

Panel Session: Awareness and Quality Improvements for the Joint ASA/NCTM Poster Competition

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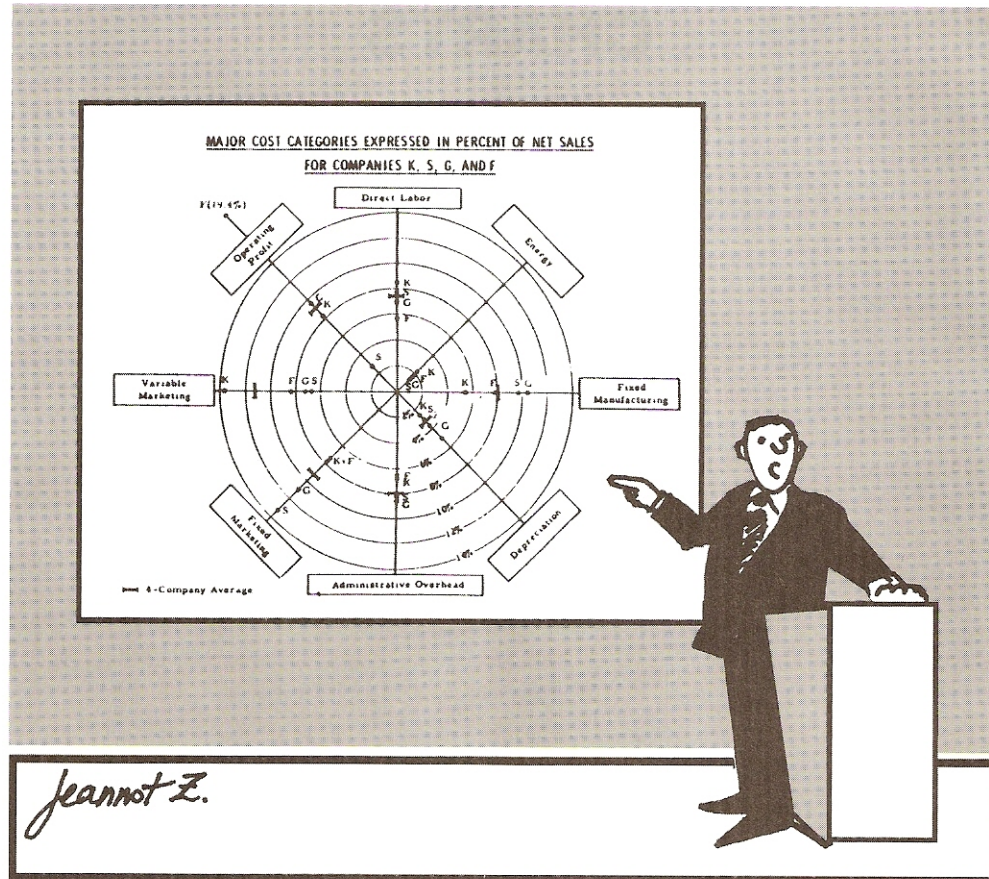
<http://www.math.usu.edu/~symanzik>

Joint Statistical Meetings, Chicago, IL
August 1, 2016



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- The “Stat Graphics Task Force”
- Common Problems Seen in Posters
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From: Zelazny, G. (2001), *Say it with Charts: The Executive's Guide to Visual Communication* (Fourth Edition), McGraw-Hill, New York, NY.

The “Stat Graphics Task Force” (1)

- “The idea for a Poster Competition originated with Lorraine Denby of the ASA's **Section on Statistical Graphics**. In August of 1989, Jerry Moreno was asked to be the first chair and establish an initial framework and structure for the competition.”

[from: <http://www.amstat.org/education/posterprojects/history.cfm>]

- Over time, the Statistical Graphics section became less involved in the Poster Competition and its members almost completely forgot about it.
- Around 2010, some members of the Statistical Graphics section started to notice “bad” graphs among the winners of the Poster Competition.

