Data Visualization

Tips for Designing Your Own Graphs/Charts
Visualization Design Principles

1) Self Sufficiency
2) Primary Purpose to Communicate
3) Maximal Data-to-Ink Ratio
4) Legible Text and Information
5) Meaningful Axes
6) Distinct and Readable Symbols and Plot Lines
7) Relevant Use of Color
8) Use of the Simplest Plot that is Appropriate
A visualization should stand on its own

- A visualization should be self-sufficient
- It should be clear, effective and informative for the intended audience
- If someone in your target audience cannot understand your graph just by looking at it, then consider an alternative presentation

Tips:
- Use annotations and self-explanatory symbols in place of remote legends
- Avoid packing too much information into one display; it could distract from the main message. Two clear graphs are better than one unclear graph.
A visualization should stand on its own
Tailor a visualization to its communicative purpose

- Ask yourself the following questions:
  - What is the purpose of the visualization?
  - Who is the intended audience to whom you are trying to communicate the purpose?
- Once you have these two points down, imagine yourself as a member of your target audience. As such, would you be able to understand your graph, without additional commentary?
Tailor a visualization to its communicative purpose

Image Source
Maximize the Data to Ink Ratio

- “Above all else, show the data.” Edward Tufte
- Data to Ink Ratio = ink used to display data / total ink
- Proportion of graph’s ink used to display non-redundant data
Provide Legible Text & Information

- Text should not be smaller than 10pt font in standard contexts
- Abbreviations should be used sparingly
  - Avoid novel abbreviations that are not well known
- Scales should not be too sparse or too dense
- Use typography that is standard, visible, concise, and comprehensible
- For more information: Google’s Material Design Spec
Design Axes to Aid in Interpretation

- Scale your axes to show the interesting features of your data.
- Avoid cluttered axes.
  - This could mean you might want to use a logarithmic scale in certain instances.
  - In R: `plot(var1, var2, log = "x")` makes the scale of the x-axis logarithmic.
  - You can use "y" to make the y-axis log scale, or "xy" to make them both log scale.
Make symbols and plot lines distinct and readable

- Avoid shades of the same color for similar components
- Avoid colors with low contrast
  - Good: Black and Yellow
  - Bad: Green and Red
    ■ Why is this especially bad?
- Make sure that your symbols and labels are distinct
  - Good: ♂ and ♀
  - Bad: ∪ and U
- Be consistent
  - If blue is the control group then blue should always be the control group
Make use of color when applicable

- To visually distinguish between components
- Colors should not be used as accents, since they could distract or confuse. I.e., What does it mean that some data a different color than the rest?
- Only use color when strictly necessary
  - Ask yourself if color is the best representation
  - Ask yourself if your colors follow good design principles
- Line dashes and other types are a good alternative to color
  - Might your visualization ever be viewed in black and white?
- Be careful about using color weight due to printing and visibility concerns
Use the simplest plot that is appropriate

- Complex graphs may look really cool, but the point of the graph is to convey information in the best way possible, not to be a piece of abstract art!
- The heat map on the left is not a very nice graphic. Does anyone have any idea of what the vertical axis is even representing?
- However, in the correct context, a heat map can work well, like on the right.
Recap: Visualization Design Principles

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Your Turn!

- Please find a data visualization that you find particularly relevant, insightful, surprising, well-designed, or thought-provoking!

- Great place to start: The Pudding

- Feel free to use explore other web sites as well. There are plenty of awesome visualizations out there!

- Please include a link to your chosen visualization in the Google Form, where you indicate that you attended Section today.
Checkoff

https://forms.gle/QtmHPNjaLdkznyyyD9