

## **Graph or Table Redesign Project**

### **Guidance for the Redesign and Written Description**

#### **1. Redesign Objectives**

This redesign project has two main objectives. A first objective is for student to gain experience in applying the design guidelines taught in class. This involves scanning for poor examples, knowing what to do in improving the design, and using software to construct the improved designs.

The second main object is to give students experience in presenting their work in visual/verbal form. Unfortunately with large classes this is insufficient time for all students present. Students are selected based on their redesign presented in written form.

The intent of the class presentation is to provide a positive experience for the presenters and the class members. The presentation setting is intended to be comfortable. Some students may have never presented before and English may be a second language. Presentations will hopefully be educational to classmates and may contain a bit of tasteful humor. It is okay to poke fun at poor designs.

Every student is to be treated with respect! Talking or engaging in other activities during a student presentation is rude! Questions and constructive comments are fine when the intent is to learn, to gently guide or to make the presenter look good. Arrogant comments belittle the commenter. Applause is expected at the end of each presentation.

The redesign is also presented to the instructor in writing. The grades are based strictly on the paper, for the classes in which there is not time for all students to present. While the emphasis is on content as indicated below and the written material should be very short, some deductions may be made for poor writing. Feel free to have someone read your paper to address writing issues.

Another lesser objective is to master the classroom presentation environment so the final project presentations run smoothly. Setup problems sometimes happen in the redesign presentations. Please learn from the problems that occur

#### **2. Presentation and paper content**

The most important items are 2.3, 2.5, 2.6, and 2.7 below. The rest is mostly to make sure you get full credit for your work or to guide classmates to good resources

2.1 Include the title of your talk/paper and your name

2.2 In the talk you may include something about your work, interests or search that lead to your finding the poor design.

**2.3 Include the source of the poor graph or table.** The more reputable the source, the more the fun.

2.4 Indicate how you obtained data, especially if this involved extra work such pulling data from different source and merging it, digitizing graphs, or making up similar data when values weren't available. Also share links to good resources for data when getting data was easy.

**2.5 Describe the context of the data.** What is the purpose of the graph or table? What are the variables and units. What relationships might be expected? Are there reference values for comparison? This may be very brief, but be sure to include the units of measure at least in the redesign plot or table.

**2.6 Include the poor graph or table and indicate the design facets that seem poor.**

**2.7 Include your redesigned graph or table and indicating the things you have changed to make improvements. Cite the design guidance that supports your claim that the changes are an improvement.**

2.8 Indicate any extra efforts involving in producing the revise table or graph. Did you write a new R function, etc.

2.9 Indicate additional changes you would like to make to the redesign and cite barriers to making them, such as inadequate tools, lack of time, etc.

2.10. Your instructor likes to see templates presented in class, such a linked micromaps, put to use. Such redesign are usually safe. Your instructor also likes to new things and creativity in action.

### **3. Target paper length**

Two or three pages, including the original graph and the redesign should suffice. Longer reports are acceptable. However, returns for doing more than one example are diminishing and often zero. The returns can be negative if one example indicates lack of understanding.

### **4. Notes**

4.1 Exact data is not required.

The original graph may not come with data in convenient digital form. Approximate values will suffice for the redesign. The goal is to produce a template that will work with similar data.

4.1 Make sure the units of measure appear.

A graph about data is pretty worthless, if we don't know what is being represented.

#### 4.2 In general layer the information.

Make the most important information the most salient.

For example, you know that I like grid lines in many graphs and that grid lines should appear in the background. Inclusion of reference lines or reference values is often helpful. These may appear closer to the foreground. The primary estimates trends, etc. should be in the foreground. Use line thickness, dot size, contrast or other methods to achieve the visual layering.

#### 4.3 Linking multivariate information is often an important consideration.

Also, better linking of labels to estimates can be a redesign feature.

#### 4.4 Consider perceptual accurate of extraction and comparability in your redesigns. The inclusion of reference values can be very helpful.

#### 4.5 **Consider adding more context and data.**

#### 4.6 Avoid using perspective 3-D bars in the improved design.

Be advised that I do not particularly like 3-D perspective bar plots. In general bars may be hidden. Further, perceptual accuracy of extraction and comparison seems poor compared other representations such as position along a scale or length in an orthographic projection.

Still some people like 3-D bars. Displays of a large matrix of bars can be visually appealing and informative. Pan and zooming or changing viewpoints can partially address the hidden value problem. Interactive masking of rows or columns can help provide focus and revealing hidden values. Watermarks, for example generated via a user controlled translucent cutting plane) can increase perceptual accuracy of extraction based on Weber's law. (The part of the bars above a threshold can be a different color.) Further, at least one psychologist reports experiments indicating that perceptual accuracy of extraction is not all that bad. (I still need to find this paper and read it.) The situation of 3-D seems to be quite different in an interactive setting than for static plots.

If you really like 3-D bars and choose to use them, please do something like adding a translucent reference plane, or different viewpoints to reveal hidden bars, so that it is easy to talk about improvements. You might find the studies that contradicts my opinion that perspective views degrade perceptual accuracy of extraction relative to simpler 2-D bars. You might indicate the center of projection for the Excel 3-D bars and knowing this explain how to properly read the values from the grids provided.

#### 4.7 **Avoid use of pie charts in the improved design**

Be advised that I do not particularly like pie charts. Their merits are that they are familiar and that they immediately convey that percents add to 100% (or fraction

add to 1). Angles have good perceptual accuracy of extraction, which is not bad but not as good as position along a scale.

Mostly I find pie charts hard to label. Row-labeled dot plots seem pretty hard to beat for clear, easy-to-read labels. Labels link by vertical position to the dots that presenting values. Further, perceptual grouping of labels and dots can increase linking speed and accuracy.

3-D perspective pie charts seem to make it harder to compare angles accurately. This assumption could be tested.

4.8 Feel free to ask for guidance from your instructor

## 5. Outstanding Redesigns

Some students chose to invest considerable thought, creativity and effort in the redesign project. I give A+ to redesigns that represent serious efforts to improve a non-trivial graph or table by adapting and applying the methods taught in class.

## 6. Grading Criteria parallels the above guidance.

- **Level of effort: effort is recognized many areas**
  - + Selection of non-trivial example to redesign
    - Converting 3 4-item pie charts into 3 lines on a line chart using Excel is at best B level work.
  - + Attention to appearance details
  - + Attention to comparability issues
  - + Data gathering and preparation data for analysis/graphics
  - Development of a good new graphics design
  - Discovery of misrepresentation
  - Discovery of mismatch between an article and the graphic
  - Representing a fairly large/complex data set
  -
- **Use of methods or concepts taught in class**
  - Perceptual grouping, layering, enhanced comparability
  - Context for appropriate interpretation
    - Units of measure
    - Legends if necessary
  - Distributional Summaries
  - Clean appearance
    - No points on the axes.
    - Easy to read labeling
    - Minimal memory burdens

- Do not plot points on tick marks (I prefer tick appearing outside the plot frame. (I prefer tick appearing outside)
    - Avoid too many font sizes. Use consistent fonts.
  - Focus on key the issue
    - The graphics in some articles are off target.
  - Quality of Description
    - Indicate the nature of the data set
    - Indicate the goals for the redesign
    - Point out the improvements
    - Clear labeling in the graphics (for example, units of measure)
    - Clarity of the text
- **Bonus**
  - Develop an automated production tool (or R function)
  - A scientific discovery