Working with and Understanding Plot Types

Steven Braun

Data Analytics and Visualization Specialist

May 8, 2017

static ——— interactive

chart ——— graph

plot ——— figure

visualization ——— infographic

5 minutes

Come up with as many ways possible to visually represent the following data:

5 minutes

Come up with as many ways possible to visually represent the following data:

27 73

How would we begin to taxonomize your responses?

Creating Taxonomies

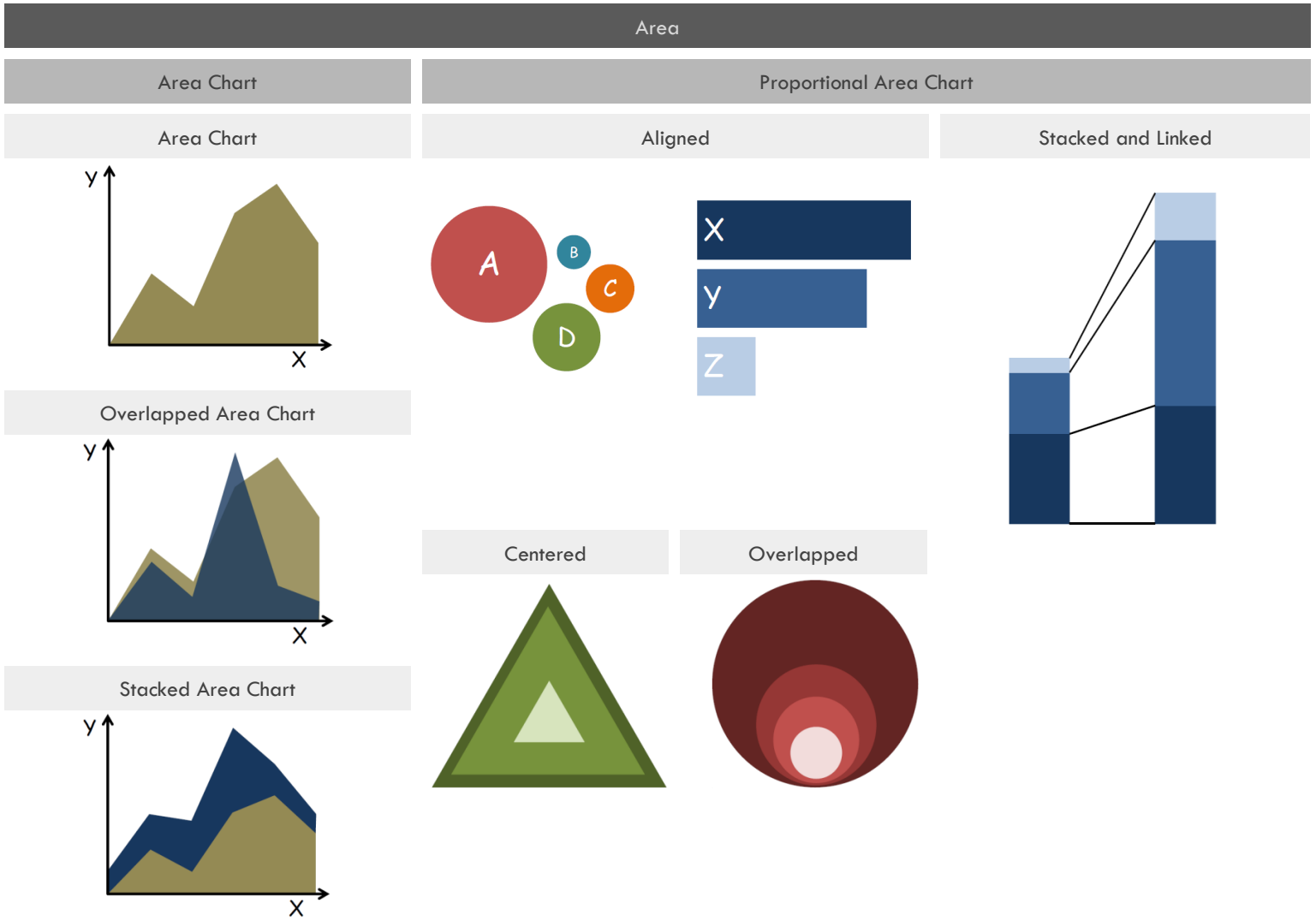
1. Divide into 2 large groups

2. In each group, post all of your visualization responses on the wall

3. As a group, come up with a classification scheme (taxonomy) to categorize and organize your responses; be prepared to share with the class

A Taxonomy of Visualizations

Michelle Borkin, Azalea Vo, Zoya Bylinskii, Phillip Isola, Shashank Sunkavalli, Aude Oliva, & Hanspeter Pfister. What makes a visualization memorable? *IEEE Transactions on Visualization and Computer Graphics* (Proceedings of InfoVis 2013), 19, 12, 2306-2315.