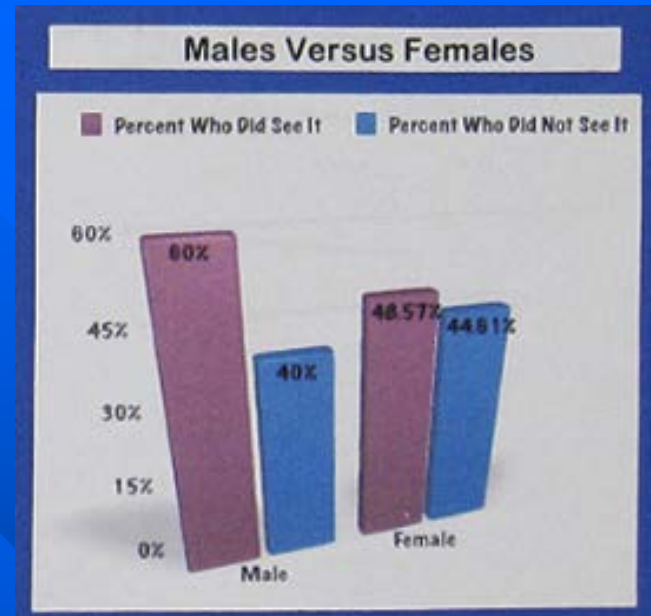
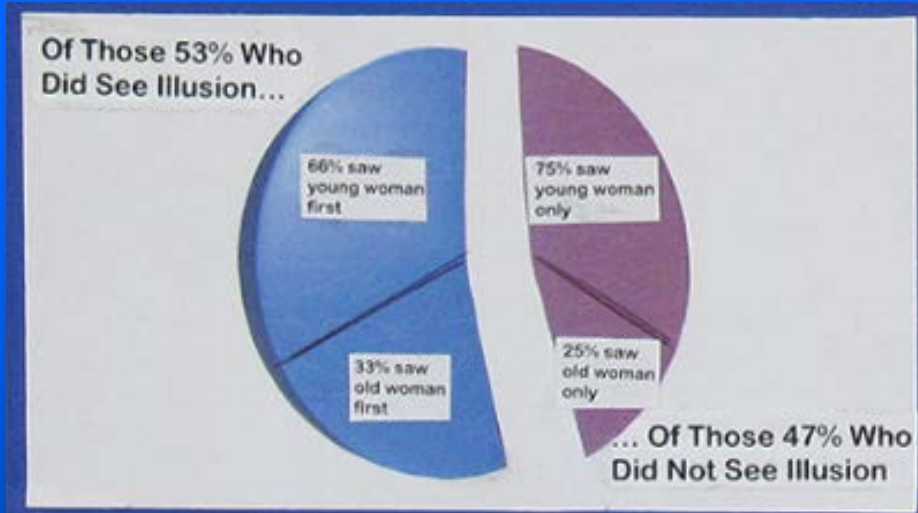
The “Stat Graphics Task Force” (2)

- This led to the creation of the “Stat Graphics Task Force” in Fall 2012.
- Members: Juergen Symanzik, Naomi Robbins, Richard Heiberger.
- Approach: Closely collaborate with the ASA/NCTM Joint Committee.
- Overall Goal: Improve quality of graphs in the Poster Competition.

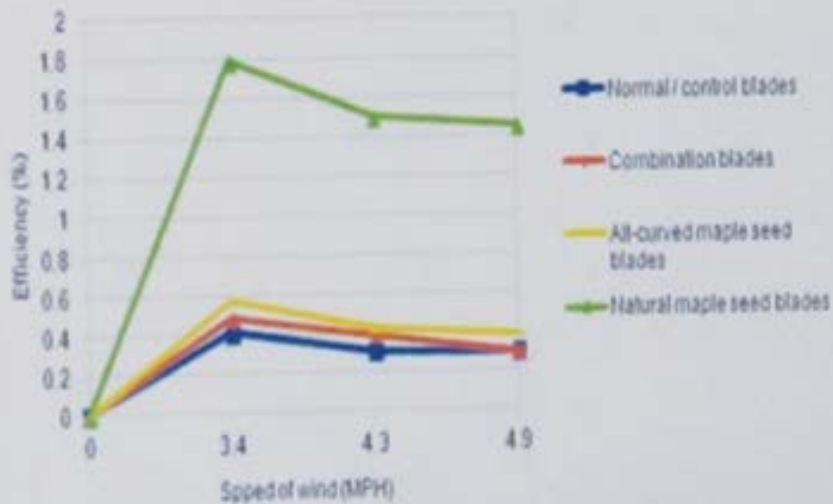
Summary of Observed Problems

- Misleading 3D pie charts & 3D bar charts !!!
- Incorrect graph type (e.g., using pie chart even if data are not part of a whole)
- Scale-related problems (for horizontal & vertical axis)
- Axis not starting at 0 (in bar charts)
- No identical baseline
- Making radius (and not area) proportional to numbers
- Omitting space in bar charts & adding extra space in histograms
- No meaningful sorting in bar charts & pie charts (minor problem)

