French Revolution in an early florescence of mathematical social science in the country that was shortly to revolutionize its system of physical measures. Elections are one kind of apparatus for measurement that has some analogy to weights and measures.

References 10

2. *Historical Metrology* 12

Concern for the accuracy of weights and measures and the attempt to maintain convenient and uniform standards and units are persistent themes in history. Our physical dimensions and techniques for measuring them are social constructs that were invented to solve social problems, and our systems of physical units have evolved through a complex social process that invites investigation by students of social change, class conflict, social movements, bureaucratization, and the sociology of knowledge, as is suggested by observations on the origin and diffusion of the metric system. I propose that the social history of measurement be extended to include social measurement.

References 36

3. *More Inventions* 39

A sociology of invention might identify basic ideas about social measurement and trace the techniques that evolved as elaborations of them. Among the fundamental inventions are several that precede the era of modern science or, at any rate, have their social roots in earlier periods. They include, in addition to (1) voting, (2) counting, to measure the size of the group or functional subdivisions of it, often as an

aid to taxation and levying of military forces; (3) valuing goods and services in units of some standard good, which was first accomplished without coins and currency but was later facilitated by monetary systems controlled by central authority; (4) defining and labeling social ranks or degrees, provision for which is found in early Greek and Roman constitutions; (5) appraising the quality of persons or performances by contests, games, examinations, and grading systems, as in the ancient Chinese civil-service examination system and the Greek athletic and poetry contests; (6) making awards or bestowing honors for merit or performance, and meting out punishments for criminal offenses or lesser transgressions when the magnitude of the reward or punishment is somehow calibrated to the degree of excellence, or the gravity of the offense. Modern ideas about (7) chance, conceived as measurable, objective probability, and (8) random selection and allocation, as devices for assuring fairness and/or representativeness, were anticipated in various ways by the ancients. The method by which Athenians designated members of their council (*boule*) in the fifth century B.C., for example, is tantamount to stratified random sampling, although there is no evidence that the Greeks had considered the possibility of calculating probabilities—an innovation made by the seventeenth-century demographer, John Graunt. Among the basic concepts of social measurement are several originating in modern times that are largely due to deliberate scientific investigation, although earlier social roots for some of them could perhaps be found. Index numbers, psychophysical scaling (and other such calibrations of human judgment), utility, measures of statistical distributions, and measures of properties of social networks are salient examples. The variety of uses of time measurement in social organization and social inquiry illustrates how concepts ordinarily taken to be “physical” also are central to quantitative social science.

References 113

4. *On Scales of Measurement* 119

The theory of scale types proposed in 1946 by S. S. Stevens focused on nominal, ordinal, interval, and ratio scales of measurement. Some of his examples of these types—notably those concerning psychological test scores—are misleading. Stevens’s equating of scientific classification with measurement on a “nominal scale” and his conse-

quent underemphasis on counting (which actually employs an absolute scale) has mischievous consequences when taken seriously by population scientists. There is no clear place in his theory for the probability scale which, like counting, is central to the population sciences as well as important for some parts of physics. Even an appropriately expanded typology of scales, however, is only one part of a theory of measurement, and that theory, just beginning to emerge, is not always helpful in understanding the attempts to measure made by the empirical or soft sciences.

References 155

5. *Measurement: The Real Thing* 157

Every science uses physical measures of some kind, most of which can be expressed in terms of the dimensions of length, mass, time, electric current, temperature, luminous intensity, amount of substance, and the plane and solid angles. While standards for the primary units of these dimensions are defined to a very high accuracy, in practice physical measurements (like social measurements) are highly error prone. Moreover, there are still some primitive sectors of physical measurement, like hardness and characteristics of fabricated objects. Still, social science, with the possible exception of economics, has no coherent system of measures, with powerful dimensional properties, like those available to the theoretical physicist.

References 170

6. *Psychophysics* 172

The method of magnitude estimation of sensation intensity, due to S. S. Stevens and used by him to establish the "psychophysical law" in the form of a power function relating sensation to stimulus magnitude, has been adapted to measures of values about which there is an approximation to a social consensus, such as the meaning of adjectives, the seriousness of crime, or the prestige standing of occupations. There is also some exploratory work proposing magnitude estimation as an alternative to L. L. Thurstone's method for scaling attitudes. The hope that magnitude estimation can provide a true ratio scale (analogous in its properties to, say, the Kelvin temperature scale) for social values and attitudes has not yet been realized, as is shown by an analysis of

the properties of the proposed scales in comparison with scales produced by other methods.

References 197

7. *Psychometrics* 200

Social science has made much use of statistical data derived from mental tests and has often adopted the classical psychometric techniques of correlation and factor analysis in constructing instruments. An example is the set of twelve Social Life Feeling Scales of K. F. Schuessler. Research producing them is considered to represent well the current state of the art. Statistics based on scales of this kind unavoidably confound the properties of the measuring device with aspects of the distribution of feelings (or attitudes, et cetera) in the population, thereby violating Thurstone's criteria of invariance and relevance. This is demonstrated with calculations on simulated data derived from a measurement model of Georg Rasch which keeps separate the parameters pertaining to the location of items and persons on the (latent) attitude continuum and those that reflect, as well, the statistical distribution of the population on that continuum.

References 218

8. *Social Measurement: Predicaments and Practices* 220

Some distinctive features of social measurement are our dependence on measures and measurement models borrowed from other sciences; the salience of the population concept, which leads to an emphasis on measurement by counting and on the measurement of individual variability; our consequent need for statistical models that recognize real variability as well as measurement error and stochastic behavior, paradoxically coupled with our backwardness in retaining obsolete statistical methods; the fact that the social process itself generates many of our measurements and limits what can be done in basic social science, which creates a set of challenging problems for a sociology of measurement; our willingness to "measure" almost anything that has a name, however thin the theoretical rationale or meager the measurement model; our enforced reliance on "indicators" and "indexes," or symptoms and composites. To understand our measures better, to improve

and rationalize them, we shall have to learn more about the culture of numbers and what it means for a society whose heritage it is.

References 239

Acknowledgments 241

Name Index 243

Subject Index 253