

## How Real Are Statistics? Four Possible Attitudes\*

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REFERENCE to "reality" is a commonplace among both producers and users of statistics. This "reality" is understood to be self-evident: statistics must "reflect reality" or "approximate reality as closely as possible." But these two expressions are not synonymous. The very notion of "reflection" implies an intrinsic difference between an object and its statistics. In contrast, the concept of "approximation" reduces the issue to the problem of "bias" or "measurement error." Thus even these two common expressions, generally used without regard to consequences, tell us something important: a critical reexamination of this notion of "reality" is, for statisticians, an efficient way to reconsider the deepest-rooted but also the most implicit aspects of their daily work—precepts, tricks of the trade, justifications provided to users, and so on. This paper argues that the way in which producers and users of statistics talk about "reality" is informed by the fairly unconscious intermingling of several attitudes to reality. The mix of these attitudes and the links between them vary according to the circumstances—or, rather, according to the specific constraints prevailing in different situations. As it happens, the field of business statistics offers a representative spectrum of these various possible

(\*) This paper, which has been translated by Jonathan Mandelbaum, is a revised version of an article originally published in French in *La Lettre du Systeme Statistique d'Entreprise*, the in-house bulletin of INSEE (the French national statistical institute). The "business statistics" discussed are those supplied by national statistical institutes to describe the activity of enterprises. The accounting and statistical data produced and used in firms are discussed here only with regard to their use by statisticians and, subsequently, by economists.

attitudes to reality. However, we cannot say—despite their differences—that some are better than others since each is so closely associated with situational constraints specific to particular phases of the statistician's technical, administrative, or managerial work.

Four possible attitudes to reality (among others) will be discussed. First, we will describe them in a "pure" (hence certainly exaggerated) form. Next, we will see how they are applied to concrete situations. Each attitude has its *language*, that is, a register of words, requirements, and arguments; these are consistent, but difficult to interlink if one shifts from one attitude to another. Here is a list of the four attitudes ranked by "obviousness" (at least for statisticians; for other communities the order would, no doubt, be different):

- metrological realism;
- pragmatism of accounting (which may be "national" accounting);
- use of material from a database for argumentative purposes in social life or in quantitative economics and social sciences; and
- the explicit admission that the definition and coding of the measured variables are "constructed," conventional, and arrived at through negotiation.

Of these four attitudes, the first three may be qualified as "realistic," but each has different *reality tests*—that is, ways of verifying and articulating the substance of that reality and its independence from observation. The fourth attitude, instead, emphasizes the conventional and social character of statistical variables, and may thus be labeled as "constructivist." It mainly comes into play in situations marked by discontinuity, controversy, and innovation. We will now examine each attitude individually, spelling out their languages, origins, and conventions.<sup>1</sup> [...]

*Proof in Use*

[natural science  
and accounting]

We can distinguish these two initial forms of realism from a third form, which is implicit or explicit for the user outside the two universes where these two concepts of reality reign: the official statistical departments, and enterprises producing their accounts in a continuous flow. Typically, this user is a researcher, or a social player in the administrative, political, or economic sphere (notably in other enterprises). For users in this third group, "reality" is nothing more than the database to which they have access. Normally, such users do not want to (or cannot) know what happened before the data entered the base. They want to be able to trust the "source" (here the database) as blindly as possible to make their arguments—backed by that source—as convincing as possible.

We are confronted here with a "metadata paradox."<sup>3</sup> From a *normative* standpoint, users must be given a maximum of detailed information on the data-production process. It is also true that, from a *descriptive* standpoint (i.e., without passing judgment), many users do not welcome an abundance of metadata: "ideal" information is that which seems self-sufficient, without footnotes to interfere with the message. This unfamiliar field—generally

mentioned (if at all) with a touch of irony—would deserve to be studied in terms of *cognitive economics*—that is, in terms of the yield (cost-effectiveness) of a statistical argument. These issues cannot be dealt with in purely normative terms such as: *we must* supply metadata (which is, of course, true). A sociology of the social uses of the statistical argument remains to be developed. It would be especially helpful in exploring “quality” issues, often discussed in strictly normative fashion.

The examination of uses—the argumentative contexts in which statistical data are introduced—reveals a realism of the third kind, based on the consistency and plausibility of the results obtained. This is especially visible in the development of econometric methods. They provide many tools or arguments for an *internal validation* of a data set, without the need (at least in “normal” conditions) to examine the prior stages (the recording and coding of these “data”). Alas, contrary to what the etymology of the unfortunate term “data” suggests, very few “data” are actually “given”: they come with a high price tag, in both financial and cognitive terms. Coding always involves sacrificing something with a view to the subsequent use of a standardized variable, that is, an *investment in form* (Thévenot, 1984). This is comparable to the industrial investment needed to produce the standardized and mutually validating parts of a machine.<sup>4</sup> [...]

#### *The Three Realisms: Summary and Comparison*

To conclude this review of the three ways of being “realistic,” we can try to compare the reality tests that characterize them. The first is that of the pure statistician, trained in a probabilistic culture; this test is a remote descendant of the theory of measurement errors in eighteenth-century astronomy. The latter science regarded observations, however numerous, as independent of one another. The object’s reality and substance are proved by the normal distribution of error-ridden observations. A confidence interval can be presented in probabilistic terms. This metrology was imported into the social sciences through the sampling method. The astronomers’ basic hypotheses have been transposed to this new universe: statistical units are “homogeneous” (but the definition of this term is ambiguous, notably in the case of enterprises); the distributions of the variables studied do not diverge too significantly from the normal curve; and the law of large numbers can be applied. The central notion of this transfer is that—just as with the distributions of astronomical observations—the computed moments (averages, variances, correlations) have a substance that *reflects an underlying macrosocial reality, revealed by those computations*. Therein lies the essence of metrological realism.

Accounting realism is altogether different. It is internal to the enterprise. Accounting is already an aggregation, in monetary terms, of heterogeneous elements. Some of these are measured with certainty (cash positions, at least when the monetary unit is

reliable and stable); others are estimated with uncertainty and imply a degree of subjective probability. The choices of these values are guided by the two potentially contradictory requirements for prudence and for communication with other players. The main underpinnings of this approach are the "interdefinition" of the variables and their recording in balanced tables. Its overall realism is more pragmatic—in the sense in which we describe someone as "realistic"—than metrological. In any event, the two orders of realism are closely intertwined, and this combination forms the core of a practice of construction and use of quantitative data that differs from the statistician's approach.

The reality judgments of users represent yet another category. Here the technical and social divisions of labor, between the production and use of statistics, have engendered their social and technical effects. The data set is a black box whose input and output sides can be clearly distinguished, provided that the input side is perceived as meeting "quality standards." Today these are increasingly explicit and guaranteed, whereas they used to be more implicit. The user's trust in the data-production phase is a precondition for the social efficiency of the statistical argument. The reality test is provided by the consistency of the results and constructions issued from the data set.

Let us now stand back from these three forms of realism, which we have separated for analytical purposes. We can observe that, if "ultimate reality" is never accessible directly but only through different perception systems, then the three realisms come together in a single test—that of the consistency between the various perceptions. However, the three approaches contrast with a fourth, which, in its concern to reconstruct the chain of coding and measurement *conventions*, effectively challenges the reality of the objects. This attitude—which we may describe as *nominalist* or *constructivist*—generally does not result from a theoretical philosophical choice but arises in situations marked by controversy, crisis, innovation, and changes in the economic, social and

administrative contexts: this is indeed the situation in the 1990s and 2000s.<sup>5</sup>