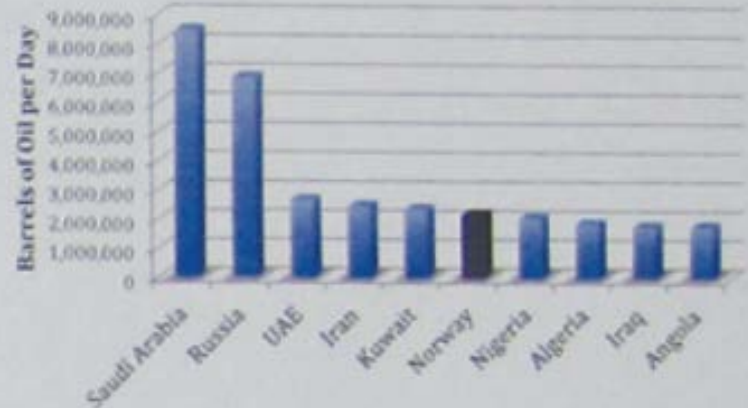
Examples of Bad Graphs (2013)



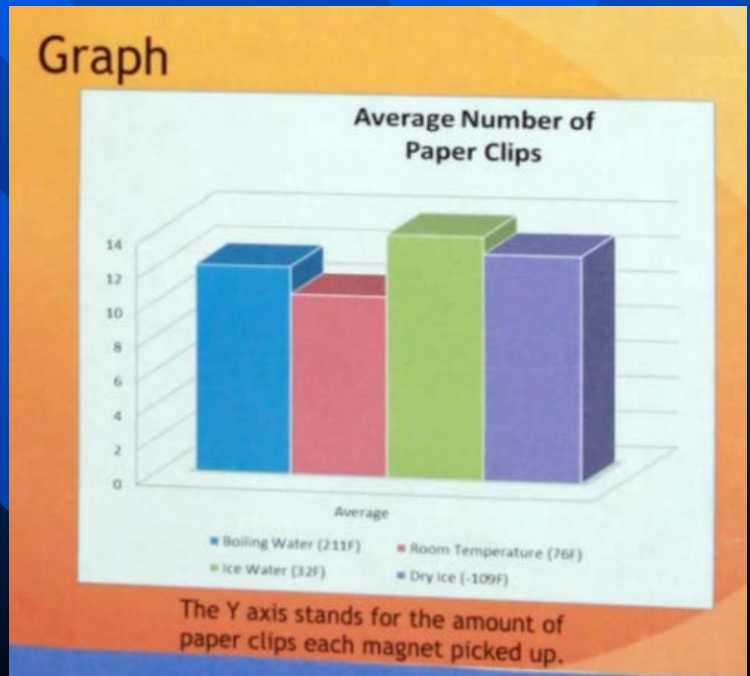
