Statistics: Advantage or Potential Minefield

By ROBERT J. GRIFFIN

Like most folk s, reporters sometimes cringe when they encounter statistical information, even that generated by their own news-gathering efforts. For example, when the *Milwaukee Journal* discovered last fall that a graph accompanying its story on single-parent households had incorrectly presented some census data, the editor involved observed that he approaches any story based on statistics, done under deadline pressure, as "a potential minefield."

If data is provided by someone outside the news organization, the minefield can become truly explosive, as *Time* magazine discovered to its dismay after running the ill-fated cover story on "cyberporn"

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this past summer.

Time's July 3 piece on Internet pornography was based on a flawed and unrepresentative study that had not been peer-reviewed. This study grossly overestimated the amount of pornography available on the Internet The cyberporn episode illustrates, reporters from any media who do not think critically about information-be it verbal or numeric-which they get from sources can find themselves and their audiences misled. Part of the problem, as Jerry Adler commented just a year earlier (*Newsweek,* July 25, 1994, p. 56), is that magazine researchers "by and large consider their job done when they find a number that can be attributed to a credible source."

Since it seems so easy to misstep, wouldn't it be better just to avoid using statistics in stories? Given the use (and misuse) of data by all sorts of news sources, the advent of computer-assisted reporting, and ready access to statistical analysis packages, the need for journalists to deal competently with numbers and the scientific methods that generate them is certainly not going away. In fact, it seems that capable reporters with computer and statistical acumen might have a real advantage' in the tight journalistic job market, according to a recent article in *Quill* (Christopher J. Feola, "Making the Cut," March, 1995, pp. 24-26).

Environmental journalists in particular can find some real news-gathering advantages in the combined use of databases, surveys, and statistical analyses.

For example, hazardous chemicals are quite common in communities of all sizes. Reporters can use the computerized Toxics Release Inventory (TRI) database to discern trends and make key comparisons about the release of these chemicals into· the environment locally and nationally. (A fine guidebook, *Chemicals, the Press, and the Public,* discusses some of the strengths and weaknesses of TRI data and is available free to reporters from the National Safety Council's Environmental Health Center in Washington, D.C.)

Assessing public reactions to health risks from hazardous chemicals and other potential pollutants has become an increasingly important part of environmental policy debates. Often, those most at risk from pollution have relatively little political or economic clout. Knowing survey techniques could help reporters shed light on a couple of key questions for just about any community:

- What risks are acceptable to the people who must, for example, live near the local plant that provides jobs 'but spews pollutants?
- Given that those who live in industrys' backyard are typically poorer and less educated, how aware are they of possible danger from chemicals and what to do about these dangers?

If properly conducted, surveys can gather information that reflects the public's views on health risks and other environmental issues, views which are essential to the development of good public policy. Such views usually are not well-represented by the posturing of politicians, bureaucrats, special interest groups, public hearing testifiers, talk-show callers, petition signers, op-ed writers, or writers of letters to the editor.

Of course, gathering any information and assessing its value are only part of a journalist's job. Interpreting the meaning of information for audiences is yet another task. This task can be daunting, especially when information is statistical and such a large portion of the general public seems to suffer 'from "innumeracy," (a term coined by Temple University mathematics professor John Allen Paulos to describe the widespread problem of mathematical illiteracy.)

Given that most reporters are much more likely to encounter data provided by others than to generate it themselves through techniques such as surveys, the ability to think critically about data encountered in the news can be a valuable ability on any beat. Journalists who engage in statistical reasoning instead of holding data at arm's length can do a lot to help audiences understand the news.

Statistical reasoning is the application of a basic set of logical rules of evidence based in the sciences. A serious error in statistical reasoning occurs when people assume that one thing causes another simply because the two correlate.

A case in point: this past summer an environmental activist group claimed that the large number of nuclear power plants surrounding the Great Lakes coupled with the high incidence of breast cancer in the region demonstrate danger from nuclear power plants.

