



UNIVERSITY OF SAN FRANCISCO  
CHANGE THE WORLD FROM HERE

# Design Principles

How to Design Visualizations

# Designing Visualizations

- **What** data are you visualizing?
- **Why** are you visualizing that data?
- **Why** would others use your visualization?
- **How** will you encode the data?
- **How** will you implement the visualization?



# Type of Data

- Multivariate Data
- Text Data
- Temporal Data
- Geospatial Data
- Hierarchical Data
- Network Data
- Numerical Data
- Categorical Data
- Structured Data
- Semi-Structured Data
- Unstructured Data



# Visualization Purpose

- Convey complex information
- Capture attention and raise awareness
- Create something aesthetically pleasing
- Encourage exploration



# Visualization Task

- Quickly identify outliers
- Quickly identify groups/classes
- Quickly identify problems
- Explore data to gain insight
- Identify complex patterns



# Encoding Data

- Map data to pre-attentive attributes
- Keep in mind perception
  - Which attributes are stronger?
  - How many distinct attributes can you use?
- Revisit if how encoding is perceived matches underlying data

# Evaluation

- Does the visualization achieve your purpose
- Can the users achieve their visualization task
  - Quickly
  - Accurately
- Evaluate and iterate



# GUIDELINES

Information Visualization by Colin Ware





# Random Selection of Tips

- [G1.2] Important data should be represented by graphical elements that are more visually distinct than those representing less important information.
- [G1.6] Consider adopting novel design solutions only when the estimated payoff is substantially greater than the cost of learning to use them.

“Information Visualization: Perception for Design”, by Colin Ware, 3rd Edition, 2013



# Random Selection of Tips

- [G3.1] Avoid using grayscale as a method for representing more than two to four values.
- [G4.1] Use more saturated colors when color coding small symbols, thin lines, or other small areas. Use less saturated colors for coding large areas.

“Information Visualization: Perception for Design”, by Colin Ware, 3rd Edition, 2013



# Random Selection of Tips

- [G5.6] Use strong pre-attentive cues before weak ones where ease of search is critical.
- [G10.6] Consider providing a small overview map to support navigation through a large data space.

“Information Visualization: Perception for Design”, by Colin Ware, 3rd Edition, 2013



# QUESTIONS

<http://sjengle.cs.usfca.edu/>