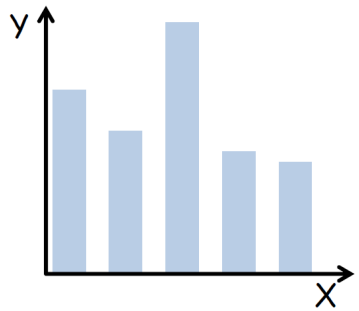


Michelle Borkin, Azalea Vo, Zoya Bylinskii, Phillip Isola, Shashank Sunkavalli, Aude Oliva, & Hanspeter Pfister. What makes a visualization memorable? *IEEE Transactions on Visualization and Computer Graphics* (Proceedings of InfoVis 2013), 19, 12, 2306-2315.

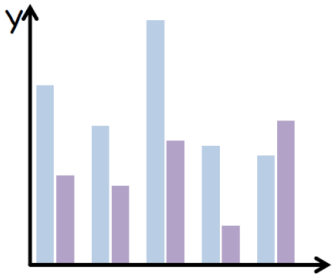
Bar

Bar Chart

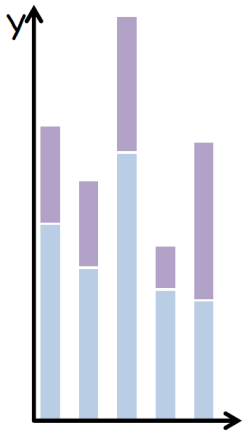
Bar Chart



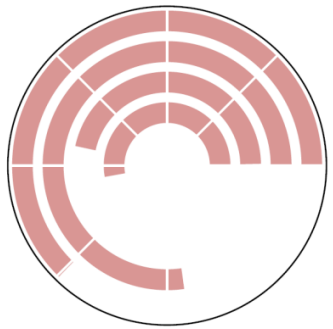
Grouped Bar Chart



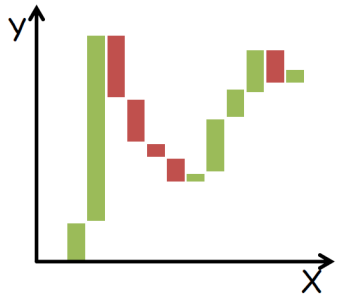
Stacked Bar Chart



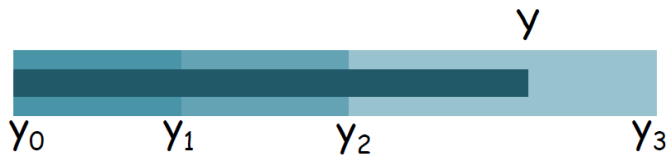
Circular Bar Chart



Waterfall Chart

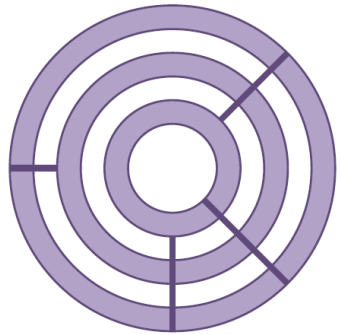


Bullet Graph



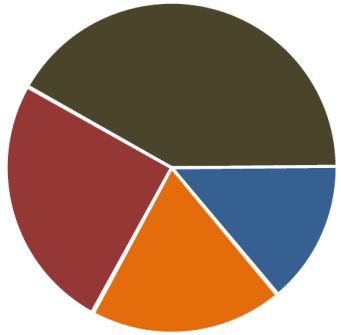
Circle

Belt Chart



Donut Chart

Pie Chart



Sector Graph

Diagram

Flow Chart

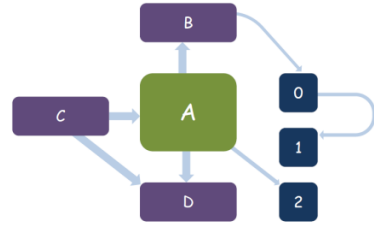
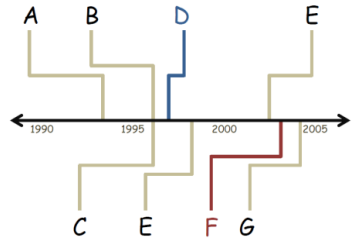


