Graphical Representation of Information

Lecturer: Amy Smith

Edward Tufte's "Visual Display" Recommendations

This segment of the lecture is based on the work of Edward Tufte and his seminars, which Amy has attended. See his book *The Visual Display of Quantitative Information*, 2nd ed. Cheshire CT: Graphics Press, 2001 ISBN: 0961392142; and several other books he's written.

Figures from *The Visual Display of Quantitative Information* are discussed in class.

Tufte identifies two key aspects of graphical practice: graphical excellence and graphical integrity.

Graphical Excellence

According to Tufte, visual displays of information should:

- Show the data efficiently
- Induce the viewer to think about the substance rather than the methodology, graphic design etc.
- Make large data sets understandable
- Encourage the viewer to make comparisons

Well designed graphs can make datasets much easier to interpret. Compare the table on p. 13 with four graphs on top of p. 14.

Re: map of deaths due to Typhoid, p. 24. This is one of the earliest good examples of well-presented data, where graphical display led to an important scientific discovery: water was found to be the carrier of disease. The Xs show location of water pumps. There's a cluster of deaths right next to one of the pumps, so it was closed.

Re: maps of cancer incidence by county, pp. 17-19. These maps allow you to see that the highest incidences are in upper Midwest and the southwest. These images are much more useful being on a per-county basis; imagine how much less useful it would be if only on a state by state basis, or if data was only presented in a table.

Re: map of the march of British forces in Russia 1812-1813, p. 41. This graphic poignantly illustrates what happened to British forces, correlated to geography, weather, etc.

Graphical Integrity

One must enforce consistent, legitimate displays in order to communicate the right messages.

Re: commission payments to Travel Agents, bottom of p. 54. The data is correct and OK, but its presentation of the final half-year vs. previous full years creates a misleading message that payments have fallen even though they haven't.

Re: bar charts with numbers. See financial results chart on top of p. 54. The bars need to be drawn proportional and consistent to the data values – constant scale, constant zero-point. Also, see chart of oil prices, top of p. 71. Be careful about 3-dimensional or perspective tricks among the bar elements.

Re: graphs of traffic deaths, pp. 74-75. Show the full context of the data. For instance, if you focus on a few years' time in a sequence of data, make sure the broader context (i.e. full time period) is also shown.

The Pitfalls of PowerPoint

As this tool has become widely adopted, people are realizing it has some pitfalls. See the course reading from Wired Magazine and Peter Norvig's excellent"Gettysburg Powerpoint Address" (http://www.norvig.com/Gettysburg/).

Presentation Skills

Guest Lecturer: MJ Morse, Boston Museum of Science – Program Manager for Current Science and Technology Center.

[The museum will be hosting a day of D-Lab project presentations at the end of the term.]

If you are pitching a scientific message to a non-scientific audience, your primary message to them should be one of passion. Remember why you got into this subject and put energy into its solution.

When you speak to colleagues, you're largely conveying what you know, how much you know. This does NOT work for most laypeople.

Showing passion is more important than *maintaining dignity*. Passion is the primary message, and content is secondary. Realize that you have a much more intimate connection to your content than anybody else does; just as you don't share all your intimate secrets with a stranger, don't belabor all the technical minutia to a lay audience.

Some ground rules for public presentations

- Don't slump. Be outflowing, physically expressing the words.
- When you move or walk or gesture on stage, do so with purpose. All the non-verbal modes of communication really count.
- Use the projection screens to complement your talk ONLY, but do not show too much info.
- Dress clean and neat, know that the audience will be easily distracted by unusual earrings or bare toes or…

- Master the material and key messages so you're thinking about interacting with the audience, developing the relationship with the audience, rather than worrying about your content.

Here are some recommended steps to prepare for your talk.

1. Decide on the subject / message. What are the one or two "factoids" you want people to remember?

2. Free write for 10 minutes. Don't take the pen off the paper, don't stop, don't censor. Powerful associations and metaphors come from this!

3. Play with it. If you have a water filter, what about pretending to be an organism that's passing through the filter? Egg each other on in coming up with your ideas.

Keep in mind: you're a walking advertisement for your project, for the benefits it will hopefully provide.

Q&A

Q: What age range should we target?
A: You already know how to talk to scientists. Default audience at the Current Science and Technology stage is 8th grade and up, and probably not deeply schooled in science. You can gauge each particular group and adapt up or down.

Q: How to manage jargon? Does everything need to be defined exhaustively.
A: Rule of thumb is no more than three new words (not universally known) in a presentation. Test it out beforehand. And solicit questions up front "if I use a word you don't understand, please ask me."

Q: How to coordinate a team presentation?
A: Start by playing together as a team. Think of some approaches that enroll everybody in the presentation. For instance, one speaker acts as Interviewer, and asks questions of the other team members. Don't interrupt each other, know what the messages are beforehand.

Q: What about humor?
A: That's a constant battle, given how hard it is to predict/understand the audience. Keep it respectful and light. It can be a great tool but it can also quickly become inappropriate. You can always make fun of yourself (in a gentle way, of course).

Q: What if your topic is not "joyful," i.e. the HIV/AIDS patient tracking software?
A: Obviously, humor doesn't fit, but passion about the subject, the scope of the problem, and the possibilities of solutions, is absolutely appropriate. For instance, you could start by sitting on a tool and telling a heartfelt story about the project.

Q: How should the students weight the different aspects of their project: the problem, the design process, showing off the resulting solution? Does the audience care about the design process?

A: Most important thing is to be honest and authentic – start by being yourself and emphasize the things you think are most interesting. If the thing that's most captivating for you is how you worked through the design, then put your emphasis here.

Now: break into pairs to do a quick version of this process. Before doing so, write down the most important thing about the project.