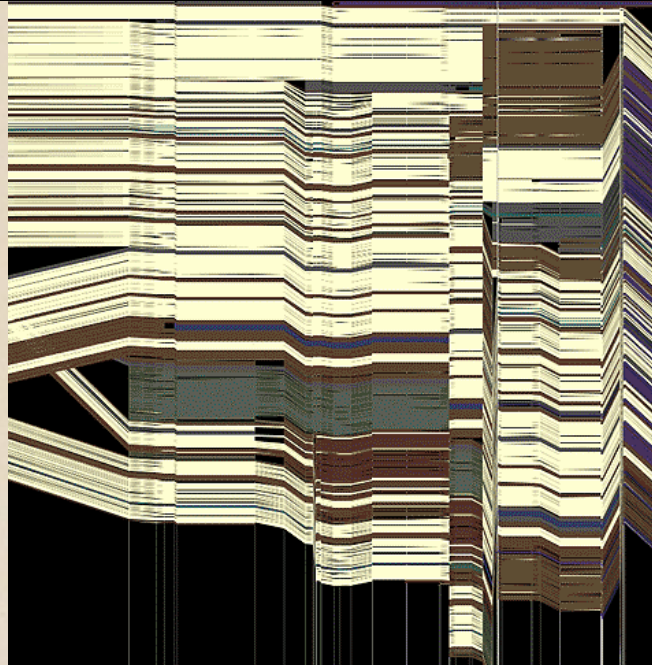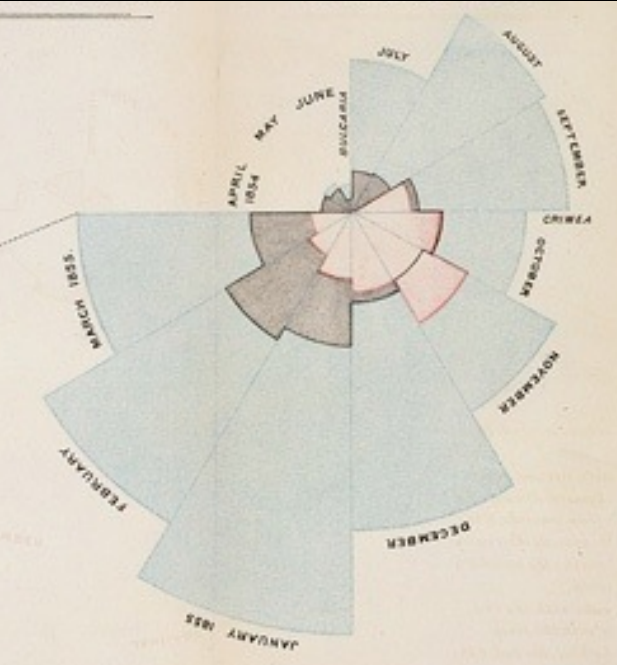# CSE 412 - Intro to Data Visualization

A1 Review

Jane Hoffswell University of Washington

A1 Submission Designs

Fields: Sunshine, Lat/Long, City, Month
Extra: Climate, Energy, Mental Health, …

Transforms: Sums, Averages, Differences, Percentages, Proportions, Filter

Chart Types: Line, Area, Bar, Scatter, Heatmaps, Maps, Radial, Compositions

Design Considerations

Title, labels, legend, captions, source!

Expressiveness and Effectiveness
Avoid unexpressive marks (lines? gradients?)
Use perceptually effective encodings
Don't distract: faint gridlines, pastel highlights/fills
The "elimination diet" approach – start minimal

Support comparison and pattern perception
Between elements, to a reference line, or to totals

Use reader-friendly units and labels
Statistical soundness (regression, interpolation)

Design Considerations

Transform data (e.g., filter, log, normalize)

Group / sort data by meaningful dimensions

Reduce cognitive overhead
Minimize visual search, minimize ambiguity
Appropriate size, aspect ratio, legible text
Avoid legend lookups if direct labeling works
Avoid color mappings with indiscernible colors

Be consistent! Visual inferences should
consistently support data inferences.

Zoom Poll:
Most Common Visualization?