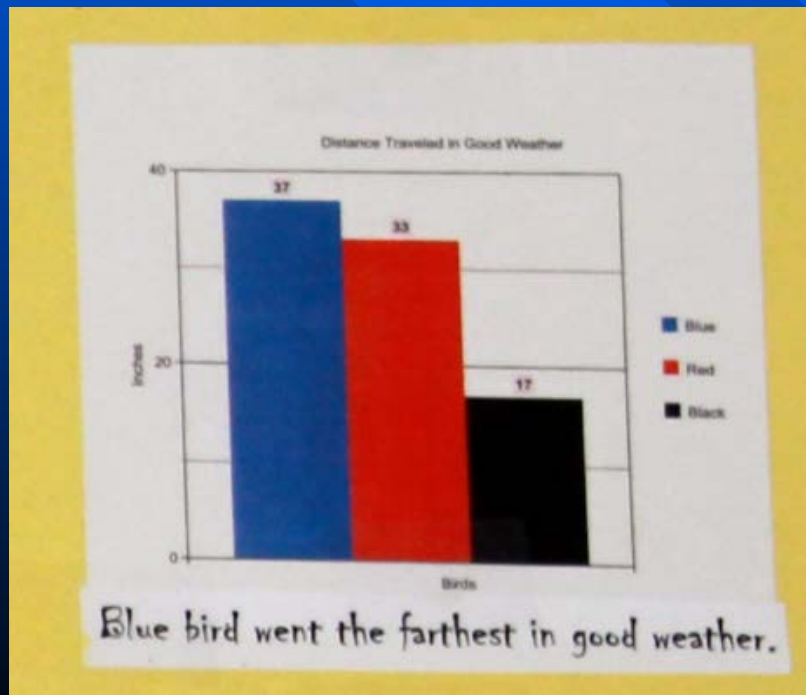
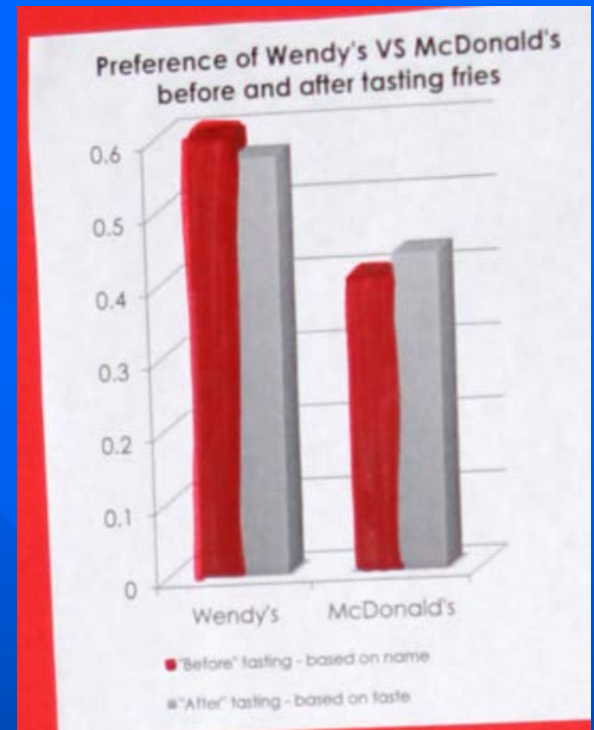
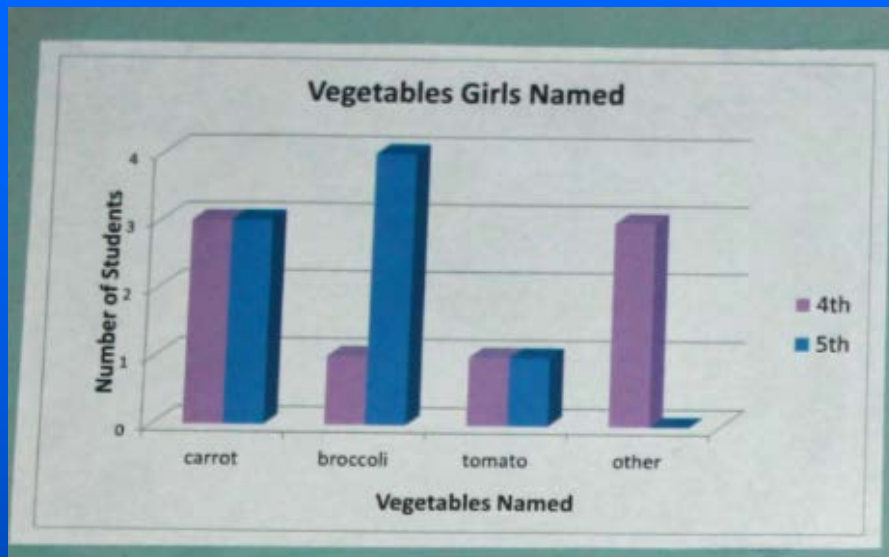
Efficiency of wind turbine



