

How to Lie with Statistics

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I'll face up to the serious purpose . . . beneath the surface . . . : explaining how to look a phony statistic in the eye and face it down; and no less important, how to recognize sound and usable data in that wilderness of fraud. . .

Not all the statistical information that you may come upon can be tested with the sureness of chemical analysis or of what goes on in an assayer's laboratory. But you can prod the stuff with four simple questions, and by finding the answers avoid learning a remarkable lot that isn't so.

WHO SAYS SO?

About the first thing to look for is bias—the laboratory with something to prove for the sake of a theory, a reputation, or a fee; the newspaper whose aim is a good story; labor or management with a wage level at stake.

Look for conscious bias. The method may be direct misstatement or it may be ambiguous statement that serves as well and cannot be convicted. It may be selection of favorable data and suppression

of unfavorable. Units of measurement may be shifted, as with the practice of using one year for one comparison and sliding over to a more favorable year for another. An improper measure may be used: a mean where a median would be more informative (perhaps all too informative), with the trickery covered by the unqualified word "average."

Look sharply for unconscious bias. It is often more dangerous. In the charts and predictions of many statisticians and economists in 1928 it operated to produce remarkable things. The cracks in the economic structure were joyously overlooked, and all sorts of evidence was adduced and statistically supported to show that we had no more than entered the stream of prosperity.

It may take at least a second look to find out who-says-so. The who may be hidden by what Stephen Potter, the *Lifemanship* man, would probably call the "O.K. name." Anything smacking of the medical profession is an O.K. name. Scientific laboratories have O.K. names. So do colleges, especially universities, more especially ones eminent in technical work. . . Please note that while the data came from Cornell, the conclusions were entirely the writer's own. But the O.K. name

helps you carry away a misimpression of "Cornell University says . . ."

When an O.K. name is cited, make sure that the authority stands behind the information, not merely somewhere alongside it. . . .

HOW DOES HE KNOW?

It turns out that the *Journal* had begun by sending its questionnaires to 1,200 large companies. Only fourteen per cent had replied. Eighty-six per cent had not cared to say anything in public on whether they were hoarding or price gouging.

The *Journal* had put a remarkably good face on things, but the fact remains that there was little to brag about. It came down to this: Of 1,200 companies polled, nine per cent said they had not raised prices, five per cent said they had, and eighty-six per cent wouldn't say. Those that had replied constituted a sample in which bias might be suspected.

Watch out for evidence of a biased sample, one that has been selected improperly or—as with this one—has selected itself. Ask the question we dealt with in an early chapter: Is the sample large enough to permit any reliable conclusion?

Similarly with a reported correlation: Is it big enough to mean anything? Are there enough cases to add up to any significance? You cannot, as a casual reader, apply tests of significance or come to exact conclusions as to the adequacy of a sample. On a good many of the things you see reported, however, you will be able to tell at a glance—a good long glance, perhaps—that there just weren't enough cases to convince any reasoning person of anything.

You won't always be told how many cases. The absence of such a figure, particularly when the source is an interested one, is enough to throw suspicion on the whole thing. Similarly a correlation given without a measure of reliability (probable error, standard error) is not to be taken very seriously.

Watch out for an average, variety unspecified, in any matter where mean and median might be expected to differ substantially.

Many figures lose meaning because a comparison is missing. An article in *Look* magazine says, in connection with Mongolism, that "one study shows that in 2,800 cases, over half of the mothers were 35 or over." Getting any meaning from this depends upon your knowing something about the ages at which women in general produce babies. Few of us know things like that. . . .

Sometimes it is percentages that are given and raw figures that are missing, and this can be deceptive too. Long ago, when Johns Hopkins University had just begun to admit women students, someone not particularly enamored of coeducation reported a real shocker: Thirty-three and one-third per cent of the women at Hopkins had married faculty members! The raw figures gave a clearer picture. There were three women enrolled at the time, and one of them had married a faculty man. . . .

Sometimes what is missing is the factor that caused a change to occur. This omission leaves the implication that some other, more desired, factor is responsible. Figures published one year attempted to show that business was on the upgrade by pointing out that April retail sales were greater than in the year before. What was missing was the fact that Easter had come in March in the earlier year and in April in the later year.

A report of a great increase in the deaths from cancer in the last quarter-century is misleading unless you know how much of it is a product of such extraneous factors as these: Cancer is often listed now where "causes unknown" was formerly used; autopsies are more frequent, giving surer diagnoses; reporting and compiling of medical statistics are more complete; and people more frequently reach the most susceptible ages now. And if you are looking at total deaths rather than the death rate, don't neglect the fact that there are more people now than there used to be.

DID SOMEBODY CHANGE THE SUBJECT?