Administrivia

A2: Exploratory Data Analysis

Use visualization software to form & answer questions

First steps:

Step 1: Pick domain & data

Step 2: Pose questions

Step 3: Profile the data

Iterate as needed
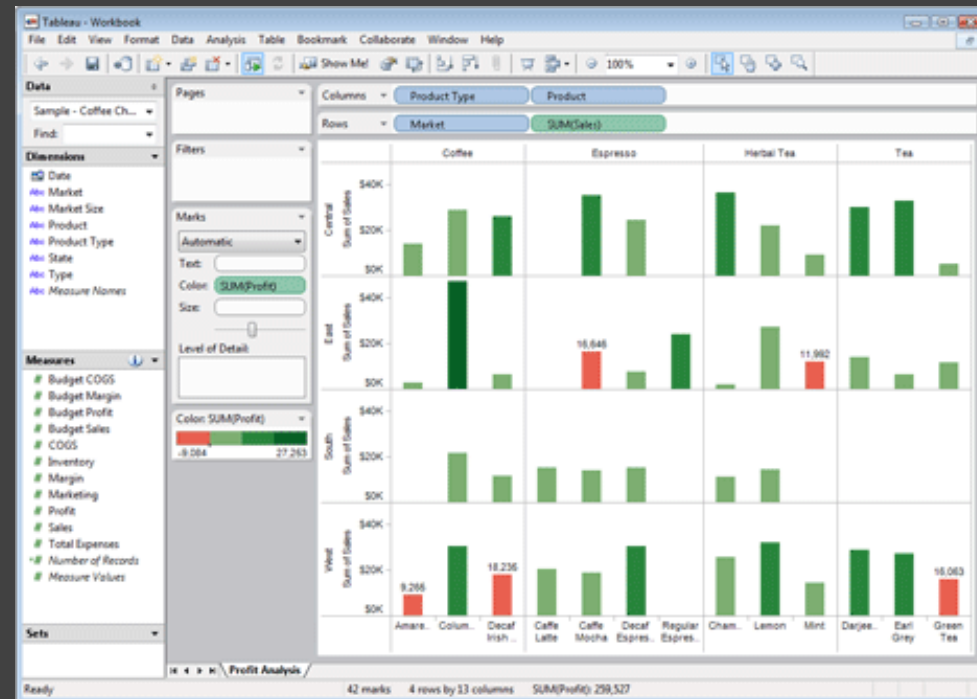
Create visualizations

Interact with data

Refine your questions

Author a report
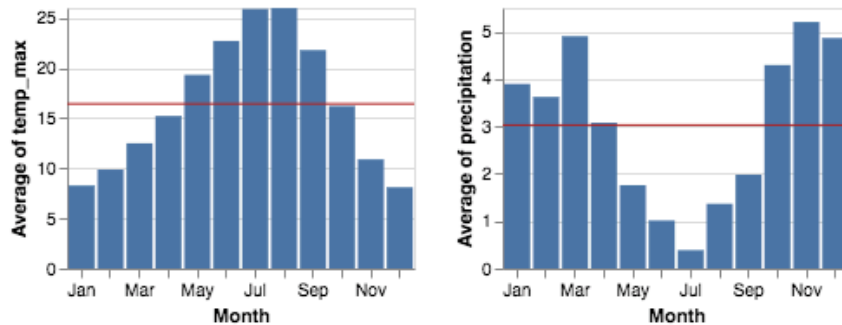
Screenshots of most insightful views *(8+)*

Include titles and captions for each view
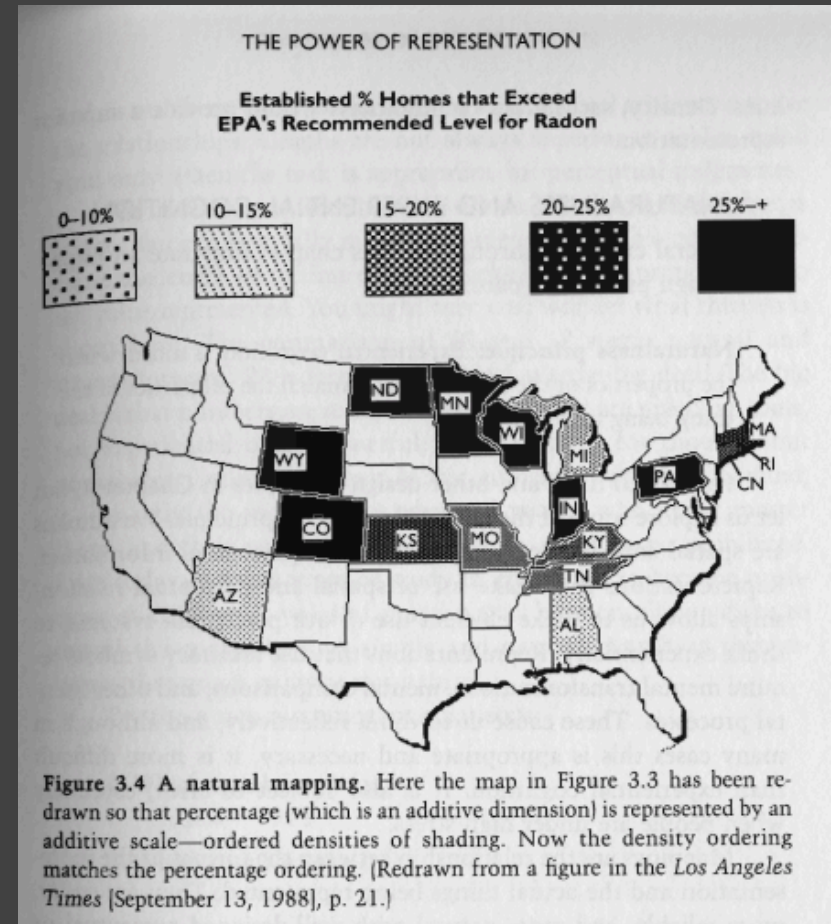
Due by 11:59pm

