Project Overview

Purpose
The Redesign Project has two main objectives:

1. Apply the class design guidelines using software that is taught in class.
2. Present data analytic results.

Instructions
The redesign project involves an oral presentation and a written paper to be submitted in Module 5. Both the presentation and paper are to include:

- **The original graph or table:** A copy of the bad graph and/or table (preferably graph). You must also cite the source of the bad graph (and/or table)
- **An analysis of the original graph or table**: A description of the context, content and intent of the bad graph or table. The disadvantages of the bad graph should be highlighted and suggestions for improving them need to be made. Your analysis should include a discussion of any visual communication flaws or failure to show patterns. Describe suggested improvements and their correspondence to class (or other) design and reasoning guidelines. For example: "The sorting of cases will simplify appearance by putting similar cases close together."
- **Special efforts:** A comment (if appropriate) about special efforts you made. For example, this can address obtaining, processing or creating data and the graphics side of production.
- **Redesigned graph:** Discuss the redesigned graph and the patterns that it shows.
- **Concluding remarks:** Make one or more concluding remarks. You might comment on the next steps to be taken. For example, you might state it is necessary to obtain more data, fit a different model, or produce a different plot (in fact, if you go ahead and produce a different plot you will get a bonus point!) You might conclude your redesign is substantially better than the original design by providing evidence.
- **Software:** For the redesign project, you should not use software other the R.

Graphic Design Guidelines
For both course projects, you should follow best practices in graphic design. Remember that making comparisons is at the heart of quantitative graphics. The four general guidelines are:

1. **Enable accurate comparisons**

   - If the encoding is poor, consider a position along scale encoding.
   - If position along a scale is not an option, consider upgrading a poor encoding to a good encoding.
   - Adding grid lines can help.

2. **Simplify appearance**

   - Creating small perceptual groups at one or more scales can help.

- Using easily discriminated symbols can help.
- Sorting rows or columns to put similar items close together can help.
- Proximity linking is often simpler than color linked labels.
- Using familiar colors with common names can facilitate communication.
- Explicit display of changes or differences, such as the differences between observed and fitted values, helps to show what is hard to envision.

3. **Provide or increase context to support interpretation or to facilitate hypothesis generation**

- Include the units of measures. Don't forget labeling and titling of the graphs!
- If the data has a spatial context adding a map can help.
- If the data is a times series adding more recent data can help.
- In an exploration in modeling context including one or more potentially related variables may be very helpful.

4. **Attract and engage the reader/analyst**

- Making text easier to read can help.
- Labeling a few points and/or providing annotation can draw attention.
- Colorful graphics can attract readers.
- Using interactive or dynamic graphics helps to engage the reader.
- Shiny or other R packages that use java scripts can be useful here.

There are tensions among the guidelines. Adding context can make the graphics more complicated while at the same time more meaningful. There are almost always design constraints such as the resolution of the screen or the size of the paper. Designing good graphics often involves picking the task(s) to emphasize and making compromises.

The Oral Presentation

The oral presentations should be no longer than 5 minutes. Presentations running much longer than the allocated time will likely result in losing up to 5 points. You will use a tool such as MS PowerPoint to record your voice while going over the slides. Submit your recording to the discussion forum by **11:59PM ET, Wednesday of Module 5.**

The oral presentation can differ from the written presentation. First, it can be less formal and more entertaining. A little tasteful humor is okay. It is okay to poke fun at poor designs (not the designers). Presentations are, hopefully, educational to classmates in terms of sharing the examples or resources and methods used for producing the redesign. (The presentation is not the forum to provide an instructional lecture. You can respond to questions in the comment section later.) Your presentation may include interactive or dynamic graphics that are not readily included in a written paper.

The presentation is to provide a positive experience for both presenters and class members. For some students this may be their first presentation. For some it may be their first presentation in English. **Every student is to be treated with respect! So, please be respectful when typing your comments.**

Respectful questions and constructive comments are fine when the intent is to learn, to make the presenter look good, or to gently guide the presenter in a better direction.

While the oral presentation does not receive its own grade, it is included in the Redesign Project rubric. If the oral presentation is not given, if it is in bad taste, or if it blatantly goes against class guidelines points (perhaps all) will be deducted from the final written report score.

The Written Report

The written report should be five pages or less. Don't play page length games such as using little fonts, narrow line spacing, and tiny graphics to get more within the page limit. Don't play the opposite game of increasing font size gaps between lines and large graphics to approach the maximum allowed page size. Going over five pages will result in losing points. Get permission if there is a good reason to go over the limits.