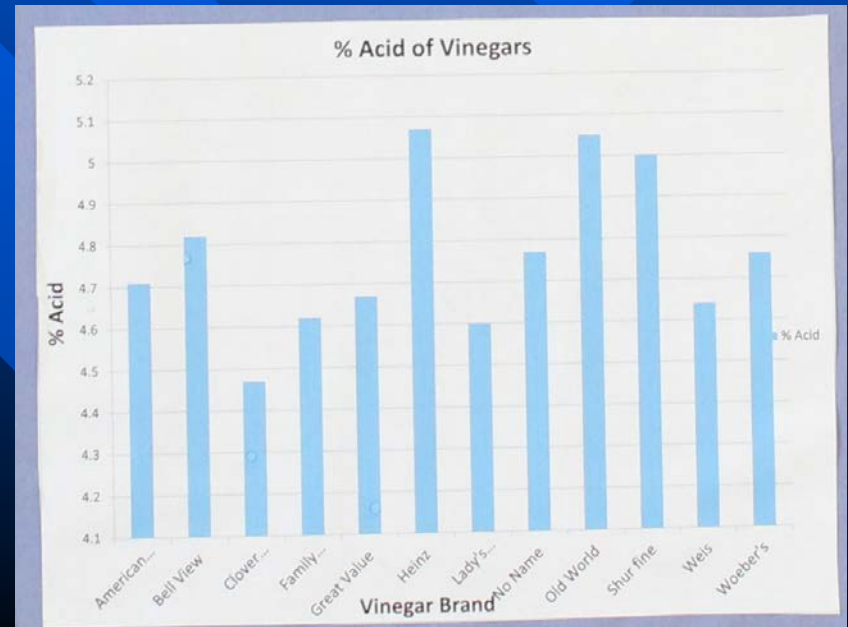
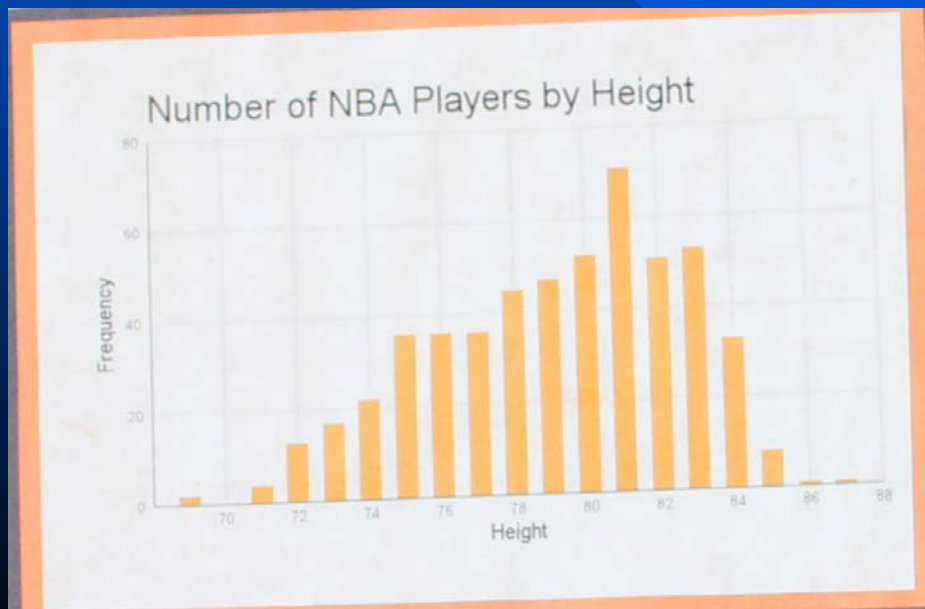
