Data Visualization Fundamentals

Why Visualize?

- Present the data in an easy to understand way
- Visually show the relationship between two or more variables
- Focus on one area, or variable, of the data
- Show patterns and/or outliers in the data
- Others:

What is data visualization?

- visual representation of data
- clear and efficient communication of information using graphics and plots
- an art and a science

How do we understand data visualizations?

- Visualizations help us to see patterns; however, some patterns can be represented in a variety of ways.
- Visualizations construct meaning through both our conscious and pre-conscious ("snap") judgements, based on our basic knowledge and understanding of the world around us.
- Cultural norms and bias play a part in how we interpret visual cues, so make sure to keep in mind both your own and your intended audience's biases.

Elements of Design

BEFORE designing your data visualization, determine your purpose based on...

- Message: Exploratory vs. Explanatory
- Interactivity: Interactive, dynamic, or static
- Medium: Paper, poster, online presentation, website, presentation?
- Audience
- Amount of Detail: Overview vs. Details

Structure / Form*

Your purpose will help you decide your form.

- Is location important? → Maps
- Is your data categorical? → Bar charts
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- Do you want to highlight individual outliers?  ➔ Scatterplots
- Does your data show parts of a whole (100%)?  ➔ Bar charts, pie charts only if 4 or fewer categories
- Is your data time-based?  ➔ Line graphs, bar charts
- More variables? Look at literature in your field to determine what is typically used.

*SUGGESTIONS ONLY! Look at literature in your field to determine what is typically used.

Color
- Logical
  - Be aware of cultural implications of color.
- Distinguishable
  - Gradients and hues should be clear
- Accessible
  - Be aware of common color blindness combos
- Necessary
  - All visual cues should reflect information in your data

Annotations
- Label axes and keys to make the visualization easier to understand
- Sources should always be included and easily findable

Golden Rule
- All visual cues should help your reader interpret your data.
- Extra visual decoration will hurt your audience's ability to interpret the message of the visualization. This extra decoration is called "chart junk."

Additional Resources
- Data: guides.auraria.edu/data
- Poster Design: guides.auraria.edu/posters
- Presentations: guides.auraria.edu/presentations
- Publish Your Research: guides.auraria.edu/publishyourresearch
- Statistics: guides.auraria.edu/statistics