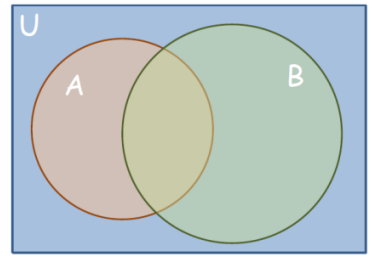
Illustration (or Rendering)

Sankey Diagram

Timeline

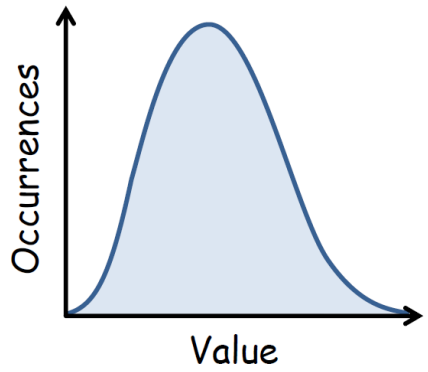


Venn Diagram

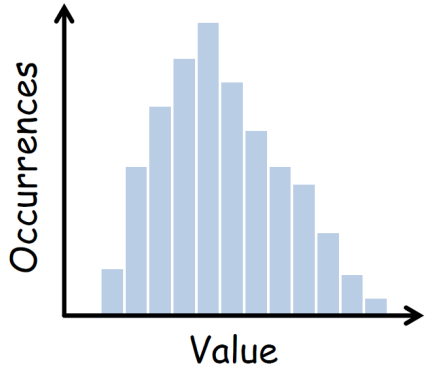


Distribution

Distribution Curve

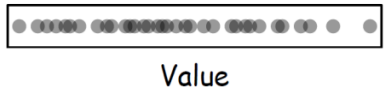


Histogram



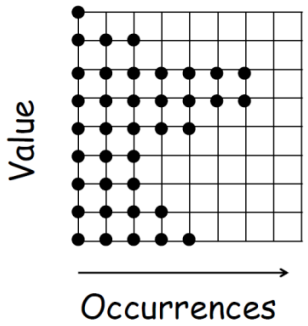
Box-And-Whisker Plot

Point Graph

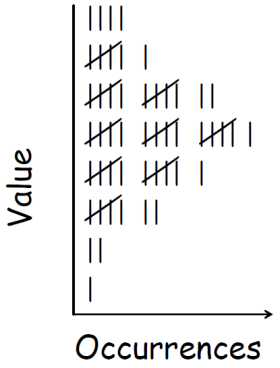


Stripe Graph

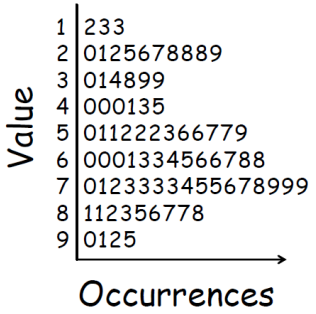
Dot Array



Tally Chart



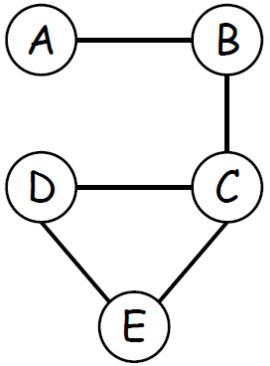
Stem-And-Leaf Plot



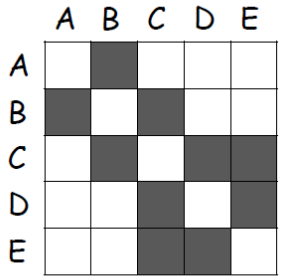
Tree and Network (Graph)

Tree and Network (Graph)