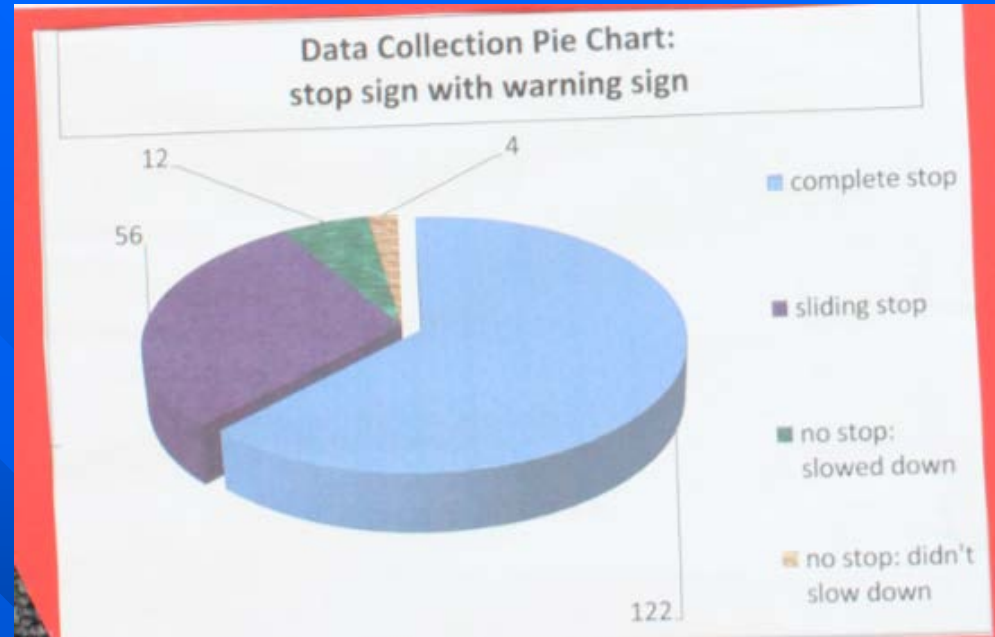
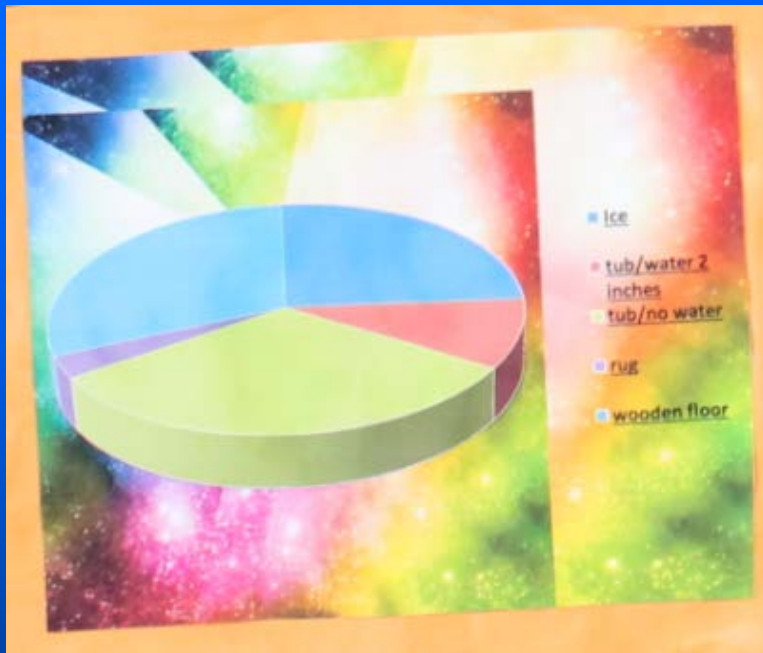
World's Largest Exporters, by Country