When assaying a statistic, watch out for a switch somewhere between the raw figure and the conclusion. One thing is all too often reported as another.

As just indicated, more reported cases of a disease are not always the same thing as more cases of the disease. A straw-vote victory for a candidate is not always negotiable at the polls. An expressed preference by a "cross-section" of a magazine's readers for articles on world affairs is no final proof that they would read the articles if they were published.

Encephalitis cases reported in the central valley of California in 1952 were triple the figure for the worst previous year. Many alarmed residents shipped their children away. But when the reckoning was in, there had been no great increase in deaths from sleeping sickness. What had happened was that state and federal health people had come in in great numbers to tackle a long-time problem; as a result of their efforts a great many low-grade cases were recorded that in other years would have been overlooked, possibly not even recognized. . . .

"The British male over 5 years of age soaks himself in a hot tub on an average of 1.7 times a week in the winter and 2.1 times in the summer," says a newspaper story. "British women average 1.5 baths a week in the winter and 2.0 in the summer." The source is a Ministry of Works hot-water survey of "6,000 representative British homes." The sample was representative, it says, and seems quite adequate in size to justify the conclusion in the San Francisco *Chronicle's* amusing headline: BRITISH HE'S BATHE MORE THAN SHE'S.

The figures would be more informative if there were some indication of whether they are means or medians. However, the major weakness is that the subject has been changed. What the Ministry really found out is how often these people said they bathed, not how often they did so. When a subject is as intimate as this one is, with the British bath-taking tradition involved, saying

and doing may not be the same thing at all. British he's may or may not bathe oftener than she's; all that can safely be concluded is that they say they do.

Here are some more varieties of change-of-subject to watch out for.

A back-to-the-farm movement was discerned when a census showed half a million more farms in 1935 than five years earlier. But the two counts were not talking about the same thing. The definition of farm used by the Bureau of the Census had been changed; it took in at least 300,000 farms that would not have been so listed under the 1930 definition. . . .

The "population" of a large area in China was 28 million. Five years later it was 105 million. Very little of that increase was real; the great difference could be explained only by taking into account the purposes of the two enumerations and the way people would be inclined to feel about being counted in each instance. The first census was for tax and military purposes, the second for famine relief. . . .

The *post hoc* variety of pretentious nonsense is another way of changing the subject without seeming to. The change of something *with* something else is presented as *because of*. The magazine *Electrical World* once offered a composite chart in an editorial on "What Electricity Means to America." You could see from it that as "electrical horsepower in factories" climbed, so did "average wages per hour." At the same time "average hours per week" dropped. All these things are long-time trends, of course, and there is no evidence at all that any one of them has produced any other.

And then there are the firsters. Almost anybody can claim to be first in *something* if he is not too particular what it is. At the end of 1952 two New York newspapers were each insisting on first rank in grocery advertising. Both were right too, in a way. The *World-Telegram* went on to explain that it was first in full-run advertising, the kind that appears in all copies, which is the only kind it runs. The *Journal-American* insisted that total lineage was what counted and that it was first in that. This is the kind of reaching for a superlative that leads the

weather reporter on the radio to label a quite normal day "the hottest June second since 1949."

Change-of-subject makes it difficult to compare cost when you contemplate borrowing money either directly or in the form of installment buying. Six per cent sounds like six per cent—but it may not be at all.

If you borrow \$100 from a bank at six per cent interest and pay it back in equal monthly installments for a year, the price you pay for the use of the money is about \$3. But another six per cent loan, on the basis sometimes called \$6 on the \$100, will cost you twice as much. That's the way most automobile loans are figured. It is very tricky.

The point is that you don't have the \$100 for a year. By the end of six months you have paid back half of it. If you are charged at \$6 on the \$100, or six percent of the amount, you really pay interest at nearly twelve per cent. . . .

Sometimes the semantic approach will be used to change the subject. Here is an item from *Business Week* magazine.

Accountants have decided that "surplus" is a nasty word. They propose eliminating it from corporate balance sheets. The Committee on Accounting Procedure of the American Institute of Accountants says: . . . Use such descriptive terms as "retained earnings" or "appreciation of fixed assets."

This one is from a newspaper story reporting Standard Oil's record-breaking revenue and net profit of a million dollars a day.

Possibly the directors may be thinking some time of splitting the stock for there may be an advantage . . . if the profits per share do not look so large. . . .

DOES IT MAKE SENSE?

"Does it make sense?" will often cut a statistic down to size when the whole rigmarole is based on an unproved assumption. You may be familiar with the Rudolf Flesch readability formula. It

purports to measure how easy a piece of prose is to read, by such simple and objective items as length of words and sentences. Like all devices for reducing the imponderable to a number and substituting arithmetic for judgment, it is an appealing idea. At least it has appealed to people who employ writers, such as newspaper publishers, even if not to many writers themselves. The assumption in the formula is that such things as word length determine readability. This, to be ornery about it, remains to be proved.