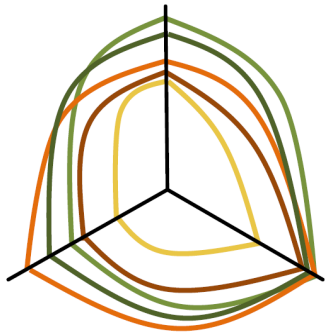
Graph



Matrix Representation

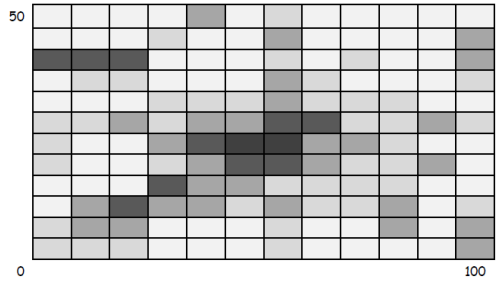


Hive Graph

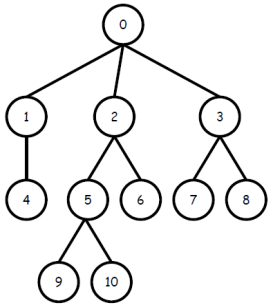


Grid / Matrix

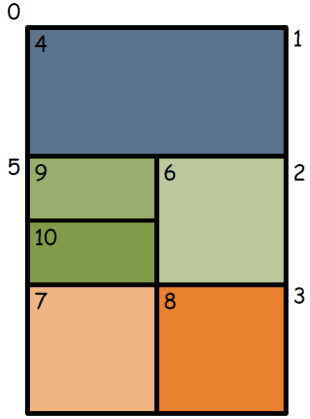
Heat Map



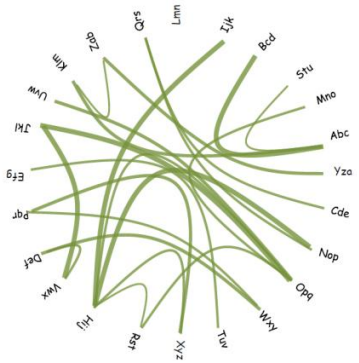
Tree



Treemap



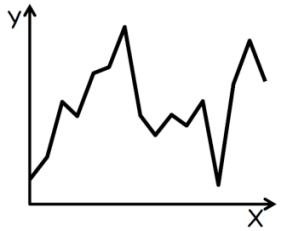
Hierarchical Edge Bundling



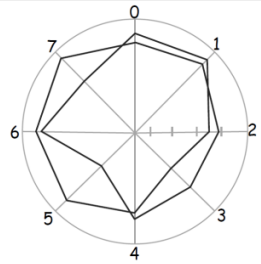
Line

Line Graph

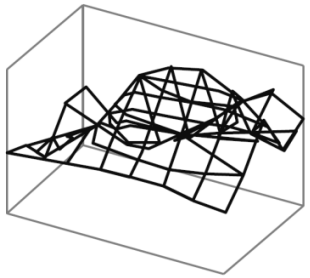
Line Graph



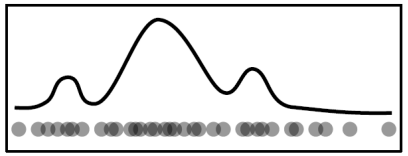
Circular Line Graph



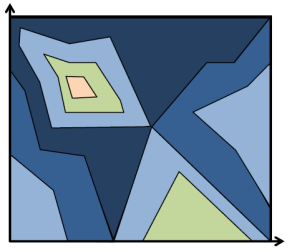
Surface Graph



