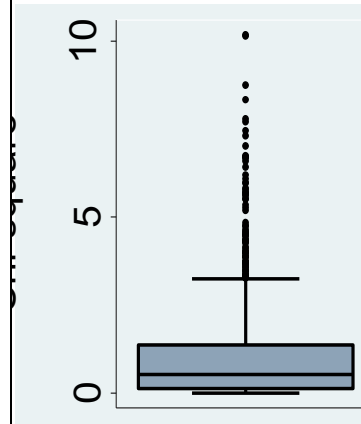


Biostat 202: Data visualization: Telling stories with data

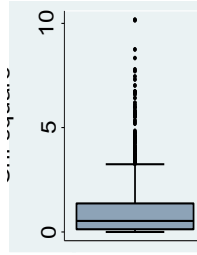
*Aaron Wolfe Scheffler,
Division of Biostatistics,
Department of Epidemiology and
Biostatistics*



Biostat 202

Outline for today

- Tables versus graphs
- Table principles
- Table practice
- Graph principles
- Graph types
- Graph practice



Tables vs graphs

Use **TABLES** when

- The user needs to look up specific values
- You want to enable individual quantitative comparisons
- You need to convey results to high precision
- You want to convey both individual and summary information
- You want to display items that are measured on very different scales. Workarounds: left vs right scales; log scales; multiple panels.

Tables vs graphs

Use **GRAPHS** when

- You want to convey shapes
- You want to convey patterns
- You want to convey trends
- You want to convey quantitative ideas quickly
- *Corollary: You should minimize tables in scientific presentations in favor of graphs!*

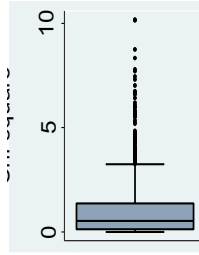
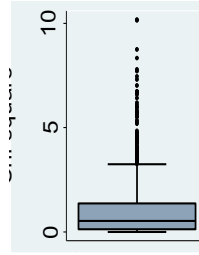
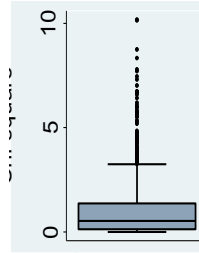


Table principles



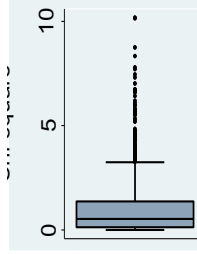
- Should be self-explanatory!!!
- It is easier to compare numbers in columns.
- Round aggressively, preferably to two effective digits (ie where the numbers differ). *Exception: you need to convey precise results.*
- Order rows and/or columns purposefully to convey information. Compare across columns
- Lightly use visual elements to ease comparisons.