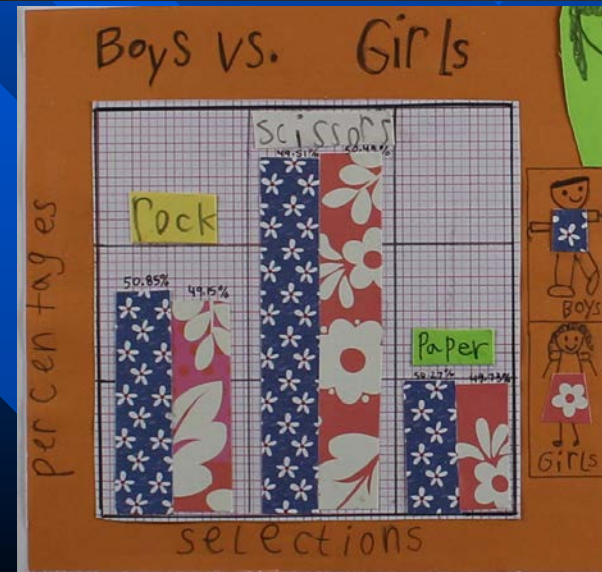
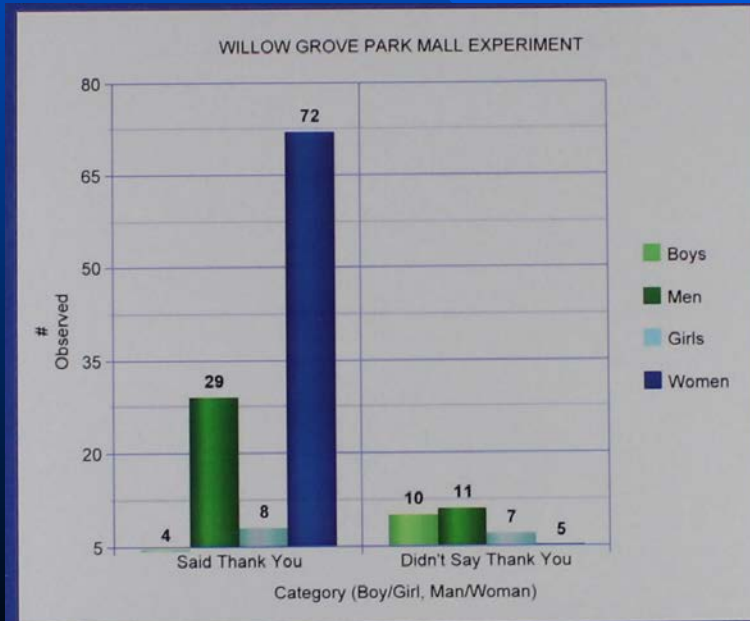
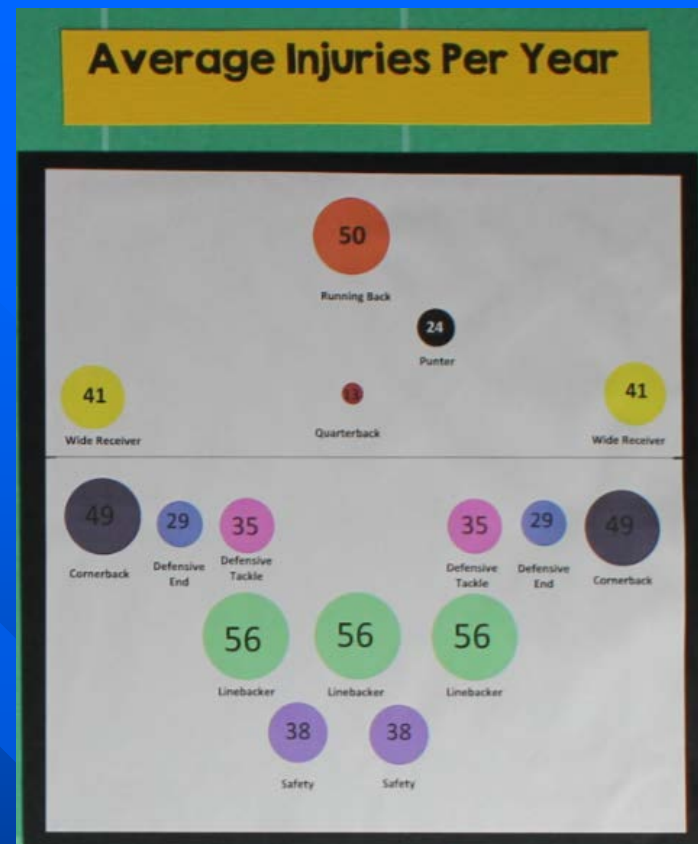
Examples of Bad Graphs (2014)