Monday, Apr 19

Required Readings for Mon 4/12


```
vl.data(weather)
  .transform(vl.filter('datum.location == "Seattle"'))
  .layer(
    vl.markBar().encode(
      vl.x().month('date').type('ordinal').title('Month'),
      vl.y().average(vl.repeat('column'))
    ),
    vl.markRule({stroke: 'firebrick'}).encode(
      vl.y().average(vl.repeat('column'))
    )
  )
  .width(200)
  .height(150)
  .repeat({column: ['temp_max', 'precipitation', 'wind']})
  .render();
```

Notebook: Multi-View Composition

THE POWER OF REPRESENTATION

Established % Homes that Exceed EPA's Recommended Level for Radon

0–10%   10–15%   15–20%   20–25%   25%–+

Figure 3.4 A natural mapping. Here the map in Figure 3.3 has been redrawn so that percentage (which is an additive dimension) is represented by an additive scale—ordered densities of shading. Now the density ordering matches the percentage ordering. (Redrawn from a figure in the *Los Angeles Times* [September 13, 1988], p. 21.)

Chapter 3: The Power of Representation. Don Norman. Things That Make Us Smart. 1993.

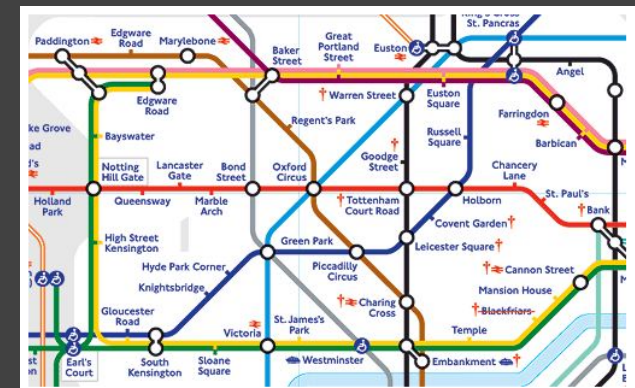# Optional Readings for Week 3
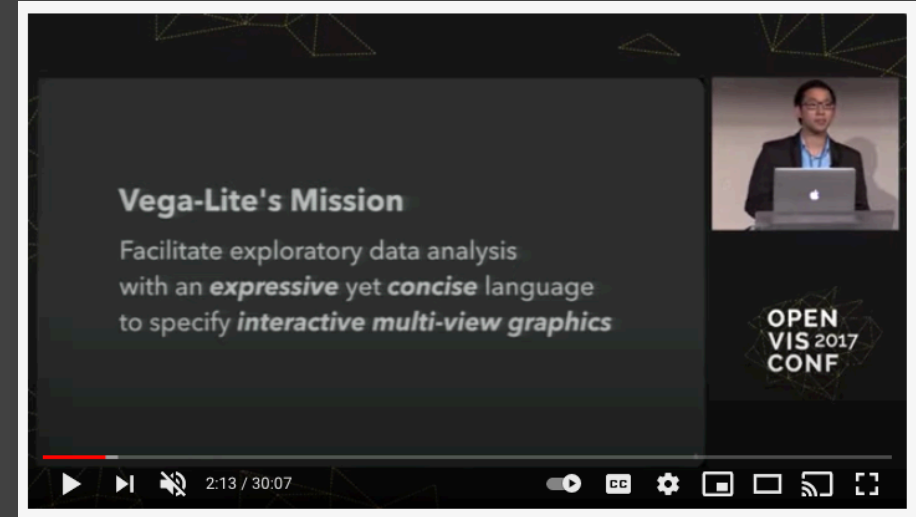
WED A Rank-by-Feature Framework for Interactive Exploration of Multidimensional Data. Seo et al. 2005.

THUR Vega Lite: A Grammar of Interactive Graphics. Wongsuphasawat et al. OpenVis Conf. 2017. (VIDEO)

WED Techniques for Flexible Responsive Visualization Design. Hoffswell et al. ACM CHI. 2020. **Best Paper Award.**

FRI Reinventing Explanation. Nielsen. 2014.

Reflection & Discussion