How to Lie with Statistics

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The title for this column is borrowed from Darrell Huff’s 1954 book, How to Lie with Statistics. The book was revisited in a 2005 issue of Statistical Science and acknowledged as “the most widely read statistics book in the history of the world” (p. 205). While laced with humor and written in a causal style, the text also contains substantial intellectual content. A quick Internet search for the text listed it as required reading on recent courses such as Quantitative Reasoning 32 at Harvard University and Statistics 21 at the University of California. The first illustration in the book is a cartoon of two men talking and the dialogue reads, “Don’t be a novelist, be a statistician. Much more scope for the imagination.” Listening to my graduate students talk about their struggles with statistics classes I suspect more than a few view the subject as an imaginative creation designed to challenge their intellect. In our sister publication, Gifted Child Quarterly, the authors take great care to present their data accurately and to support their findings and recommendations with sound statistical reasoning. Most K-12 students probably do not encounter such in-depth statistical analysis in their readings but they still need the skills to understand the data they encounter.

The American Statistical Association’s (AMSTAT) Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report seeks statistical literacy for all. While you may not know (or remember from your stats classes) all the different statistical terms and tests you read about in research journals, our world is such that we consistently encounter data as part of an effort to influence the choices we make. In their 2004 book, Math though the Ages, Bertlinghoff and Gouvêa describe probability and statistics as two sides of the same coin. Probability seeks to understand characteristics of an unknown sample of a known collection (what is the chance of...), while statistics seeks to extend our understanding of an unknown population from data collected from a small sample. Unfortunately the distinctions between the two sides of the coin are often blurred.

Statistics and probability first appear in the Common Core State Standards for Mathematics in the middle school curriculum and include the following topics and skills:

**Grade 6**
- Develop understanding of statistical variability.
- Summarize and describe distributions.

**Grade 7**
- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use, and evaluate probability models.

**Grade 8**
- Investigate patterns of association in bivariate data.

**High School Statistics & Probability**
- Interpreting categorical and quantitative data
- Making inferences and justifying conclusions
- Conditional probability and the rules of probability
- Using probability to make decisions

Waiting until middle school to introduce the statistical tools and concepts children need to make sound decisions does a disservice to all and denies our gifted students the opportunity to engage in critical thinking and seek answers to their research questions. AMSTAT offers additional resources for K-12 classroom teachers. Information on their programs in summarized in a PDF flyer at http://amstat.org/education/pdfs/EducationResources.pdf.

As a discipline, Statistics is young. Bertlinghoff and Gouvêa’s chapter on the history of Statistics (pp. 215-222) begins with an English shopkeeper’s work in 1662 and the new field of “Political Arithmetic.” Others who shared an interest in developing an understanding of the “mathematics of uncertainty” include Halley, Bernoulli, Fisher, Galton, Gauss, Laplace, Legendre, Pearson, Quetelet, and Tukey among many others. Fisher’s 1925 book, Statistical Methods for Research Workers, served as guide for many generations. Fisher writes about a summer tea party in Cambridge, England, and a women who tells the guests she could detect a

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difference between a cup of tea that had milk added after the tea was poured and one in which milk was added to the cup first. Dismissed by most in attendance, Fisher designed an experiment to test her statement. It is a great conversation or lesson starter for your students, and for you! For more on the growth of statistics as a discipline see The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century, by David Salsburg.

References

Resources