

People Count: The Social Construction of Statistics

I really appreciate the opportunity to speak at Augsburg College. Milo Schield invited me to give a talk at a session at the American Statistical Association's meeting last August. I had not realized before that session that there was a Statistical Literacy movement or that Augsburg College was the intergalactic center of that movement. (Audience laughs) I was very excited to learn this and I'm really interested in seeing what comes of your efforts.

What I'd like to do tonight is give you a sense of my slant on statistical literacy and identify what I think the potential problems that confront the movement might be. The title that I'm using is: *People Count*. That title is intended to evoke the notion that statistics are products of social activities. There's a tendency in our culture to believe that statistics – that numbers – are little nuggets of truth, that we can come upon them and pick them up very much the way a rock collector picks up stones. A better metaphor would be to suggest that statistics are like jewels; that is, they have to be selected, they have to be cut, they have to be polished, and they have to be placed in settings so that they can be viewed from particular angles. All of that is work that people do. Any number that we come across is evidence that somebody has gone about counting something. That means that it was a social process, that there were people involved, that somebody, for some reason, in some way, counted something and produced a number. This may seem obvious, but that obvious process tends to get ignored most of the time when we talk about statistics.

Now, I'm going to use a bit of jargon here. Sociologists would call this process *social construction*. What we mean by that is simply there is human activity when people count things, that all numbers are products of such human activity. *Social construction* is a term that became fashionable starting in the mid-sixties. It began in sociology but then spread to a bewildering variety of disciplines: science studies and literary theory, and so on. The term means different things in different disciplines. For some people, *social construction* has become a synonym for bogus, fraudulent, phony, made-up, fictional, or whatever. That's not my point. My point is not that bogus statistics are socially constructed. My point is that *all statistics are socially constructed*, in the sense that people make them. Now I want to spend a little time examining one example. It is of course easy to find terrible examples of statistics. Some of them are very funny and the temptation is to give you a lot of those. I'm resisting that temptation because Milo told me I can only talk for twenty minutes. (Audience laughs) So I'm going to pick a pretty good statistic: not a perfect statistic as we'll see, but one I would consider to be a pretty good statistic.

I read the Wilmington News Journal. I live in Delaware. Delaware's a small state; we have only two daily newspapers. The Wilmington News Journal is the best of these. Still, it's a fairly small paper, and it prints a lot less than all the news. In April 2001, there was a front-page story in the Wilmington News Journal that said that this week, in the Journal of the American Medical Association (also known as JAMA), researchers reported that 30 percent of children in grades 6 through 10 have moderate or frequent involvement in bullying.* Now, this is the kind of report that the news carries all the time. In fact, almost every Wednesday – the day the new issue of JAMA comes out – the media carry stories summarizing newsworthy articles in its pages.

The question is: How did this statistic about bullying find its way into my morning newspaper? Well, the Wilmington News Journal got the story from the Associated Press. Does the Associated Press pay a reporter to read each week's issue of JAMA? No, of course not. Instead, JAMA sends out press releases to alert the media about newsworthy articles. Why does JAMA do this? Because it enhances the journal's visibility; it gives those of us who are civilians the sense that JAMA is a happening journal. It encourages us to think that JAMA is an outlet for important research, and that research reported in JAMA is therefore important. Do they send out press releases for all their articles? I don't think so. The editors decided that the article on bullying might be newsworthy. The author, the team of authors

actually, was probably delighted to get this paper in JAMA because their work would appear in a big-time journal. They could publish in the Minnesota Medical Review but, all things considered, they'd probably rather be in JAMA, because it's a more visible venue. This was a huge study, it had something like 15,000 people in its sample, so it was an enormously expensive piece of social research; it had to be bankrolled by the federal government. I'm sure that the government agency that paid for the research was pleased when the results appeared in a journal of JAMA's stature and even happier when those findings found their way to a wide range of popular media, including the Wilmington News Journal. This was, in short, a visible statistic.

Now let's just pause and do a little thought experiment. I said that 30 percent of students in grades 6-10 had moderate or frequent involvement in bullying. Suppose the finding had been 10 percent. What happens? Ten percent – that's one third as much. Would the Wilmington News Journal still have run this story, do you think? Would it still strike the paper's editors as newsworthy? Would the Associated Press carry it? Would JAMA put out a press release? Would JAMA select the article for publication, or would the paper wind up in the Minnesota Medical Review? Would the funder be as happy? We can suspect not. Of course, we can't do an experiment to find this out, but we can suspect that everyone involved in this process, from the funders to editors of the Wilmington New Journal would prefer that the researchers come up with a big number. Now I'm not talking about fraud. I'm not talking about coloring the white mice black or doing some of things that we've read about in major scientific scandals. I'm just pointing out is that there are some results that would make people happier than other results. So, how do you produce those results?