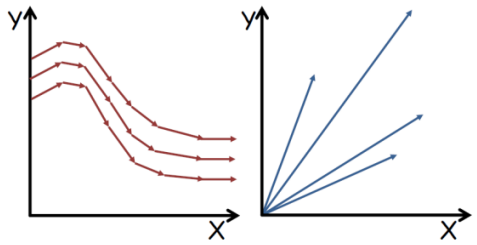
Density Plot



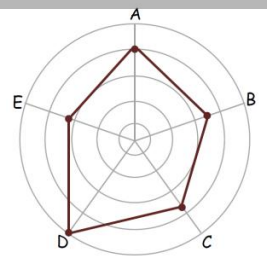
Surface Graph



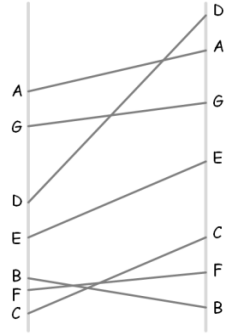
Vector Graph



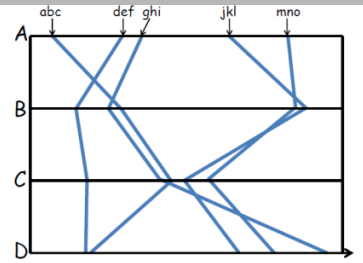
Star Plot



Slopegraph



Parallel Coordinates

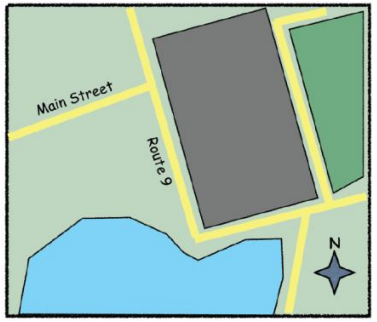


Map

Geographic Map

Geographic Map

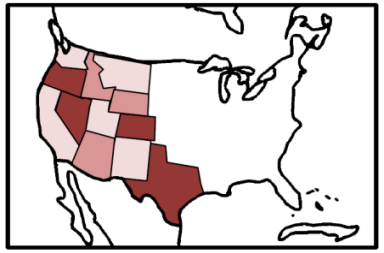
Street Map



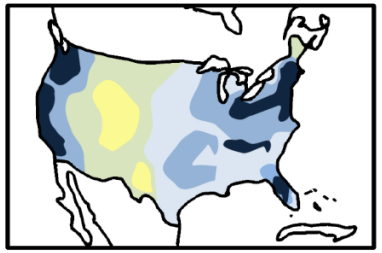
Flow Map

Statistical Map

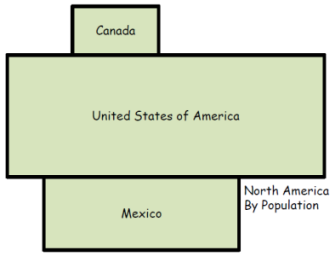
Choropleth Map



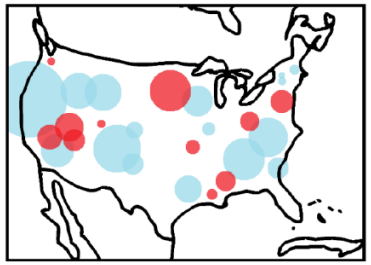
Contour Map (Isopleth)



Distorted Map (Cartogram)