A man named Robert A. Dufour put the Flesch formula to trial on some literature that he found handy. It showed "The Legend of Sleepy Hollow" to be half again as hard to read as Plato's *Republic*. The Sinclair Lewis novel *Cass Timberlane* was rated more difficult than an essay by Jacques Maritain, "The Spiritual Value of Art." A likely story.

Many a statistic is false on its face. It gets by only because the magic of numbers brings about a suspension of common sense. Leonard Engel, in a *Harper's* article, has listed a few of the medical variety.

An example is the calculation of a well-known urologist that there are eight million cases of cancer of the prostate gland in the United States—which would be enough to provide 1.1 carcinomatous prostate glands for every male in the susceptible age group! Another is a prominent neurologist's estimate that one American in twelve suffers from migraine; since migraine is responsible for a third of chronic headache cases, this would mean that a quarter of us must suffer from disabling headaches. Still another is the figure of 250,000 often given for the number of multiple sclerosis cases; death data indicate that there can be, happily, no more than thirty to forty thousand cases of this paralytic disease in the country.

Hearings on amendments to the Social Security Act have been haunted by various forms of a statement that makes sense only when not looked at closely. It is an argument that goes like

this: Since life expectancy is only about sixty-three years, it is a sham and a fraud to set up a social-security plan with a retirement age of sixty-five, because virtually everybody dies before that.

You can rebut that one by looking around at people you know. The basic fallacy, however, is that the figure refers to expectancy at birth, and so about half the babies born can expect to live longer than that. The figure, incidentally, is from the latest official complete life table and is correct for the 1939–1941 period. An up-to-date estimate corrects it to sixty-five-plus. Maybe that will produce a new and equally silly argument to the effect that practically everybody now lives to be sixty-five. . . .

You are entitled to look with the same suspicion on the report, some years ago, by the American Petroleum Industries Committee that the average yearly tax bill for automobiles is \$51.13.

Extrapolations are useful, particularly in that form of soothsaying called forecasting trends. But in looking at the figures on the charts made from them, it is necessary to remember one thing constantly: The trend-to-now may be a fact, but the future trend represents no more than an educated guess. Implicit in it is “everything else being equal” and “present trends continuing.” And

somehow everything else refuses to remain equal, else life would be dull indeed. . . .

. . . in 1874, Mark Twain summed up the nonsense side of extrapolation in *Life on the Mississippi*:

In the space of one hundred and seventy-six years the Lower Mississippi has shortened itself two hundred and forty-two miles. That is an average of a trifle over one mile and a third per year. Therefore, any calm person, who is not blind or idiotic, can see that in the Old Oölitic Silurian Period, just a million years ago next November, the Lower Mississippi River was upward of one million three hundred thousand miles long, and stuck out over the Gulf of Mexico like a fishing-rod. And by the same token any person can see that seven hundred and forty-two years from now that Lower Mississippi will be only a mile and three-quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and a mutual board of aldermen. There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact.

DISCUSSION QUESTIONS

1. Peruse the daily paper (or magazine) and find a report about some new study that makes a statistical or numerical claim. What claim does the headline make? Now ask yourself if these claims are reliable after you answer the four questions Huff poses.
2. Picking from some popular media form, take two research claims based on statistics. Elect one that you find credible and one that seems suspicious in its claims. What makes one credible and the other not? How do Huff's arguments help you decide which statistical “facts” are reliable?
3. We live in an increasingly information-based society. Why do we put so much faith in numerical arguments in such a society? What has led to the development of such a society? How do you see this evolving in the future?
4. Knowledge is power, so the saying goes. In an information-based society those without numerical literacy (i.e., the ability to understand and interpret numerical claims) risk being powerless. What groups are most vulnerable to this? What are the sociological factors that create this vulnerability?

INTERNET RESOURCES

Suggested Web URLs for Further Study

<http://www.hartford-hwp.com/archives/index.html>
World History Archives. Online resources and historical facts from around the world.

<http://www.socsciresearch.com/>
Research Resources for the Social Sciences.

<http://www.odci.gov/cia/publications/factbook/>
The World Factbook 2000. Hosted by the CIA.
Contains basic facts from around the world.

InfoTrac College Edition

You can find further relevant readings on the World Wide Web at

<http://sociology.wadsworth.com>

Virtual Society

For further information on this subject including links to relevant Web sites, go to the Wadsworth Sociology homepage at

<http://sociology.wadsworth.com>