Here's a definition from the Justice Department. What is bullying? "Bullying can take three forms: physical (hitting, kicking, spitting, pushing, taking personal belongings); verbal (taunting, malicious teasing, name calling, making threats); and psychological (spreading rumors, manipulating social relationships, or engaging in social exclusion, extortion, or intimidation)." We're talking about people in grades 6-10. Does anyone remember junior high school? (Audience laughs) I mean, what else do people do at that age? (Audience laughs) The amazing thing is that they couldn't come up with more than 30 percent (Audience laughs).

The data in this study come from two questions, well actually, four questions. Question one: Have you been bullied? Question two: If so, how often? Choices: Never, Once or twice a term, Sometimes, Once a week, More than once a week. Question three: Have you bullied other people? Question four: Again, if so, how often? Now you can think about the students' answers to these questions as producing a kind of pie of data. And one might cut this pie in different ways.

How did the authors cut the pie? Well remember I've been talking about "involvement in moderate or frequent bullying." What does that mean? Well first of all "involvement" means that you could be either a bully or a "bully-ee." They counted both. And what does "moderate or frequent" mean? Well, the authors defined frequent bullying as occurring once a week or more often. Moderate bullying was defined as occurring "sometimes" – whatever that means. Now, if you cut the pie that way, including both bullies and victims, both moderate and frequent bullying, we get our 30 percent figure.

But suppose we cut the pie a different way. Suppose we just took the people who were frequent victims of bullying – just the victims, and just those who said this happened at least once a week. What does that get us? Eight percent. How do I know this? I read the article. All of this information is in the article. The authors are not trying to conceal anything. They're making it clear. They explain their methods. They explain their definitions. There's no deception involved. On the other hand, which figure makes its way into the papers' abstract? Thirty percent. Which figure finds its way into the press release? Thirty percent. Which figure finds its way into the Wilmington News Journal? Of course – 30 percent. My point is that this is a piece of very high quality research done by social scientists working for the federal government under federal auspices with federal money, doing what they're doing about as well as it's usually done. And even so, we can see that you don't want to just take the fact of 30 percent

and run to the bank with it. Rather you need to interrogate that number a little bit, you need to think about it, you need to wonder what it really means. That's what I mean when I suggest that statistics are socially constructed.

When people like Milo are suggesting that we need *statistical literacy*, what they're saying is that our students need more than traditional statistical instruction. Because a traditional statistics class works the following way: it concentrates on what I would call matters of calculation. That is, the class is organized into series of units of about different statistical tests. As each unit is introduced, you're given the logic and the theory behind some statistical test. You're shown how to calculate it, or at least how to run it through a software package, and you're given information on how to interpret the results, and when you finish that unit, you move on to the next test. That's what statistics classes teach. But that's not what I'm talking about, is it?

I'm talking about simple stuff. I'm talking about percentages, proportions, ratios, and rates. This is the kind of thing that statistics instruction views as beneath contempt. It's the sort of thing that gets handled, if handled at all, in the first week of the introductory statistics course and then it's assumed that "Hey, we all know this stuff. We can move on." Yet those of us who spend our time talking with students know full well that, in fact, this isn't something they all understand. Many students do not have a good grasp of what these concepts mean. Their confusion affects the way they read the newspaper, it affects the way that they vote, and it affects the way that they understand the world around them.

So let's get behind *statistical literacy*. But there's a problem. Here is a humbling graph. [Figure 1 about here] I created this myself. These are my own statistics and you can judge my methods. I logged on to the ERIC database. (ERIC is the principal database covering the educational literature.) I simply entered the term "critical thinking," and I charted the number of hits for this term in the ERIC database for each year from 1981 to 2001. You may remember that, in the late 1980's, critical thinking was very large on college campuses. There was a big critical thinking movement. If you think about it, critical thinking is a far, far better cause, a far better slogan than *statistical literacy* will ever be. Absolutely everybody in academia believes that they personally are critical thinkers, and they will tell you, every last one of them, that critical thinking is a valuable skill and, by golly, we ought to be teaching students to be critical thinkers. And in fact, in the 1980's the graph shows that interest in critical thinking rose dramatically and then, what happens? It levels off, then begins to fall. This is a familiar pattern. I teach a course on fads and fashions and this is what I would call the standard fad graph. Sharp increase – peak – then starts back down again. This is hula-hoops, this is Total Quality Management, (Audience laughs) and it turns out it was critical thinking as well. How is that possible? How is it possible that something that everybody believes in--and believes is important--would start to taper off like that? The answer, I think, is that nobody owns critical thinking. What do I mean by that?

Some years ago I wrote a piece about four crime problems that emerged in the late 1980's: stalking, freeway violence, wilding, and hate crimes. All of these came to public attention in the period between 1985 and 1990. They all got tremendous press coverage right at the start. Two of them – freeway violence and wilding – have been forgotten. But the other two – hate crimes and stalking – have been institutionalized. We've got federal laws against stalking and hate crimes; we've got state laws; we've got federal agencies making money available to support research, we've got the whole nine yards. How did that happen? The answer is that somebody took over those crimes; somebody assumed ownership. Somebody cared. Somebody promoted it. Somebody was there pushing people to pay attention to those two crimes. Wilding and freeway violence didn't have that.

