

another. Information stacked in time makes it difficult to understand context and evaluate relationships. Visual reasoning usually works more effectively when the relevant evidence is shown *adjacent in space* within our eyespan. This is especially the case for statistical data, where the fundamental analytical task is to make comparisons.

The statistical graphics produced by PowerPoint are astonishingly thin, nearly content-free. In 28 books on PP templates, the 217 model statistical graphics depict an average of 12 numbers each (as do the PP data table templates). Compared to the worldwide publications shown here, the PP statistical graphics are the thinnest of all, except for those in *Pravda* in 1982, back when that newspaper operated as the major propaganda instrument of the Soviet communist party and a totalitarian government.<sup>3</sup> Doing a bit better than *Pravda* is not good enough:

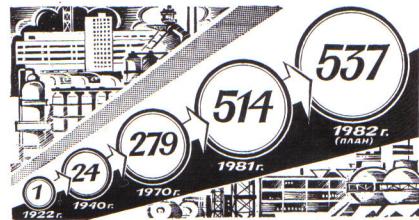
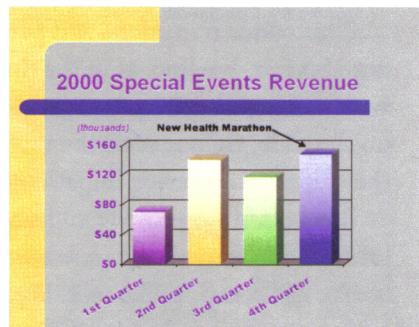
MEDIAN NUMBER OF ENTRIES IN DATA MATRICES FOR STATISTICAL GRAPHICS IN VARIOUS PUBLICATIONS, 2003

<i>Science</i>	> 1,000
<i>Nature</i>	> 700
<i>New York Times</i>	120
<i>Wall Street Journal</i>	112
<i>Frankfurter Allgemeine Zeitung</i>	98
<i>New England Journal of Medicine</i>	53
<i>Asahi</i>	40
<i>Financial Times</i>	40
<i>The Economist</i>	32
<i>Le Monde</i>	28
28 books on PowerPoint presentations (1997–2003)	12
<i>Pravda</i> (1982)	5

These PP graph templates are particularly unfortunate for students, since for all too many their *first* experience in presenting statistical evidence is via PP designs, which create the impression that data graphics are for propaganda and advertisements not for reasoning about information.

And, in presenting *words*, impoverished space encourages imprecise statements, slogans, abrupt and thinly-argued claims. For example, this slide from a statistics course shows a seriously incomplete cliché. In fact, probably the *shortest true statement* that can be made about causality and correlation is “*Empirically observed covariation is a necessary but not sufficient condition for causality.*” Or perhaps “*Correlation is not causation but it sure is a hint.*” Many true statements are too long to fit on a PP slide, but this does not mean we should abbreviate the truth to make the words fit. It means we should find a better tool to make presentations.

<sup>3</sup> In this table, the medians are based on at least 20 statistical graphics and at least one full issue of each publication. These publications, except for scientific journals, tend to use the same graph designs issue after issue; thus replications of several of the counts were within 10% of the original result. Data for other publications (*Pravda*, for example) are reported in Edward R. Tufte, *The Visual Display of Quantitative Information* (1983, 2001), 167.



*Pravda*, May 24, 1982.