Informal observation showed that some local media covered the story in the point-counterpoint way usually applied to political coverage-by conveying the allegations and then reporting that various experts disagreed with them.

However, other Milwaukee news media illustrated right away the faulty statistical reasoning involved in assuming causality from correlation. One local television station, for example, quoted an epidemiologist who explained that urbanization around the Great Lakes is the likely culprit, contributing to both the cancer rate and the demand for power met by building nuclear plants.

In general, statistical reasoning involves much more "reasoning" than "statistics." For journalistic purposes, statistical reasoning commonly concerns:

- The kinds of evidence required to show that one thing causes another (e.g., carefully ruling out other explanations lurking behind the scenes);
- The representativeness and generalizability of research findings (e.g., appropriately using some form of random sampling in surveys and especially not drawing conclusions about a group from one or two cases);
- Probability (e.g., carefully interpreting risk estimates, properly applying a margin of error to survey results);
- Basic statistical rules, especially rules for making fair comparisons (e.g., when comparing changes in the tons of trash produced in various cities, remembering the importance of

the denominator by accounting for differences in the population growth of each community).

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To serve the needs of the audience, most journalists should become more skillful in using and analyzing statistical information as well as more adept at translating the meaning of this information of audiences.

As educators and professionals, what can we do? Here are some suggestion:

1. Journalism schools should assess how well statistical literacy is integrated into the curriculum at all levels.

If a good portion of journalists are having trouble with statists, much of the fault might lie in the traditions of the journalism academy. For decades this system has subtly written off journalism students as innumerate, often with encouragement from the students themselves, and has therefore failed to helop journalists develop the necessary conceptual tools.

Journalism education, it seems, has been guided by what Lee Becker and Joseph Graf call "the myth [that] journalism is a career for those with math deficiencies" (*Myths and Trends: What the Real Numbers Say About Journalism Education,* The Freedom Forum, 1995, p. 11). This study shows that journalism students score well on the verbal portion of the Scholastic Aptitude Test. However, instead of being a bunch of math dummies, journalism students do, in fact, reflect the national average on the math portion of the SAT. Therefore, they should be able to handle the basics of statistical methods and reasoning as applied to the work of journalism-and probably have been able to do so for years.

The challenge to journalism education is to teach "numeracy" throughout the professional curriculum rather than just relegating statistics instruction to an isolated course students might take in the math or psychology department. (A stats course, however, does provide an essential base.) Statistical reasoning should be integrated thoroughly into reporting courses-at least as well as law, ethics, and the other liberal arts drawn from the rest of the university-so that students can learn how to apply it in everyday contest of news reporting.

"It's time to let the secret out," as Paulos says in his book *A Mathematician Reads the Newspaper*, (p. 3). "Mathematics is not primarily a matter of pluggin numbers into formulas and performing rote computations. It is a way of thinking and questioning that may be unfamiliar to many of us, but is available to almost all of us."

2. Journalists should consider refreshing their statistical reasoning skills and applying those skills more rigorously to the news.

Taking refresher courses in statistics, precision journalism, computer-assisted reporting and the like would be the fast track. There are some other very good resources as well:

- Read and keep nearby Victor Cohn's two books, *News & Numbers* (Iowa State University Press, 1989), and *Reporting on Risk* (The Media Institute, 1990), and also Philip Meyer's *The New Precision Journalism* (Indiana, 1991). Both Cohn and Meyer are former

journalists (Cohn was a science writer) with a knack for statistics, clear writing, and good advice.

- For a quick read, try Arnold Barnett's article "How Numbers can Trick You" in Technology Review (October 1994, pp. 38-45).
- For amplification, read John Allen Paulos' recent book *A Mathematician Reads the Newspaper* (Basic Books, 1995), his earlier *Innumeracy* (Vintage, 1988), and Cynthia Crossen's *Tainted Truth: The Manipulation of Fact in America* (Simon & Schuster, 1994).
- To keep up-to-date, point your Internet web browser to the home page of math professor Laurie Snell's Change project (http://www.geom.umn.edu/locate/chance) at Dartmouth College. The online Chance Newsletter, designed to help statistics instruction, contains a wealth of examples of the use of statistics in current news stories.