So the question is; "**Who's going to take responsibility for statistical literacy? Who is going to own statistical literacy?**" Now, I'm going to give you three bad answers.

The first bad answer is, “*We’re all going to own it.*” Recall that we all owned critical thinking. Look how that worked. If everybody owes it then nobody owns it. That’s not going to work.

The second bad answer is *statisticians*. I don’t think that’s going to work either. Consider this example. This is a page from the first issue of the American Sociological Review that I ever received. [Figure 2 about here] I joined the American Sociological Association when I was an undergraduate in 1966 and, as a member, I had a subscription to the ASR. And here’s a very typical page from an ASR article published in 1966. I just pulled the oldest issue I had off the bookshelf and picked this page as fairly typical. This page has three tables on it. Each one of the tables has nine or twelve cells. The numbers in the cells are percentages. There’s a little chi-square test at the bottom. Even if you don’t understand what chi-square is, you can still read that table and figure out what it means.

Here’s a page from the ASR this last year. [Figure 3 about here] I call this figure “Custer’s Last Stand.” I have no idea what it is. (I should confess, by the way, that I know very little about sophisticated statistics. If we had a statistics bee, I’d probably be the first one in the room to have to sit down.) So I don’t know what this is. But it’s an example of the kind of scholarship that’s now published in sociology’s leading journal.

This is a more typical page from a recent ASR. [Figure 4 about here] It is certainly elaborate. This is an “un-standardized coefficient from the random effects special lag-regression of homicide rate on political competition and party factionalism estimating using the instrumental variables method.” Now it used to be possible to print articles from the American Sociological Review in anthologies that were aimed at introductory sociology students. You can see how you could do that with 1966 page that I showed you. Clearly, it ain’t possible to do that anymore. There are only six people in the country that understand what that table means. (Audience laughs) We like to think that this reflects the advance of scholarship. What it really reflects is the democratization of computing. Because we now have powerful computers on our desks and statistical software packages that allow us to produce tables like this and so it’s become very easy to move from the cross-tabulations of 1966 to today’s regression-based statistics. But this progress comes at a price. The people who teach statistics love this stuff. This is what they live to teach. This is what’s important to them – being on the cutting edge, teaching students to master ever more arcane techniques. But this also means that statistical literacy is not what they live for or even something that’s important to them. So I don’t think statisticians are going to be the owners of the statistical literacy problem. Okay, I promised you three solutions.

A third solution is a parochial one. I’m a sociologist. *Sociologists* could become the owners of statistical literacy. If you listen to me talk, you can see that I view social construction as at the core of statistical literacy. In my view, when we think about statistics, we should think about them in terms of the social activities of the people who producing the numbers. It’s a sensible way to go. But I’m not confident that sociologists are going to be interested in assuming ownership either and I think there are a couple of reasons for this. First, statistical literacy doesn’t seem very much like what we do. We have courses on social problems, social inequality and other substantive things. We don’t have courses with names like statistical literacy.

And there is a second problem: Although people have been generally kind toward my book (Damned Lies and Statistics, University of California Press, 2001), the people who have been the most critical have been sociologists. Their critique of the book is that I pick unfortunate examples. Not that they’re not true examples, but they’re not politically-correct examples. Now I want to say that, in writing the book, I very carefully made sure that this book would offend everyone. I made an effort to make it unsettling to as many people as possible and in as even-handed way as possible. But for some sociologists, that’s troubling. My book features bad statistics used by feminists. Some critical sociologists say, in effect, “You really shouldn’t do that because we’re on the side of feminists. Feminists are good. We shouldn’t criticize statistics used by feminists. We should pick bad statistics from the RJ Reynolds Corporation. That would be okay.” But I don’t think that’s going to work. I

think that once you give your students a set of critical tools to evaluate statistics, the sad thing is they are not going to apply those tools only to the statistics that are produced by the tobacco industry; they're going to notice when other people, people that you may like, produce bad statistics. Sociology has become an increasingly politicized discipline, and I suspect that some sociologists would, then, be uncomfortable owning statistical literacy.

So I'm concerned about the future of statistical literacy. I believe in this cause. I think it's a great project. I think that what you're doing here at Augsburg is very impressive – particularly the breadth of involvement from people in many different disciplines. I think that is very promising. On the other hand, sooner or later, somebody is going to have to assume ownership of statistical literacy and I consider this to be a still unanswered question: Who's that going to be? Thank you.

Note

*The JAMA article discussed in this talk is: Tonja R. Nansel, et al.. "Bullying Behaviors Among U.S. Youth," Journal of the American Medical Association 285 (April 25, 2001): 2094-2100.

Citations for the figures

Figure 2: Philip M. Marcus, "Union Conventions and Executive Boards," American Sociological Review 31 (1966): p. 66.

Figure 3: John Robert Warren, et al., "Occupational Stratification Across the Life Course," American Sociological Review 67 (2002): p. 446.

Figure 4: Andres Villarreal, "Political Competition and Violence in Mexico," American Sociological Review 67 (2002): p. 492.