Examples of Bad Graphs (2015)



Examples of Bad Graphs (2016)



Possible Explanation for Misleading Graphs

- **Many teachers of statistics do not know graphs well !!!**
 - “At the beginning of this paper, we listed several standards that NCTM suggests that all students in the United States should master during Grades 3-5 (ages 9-11). Sadly, we discovered that the **teachers** in this study **had not mastered these ideas themselves.**” [from: Jacobbe, T., Horton, R. M. (2010). Elementary School Teachers’ Comprehension of Data Displays, *Statistics Education Research Journal* 9(10): 27-45]
 - “In this paper a **secondary teacher’s reasoning** from the comparison of box plot distributions during the teaching of a Year 11 (15-year-old) class is analyzed. [...] highlights that reasoning in the sampling and referent elements **is ill formed.**” [from: Pfannkuch, M. (2006). Comparing Box Plot Distributions: A Teacher’s Reasoning, *Statistics Education Research Journal* 5(2): 27-45]

Future Plans of the Task Force

- Ongoing interaction with the ASA/NCTM Joint Committee.
- Reassessment of the winning posters from the annual Poster Competition (<http://www.amstat.org/education/posterprojects>) and pointing out common mistakes in graphs from these posters.
- Preparation of a “Good Graphs” webinar.
- Preparation of an online booklet for future contestants and future judges.
- Your input is welcome – now and after the JSM!

Sources for Constructing Better Graphs: Books & Articles

- Robbins, N. B. (2013). *Creating More Effective Graphs*. Chart House: Ramsey, NJ. (reprinted from Wiley 2005)
- Su, Y-S. (2008). “It’s easy to produce chartjunk using Microsoft Excel 2007, but hard to make good graphs.” *Computational Statistics and Data Analysis* 52:4594-4601.
- Tufte, E. R. (2001). *The Visual Display of Quantitative Information*, 2nd edition. Graphics Press: Cheshire, CT. (first edition 1983)
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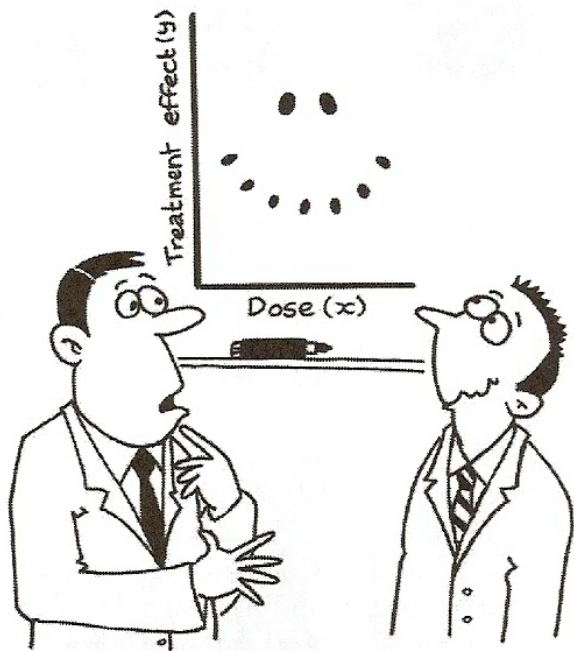
Sources for Constructing Better Graphs:

Blogs

- Camoes, J. “ExcelCharts,” <http://www.excelcharts.com/blog/>
- Peltier, J. “Peltier Tech Blog— Peltier Tech Excel Charts and Programming Blog,” <http://peltiertech.com/WordPress/>
- Robbins, N. B. “Effective Graphs,” <http://www.forbes.com/sites/naomirobbins/>
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- Wyatt, S. (March 31, 2014). “Dishonest Fox Charts: Obamacare Enrollment Edition,” Media Matters for America. <http://mediamatters.org/blog/2014/03/31/dishonest-fox-charts-obamacare-enrollment-editi/198679>

Sources for Constructing Better Graphs: For Teachers

- Heiberger, R. M., Robbins, N. B., Symanzik, J. (2014). “Statistical Graphics Recommendations for the ASA/NCTM Annual Poster Competition and Project Competition”, *JSM Proceedings*, American Statistical Association, Alexandria, VA.
- Symanzik, J., Robbins, N. B., Heiberger, R. M. (2014). “Observations from the winners of the 2013 Statistics Poster Competition — Praise and future improvements.” *The Statistics Teacher Network*, 83:2–5.
<http://www.amstat.org/education/stn/pdfs/STN83.pdf>



"It's a non-linear pattern with outliers.....but for some reason I'm very happy with the data."

A CAUSE-commissioned cartoon that is part of the CAUSEweb collection and available for free noncommercial use by statistics teachers. Cartoon by John Landers ©. Provided by permission.

Questions ???

— or —

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From: Amstat News, January 2009, p. 25