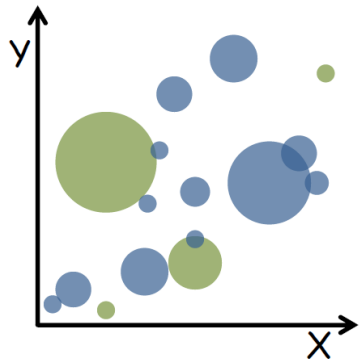
Statistical Plot Map



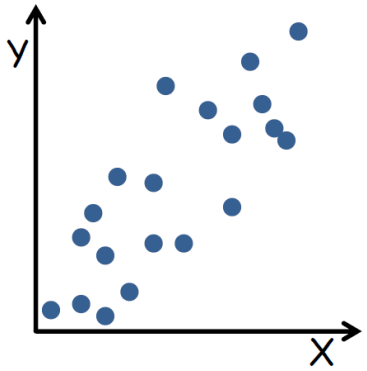
Point

Scatter Plot

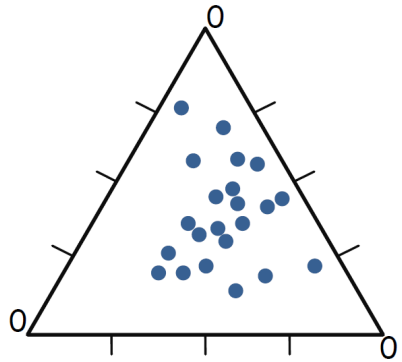
Bubble Chart



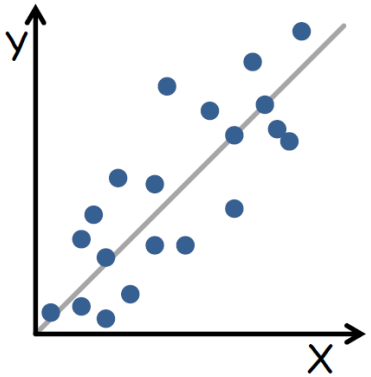
Scatter Plot



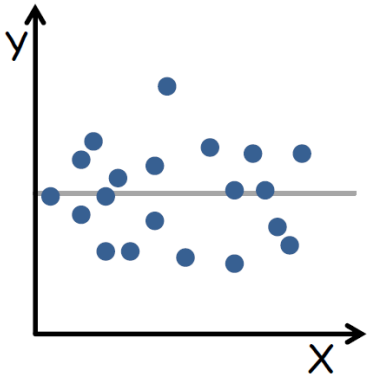
Trilinear Scatter Plot



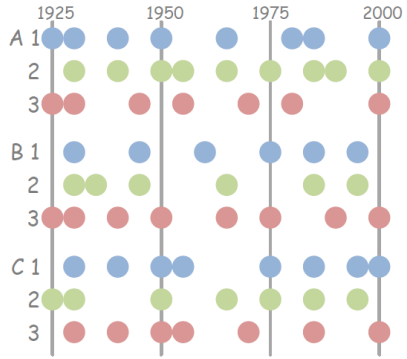
Trend Line



Residual Graph



Dot Plot



Table

Table

ABC	1234	X45
Category	543.2109	7%
Group	45.67	45%
Unit	9876	98%
Class	123.78	12%

Text Chart

Title

- Sed dignissim vehicula
- Nisl quis congue
- Sed vitae rhoncus odio
- Integer at odio

Heading 1

"Nunc aliquam turpis at tellus varius hendrerit. Ut nec magna tortor. Proin adipiscing dolor eget odio semper ut commodo lacus imperdiet."

- Lorem

Heading 2

Aenean tincidunt sem vel massa cursus non tempus quam auctor. In nisi mi, commodo sit.

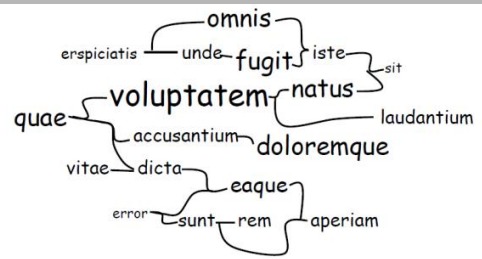
Amet rutrum vitae, fringilla non urna. Quisque sagittis ultrices sapien, quis posuere massa interdum quis.

Heading 3

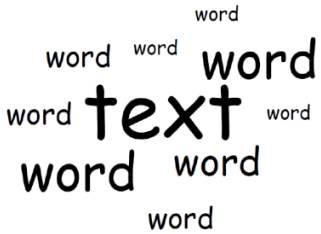
- ✓**Chart 1**
- ✓**Chart 2**
- ✓**Chart 3**
- ✓**Chart 4**