Graph principles

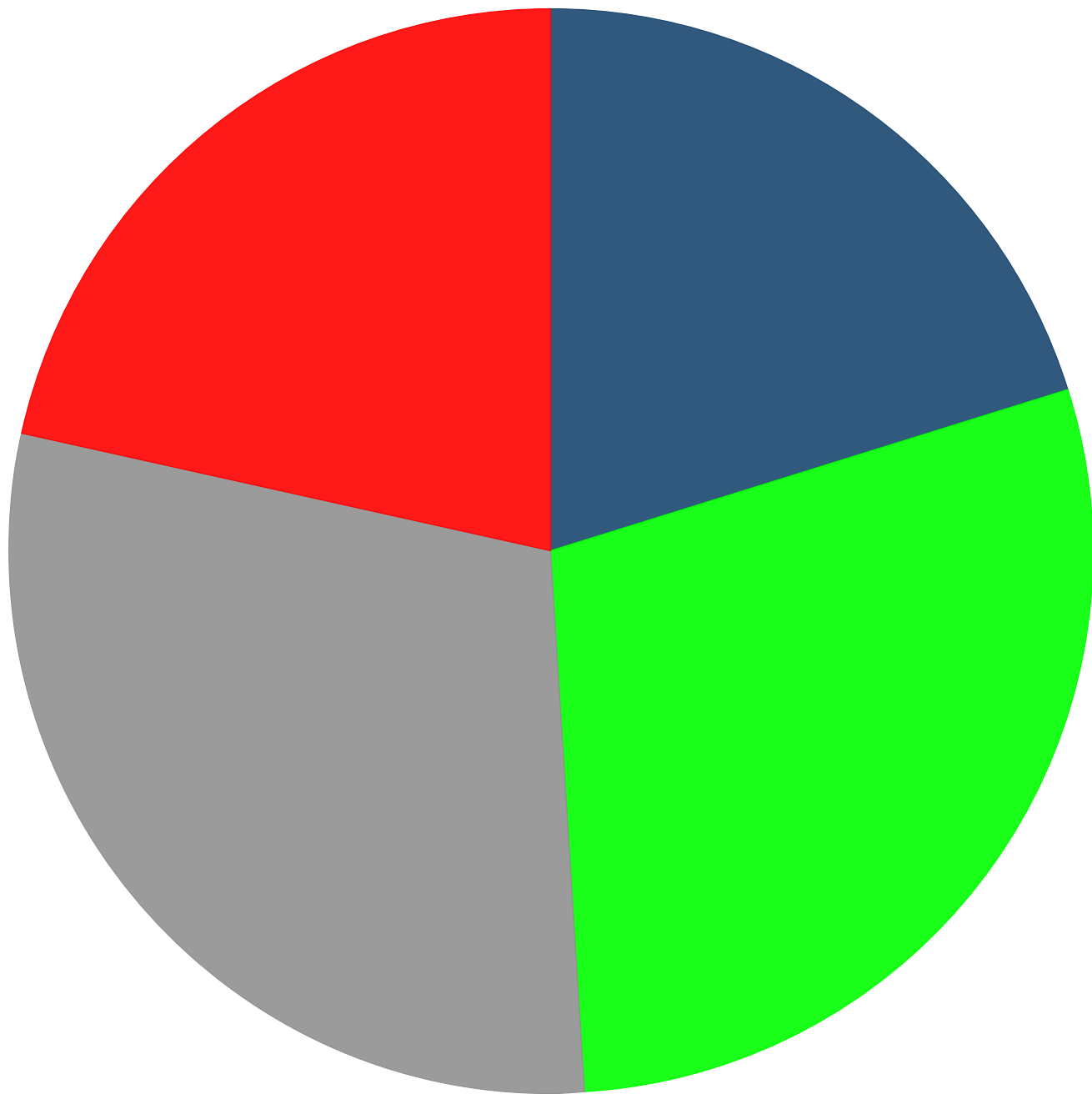


- Should be self-explanatory.
- Aim for interocular traumatic impact. Use the ideas below to convey your message clearly.
- Choose a graph type to emphasize your desired message.
- **Maximize the data to ink ratio.**
- Minimize the impact of non-data ink.
- Use colors, marker symbols and line types purposefully (Excel is ☹).

Avoid: pie charts and stacked bar charts

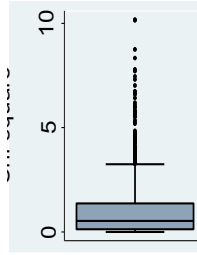


- Comparing the areas is a difficult visual perception task.
- We are really bad at comparing relative areas that are represented in these pie charts and stacked bar chart.
- Wanna bet? Let's see.



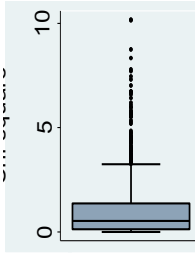
Generating graphics with orange

- Demo graphics and export

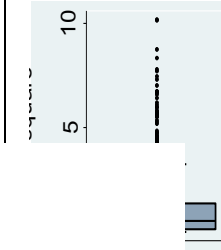


Fun resources

- <https://www.edwardtufte.com/tufte/posters>



Summary



- Use tables for specific values, quantitative comparisons, precision, individual+summary information, differing scales.
- Use graphs to convey information quickly, for shapes, patterns and trends.
- Both should be self-explanatory and use a light touch on non-data
- Tables: compare columns, round aggressively, order purposefully
- Graphs: maximize data to ink, use color, symbols and line types purposefully.