In applying statistical reasoning skills, reports should demand that statistical and other evidence presented in the news is enlightening, no misleading. Reporters also should insiste that evidence has been gathered in an ethical manner. These demands would apply to information provided by sources and that gathered by their own news organizations. That can be a big order, but there are some places to start.

Surveys are a very common-and sometimes misused-source of statistical information. Various sources, such as Phil Meyer's *The New Precision Journalism*, provide guidelines for the kinds of information reporters should gather about the method used in a survey to help them and their audiences assess its validity.

Similarly, journalists can also help audience become more savvy about statistics and the scientific methods that generate them. The *Minneapolis Star-Tribune*, for example, ran an article by Sandra Y. Lee ("Untrue Facts," Nov. 28, 1994, p. 1E), reprinted from *McCall's*, about how people accept distorted statistics. The article included a guide with questions designed to help readers sort out what to believe in surveys and similar studies. Questions included:

- Who was surveyed or studied?
- How many people were surveyed and how many responded?
- How were the questions worded?
- How was the problem defined?
- Who paid for the study?
- Was the study published in a peer-review journal such as the *New England Journal of Medicine*?

Answers to these and other essential questions (e.g., were the interviewees in a sample survey chosen in some random manner-and, if so, what is the survey's margin of error?) should be readily available to reporters from the text of the study's report or from the organization which conducted the study. One very important way for reporters to apply statistical reasoning is to use a sample survey's margin of error directly to interpret the results for audiences (e.g., it the difference in support for the incumbent and the challenger greater than what the sampling error would produce?). This is more useful to readers than simply reporting the margin of error at the end of the story and hoping audiences can figure out its application.

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There are some unethical practices in survey research which reporters should be aware of. The most worrisome capitalize on others' innumeracy and borrow the scientific aura of good surveys to lend credibility to slipshod or self-serving efforts. Recently the Research Industry Coalition, which is comprised of 15 organizations including the American Association for Public Opinion Research (AAPOR) and the National Association of Broadcasters, took a stand against the most salient abuses:

- Soliciting contributions or payments, selling products, or using survey participants to generate sales leads under the guise of conducting a survey;
- Revealing the identity of individual participants (e .g., survey interviewees) without prior, informed consent;
- Depicting "call-in" polls as representing the views of the general public.

It might be disconcerting to see a reference to what is an all-too-common media practice, the call-in poll, in this rogues gallery. A call-in poll often will ask audience members to initiate phone calls to a central number to indicate their stance on a particular issue in the news. The problem is that the call-in poll, like any kind of study based on self-selection and individual cases, is not itself generalizable to the big picture. Call-in polls may yield some individual examples (e .g. , some quotes) but they provide poor evidence of trends.

Compounding the problem is that cal l-in polls probably seem quite legitimate and representative to the public unless those who report these polls go out of their way to counteract that misperception. For example, the Research Industry Coalition recommends that the following disclaimer accompany the reports of call-in polls: "These 'polls' represent the opinions of only those people who have called or written in, and not the general public."

As the primary professional and scholarly association in public opinion research, AAPOR has developed a set of voluntary standards of good practice for conducting surveys-standards which the organization is currently reviewing.

3. Since much evidence about journalists' encounters with statistics is itself anecdotal, we still have much to learn. Intelligence on the current state of the art is still tentative. We need to get more systematic information, from the journalist's point of view, about their experiences with statistical information in the news (e .g. , what are the most common or vexing problems they face when dealing with data?). We need to explore how journalism schools can do a better job teaching statistical reasoning and other intellectual software that should accompany the news-gathering power brought about by the newsroom computer.

There is no doubt, however, that the need to apply statistical reasoning to data and other forms of evidence can occur on just about any reporter's beat. Environmental reporters in particular play an increasingly important role as interpreters of complicated statistical and technical information to audiences, information which can help to enlighten debates over some of the most vexing public policy issues.

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