

QUANTIFICATION

Quantification is the act of giving a numerical value to a measurement of something, that is, to count the quanta of whatever one is measuring. Quantification produces a standardized form of measurement that allows statistical procedures and mathematical calculations. Quantitative research methods are based on a natural science, positivist model of hypothesis testing. In the social sciences these methods attempt to collect and analyze numerical data on social phenomena, seeking to understand the links between a relatively small number of attributes across a wide variety of cases. Thus, quantification is especially useful in describing and analyzing social phenomena on a larger scale.

THE RISE OF QUANTIFICATION

During the last centuries quantification has become immensely prevalent in the social sciences. Practices of quantification have been widely used in the West since the thirteenth century, and even before that. But only in the first part of the seventeenth century did the idea that social topics may be subjected to systematic quantitative analysis begin to acquire real dominance in Europe. These tendencies grew stronger during the nineteenth century, and by the first half of the twentieth century the “quantitative paradigm” had become extremely dominant in most of the social sciences, including economics, psychology, sociology, and political sciences.

There are a few prominent explanations for this growing use of quantitative measures in western society and in the social sciences in particular. First, the growing prominence and success of the natural sciences, especially physics, drove social scientists to imitate their use of quantitative measures in the hope of acquiring similar success and precision (see for example the 2002 book *How Economics Became a Mathematical Science*, by Roy Weintraub).

A second explanation emphasizes the rise of capitalism and the rational spirit in western societies, described by sociologist Max Weber in his 1905 book *The Protestant Ethic and the Spirit of Capitalism*. Weber describes a move toward a more rational, bureaucratic, and calculative life, and the increased tendency to quantify social entities and behaviors is well explained in light of these changes. Some scholars ascribe the proliferation of quantification mainly to the rise of the modern centralized state, in which public officials face the need to efficiently manage increasing populations and large-scale social institutions. Finally, in his 1995 book *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*, Theodore Porter suggests another interesting explanation. Porter argues that the tendency toward quantification in modern society is not so much a response to the success of the natural sciences,

as it is an attempt of weak professional groups to pacify social and political pressures for greater accountability. In other words, according to Porter, the surge of quantification in the social sciences was driven mainly by the desire to create an appearance of professionalism and gain legitimacy for social research and public policies.

THE MERITS OF QUANTIFICATION

Quantification holds prominent advantages to scholars and policy makers. Its advocates believe that it increases precision and generalizability, while minimizing prejudice, favoritism, and nepotism in decision-making. According to this view, the decontextualized and value-free mathematical symbols used in statistical analyses assist in achieving objectivity, stability, and fair judgment as decisions become more businesslike. In this sense the quantification and standardization of the social life have liberating and emancipatory effects.

Quantification is also economical. Many feel that in today's world, with the inevitable avalanche of numbers that arises from the growing state apparatuses and with the fast advancing information revolution, there is simply too much information to be efficiently handled with detailed qualitative descriptions. Trying to make complicated decisions without finding a way to reduce the amount of information to be considered may be overwhelming. Quantification, therefore, serves as a necessary tool for organizing and discarding information, making the flux of data more manageable. It recognizes that people have bounded cognitive skills and can only process limited amounts of information. Quantification saves time, helps in making sense and analyzing large datasets, and facilitates large-scale research, planning, managing, and decision-making. In light of these advantages, some scholars believe that every aspect of the social world can, and in fact should be quantified. Psychologist Edward Thorndike, for example, claimed at the beginning of the twentieth century that “Anything that exists exists in a certain quantity and can be measured” (Custer 1996).

THE SHORTCOMINGS OF QUANTIFICATION

But many disagree with this approach. First, critics of quantification claim that it sacrifices the substance and authenticity of the information. Transforming social experiences into standardized numbers leads to alienation and distances many groups from these experiences. It also allows decision makers to escape accountability, as numbers and statistics become refuge from personal responsibility. In that sense, quantification is actually a way of making decisions without seeming to decide, as decisions are left to the numbers. Quantification, according to its opponents, symbolizes the takeover of the market econ-

omy over social life, eliminating values of recreation and spontaneity. Another problem is that quantification facilitates the emergence of new categories such as “the nation” or “public opinion.” These terms are actually materializations of complex social actions and institutions, but in the process of quantification they turn into “things.” In the process of quantification, important information is lost for the sake of simplicity and calculability. But in areas such as environmental preservation, intimate relationships, identities, rights, and religion, these attempts often distort the nature of the category and fundamental qualities disappear. At the same time, the dominance of quantification also erases existing objects and relations, making some social phenomena, which cannot be quantified, practically invisible.

Finally, critics of quantification claim that it is often extended into areas in which it does not make statistical sense. This is especially true when measuring social entities, which are often flexible and subject to revision and change. For example social scientists often criticize the quantification of categories such as race and ethnicity, claiming that these are not real and stable entities, but rather fluctuating social definitions and classifications. This problem is exemplified in population censuses, in which some categories are invented and imposed on people by state officials, even when they do not coincide with personal identities and perceptions of self. In addition the interpretation of quantitative representations of social realities, such as race, fails to place these realities in the social context of the real world. This failure, in turn, may lead to misconceptions and erroneous judgments.

Despite these problems, quantification is clearly a process that cannot be avoided. It is an important and viable component of today’s social world, and there are few who would argue for returning to a prequantification world. Still, much more thought must be given to the problems of quantification and to its pitfalls. Researchers and policy makers must identify the places where it distorts the reality of social life and be much more cautious when applying it to social categories.

SEE ALSO *Alienation; Bureaucracy; Capitalism; Data; Demography; Ethnicity; Information, Asymmetric; Mathematics in the Social Sciences; Professionalization; Protestant Ethic; Race; Rationality; Science; Social Science; Social Science, Value Free; Weber, Max*

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QUANTITY INDEX

We begin our discussion of quantity indexes by setting up some basic notation: Let $p^0 = (p_1^0, \dots, p_n^0)$ be a vector of prices for n goods in period 0. Let $p^1 = (p_1^1, \dots, p_n^1)$ be a vector of prices for the same n goods in period 1. Similarly, let $q^0 = (q_1^0, \dots, q_n^0)$ and $q^1 = (q_1^1, \dots, q_n^1)$ represent quantity vectors for the n goods in periods 0 and 1, respectively.

Total expenditure in the two periods is the sum (across all n goods) of the prices multiplied by the corresponding quantities: $Y^0 = \sum_{i=1}^n p_i^0 q_i^0$ and $Y^1 = \sum_{i=1}^n p_i^1 q_i^1$.

Thus, the ratio of total expenditures in the two periods equals Y^1/Y^0 . If total expenditure is increasing from period 0 to period 1, then Y^1/Y^0 exceeds 1. If total expenditure is decreasing, then Y^1/Y^0 is less than 1. Total expenditure can increase from one period to another simply because prices are increasing. For example, suppose that the quantity vectors are identical in the two periods but the prices of all n goods increase from period 0 to period 1; then total expenditure will also increase.

Quantity indexes can be used to remove the effects of price changes in order to facilitate comparison of expenditures in different time periods. We will use the notation Q_{01} to denote a *quantity index* between periods 0 and 1. If the quantity index exceeds 1, then it means that expenditure is increasing from period 0 to period 1 after the effects of price changes have been removed. Similarly, if it is less than 1, then it means that expenditure is decreasing after the effects of price changes have been removed. In the context of national income accounting, quantity indexes can best be thought of as measuring changes in