The written report differs from the oral presentation. While the presentation may have bulleted items, the paper should have clear sentences and succinct paragraphs. This is a graduate level class, so the quality of your writing should meet the requirements of academic writing. Every resource used needs to be referenced properly (preferably APA format). Failing to reference books, documents, R, R packages and codes, will result in losing points. Copy and pasted text (without quoting and fully referencing) is considered plagiarizing.

The talk may mention any special efforts you made. The paper can also make brief mention of this and provide supportive evident in appendices that do not count against the paper page limit. I expect one slide explaining the challenges and also a written paragraph on your paper.

Once the paper is written, check the spelling and grammar with available tools such as those in Word. After the initial paper writing, in this class it is not an honors code violation to get help in revising your paper from the university writing center. It is also okay to have a native English speaker read the paper and comment. Omit the humor and tips for classmates that may have been part of the presentation.

Asking your instructor about the suitability of a candidate bad graph or table for redesign is fine. The goal is to learn and develop professional communications skills that make you a valued resource in this culture. The written report is due by **11:59PM ET, Sunday of Module 5.**

Notes

Exact data is not required on the paper or slides.
The original graph may not come with data in a convenient digital form. You need to track it down and use it for your analysis, but I don't require you to show the data on your slides. The uploading of the data is requested if it is in digital form.

Several suggestions were made above. For example, make sure to include the units of measure.
A graph about data is pretty worthless, if we don't know what is being represented.

In general, *layer* the information.
Make the most important information the most salient. For example, grid lines should appear in the background. Reference lines can be drawn on grid lines. Confidence interval lines can be drawn on reference lines and estimate symbols plotted on top. Methods other than overplotting can also be used to support visual layering.

Resulting designs to avoid
Don't just get a pie chart and redesign it to a bar chart! Providing multiple graphs is required to show the effort. Adding an inferential method and some analysis results to understand the data or trend is encouraged.

Avoid using perspective 3-D bars in the improved design.
I do not particularly like 3-D perspective bar plots. Bars in front can hide bars in back. A perspective view can complicate reading bar heights against scale.

Side note: Some of the perspective weakness can be addressed. A translucent cutting plane parallel to the bar base that touches the reference scale helps to assess bar height values and to compare the bar heights. A dynamic interactive setting that supports move the reference plane can work pretty well. I have seen tools that support large matrices of 3D bars.

Avoid use of pie charts in the improved design
I do not particularly like pie charts. They have merit because they are familiar and immediately convey that the percentages add to 100% (or fractions 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 in comparison to row-labeled dot plots that have easy-to-read labels. The labels in dot plots link by vertical position to the dots that values using position along a scale encoding. The perceptual grouping of rows can increase linking speed and accuracy.

Both designs can sort values in ascending or descending order. For pie charts, this will put the smallest value by the largest value. With pie charts including additional variables to increase context is a challenge.

Outstanding Redesigns
Some students chose to invest considerable thought, creativity and effort in the redesign project. I give A+'s to redesigns that represent serious efforts to improve a non-trivial graph or table by adapting and applying the methods taught in class, providing multiple ways of improving graphs, and going for the best options (not the easy options!).

Grading Criteria

Level of effort: effort is recognized in many areas

- Selection of a non-trivial example to redesign (Converting three 4-item pie charts into 4 lines on a line plot is at best B level work.)
- Attention to appearance details

- Attention to comparability issues
- Data gathering and preparation of data for analysis/graphics
- Development of a good, new graphics design
- Discovery of a misrepresentation
- Discovery of a mismatch between an article and the graphic
- Representing a fairly large or complex table

Use of concepts taught in class

- Perceptual grouping and layering to facilitate comparison
- Sorting and linking (example: using linked micromaps)
- Background grid lines, grid line labels (Avoid tick marks when there is a reasonable alternative.)
- Context for appropriate interpretation (Units of measure, legends if necessary)
- Distributional summaries
- Clean appearance:
    o No points plotted on axes
    o Easy to read labeling
    o Minimal memory burdens
    o Avoid too many font sizes. Use consistent fonts.
- Focus on the key issue (The graphics in some articles are off target)
- Quality of description
    o Indicate the nature of the data set
    o The bad design flaws
    o Indicate the goals for the redesign
    o Point out the improvements
    o Clear labeling in the graphics (for example variable names)
    o Clarity of the text