Text Based

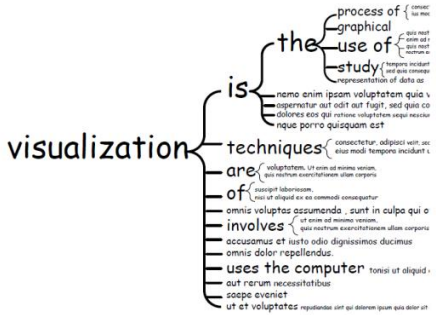
Phrase Net



Word Cloud



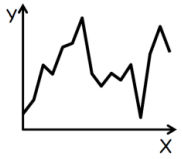
Word Tree



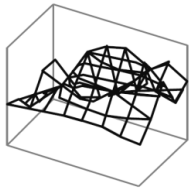
Properties

Dimensionality

2D

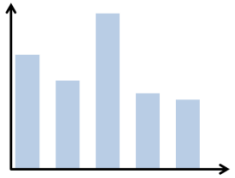


3D



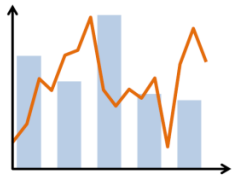
Multiplicity

Single



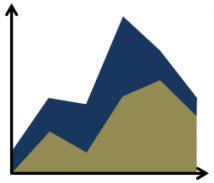
Multiple

Combination

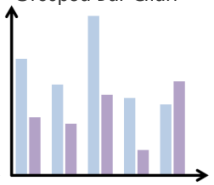


Grouped

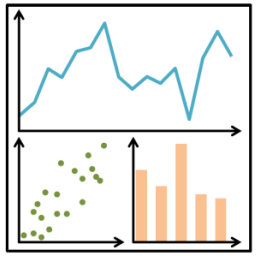
Stacked Area Chart



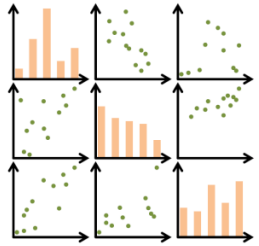
Grouped Bar Chart



Multipanel

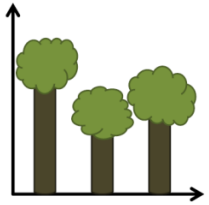


Small Multiples



Pictorial

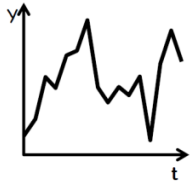
Pictorial Bar Chart



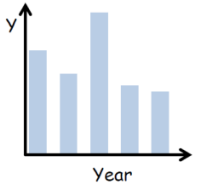
Pictorial Unit Chart

Time Component

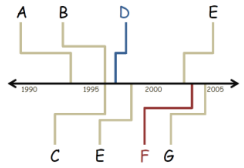
Time Series



Bar Chart with Time



Timeline



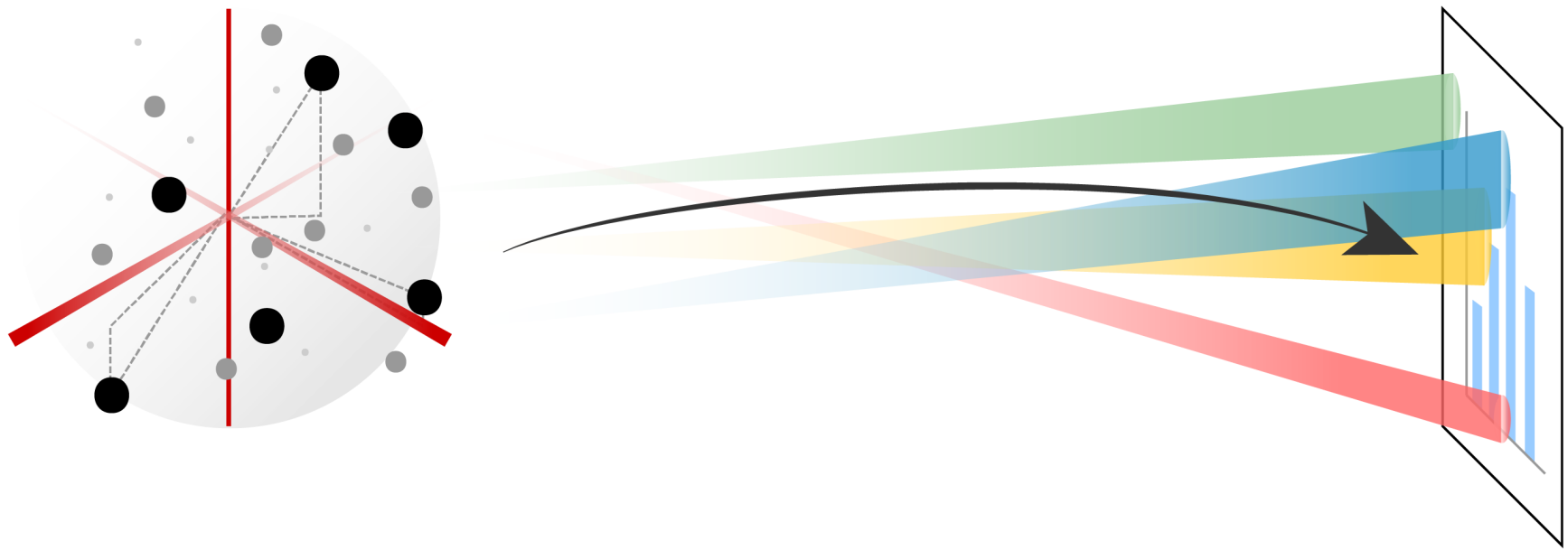
What kinds of charts, graphs, and plots do you create in your research?

How do you know which kind of plot to use and when to use it?

Being **critical practitioners** of data visualization means thinking about information design as

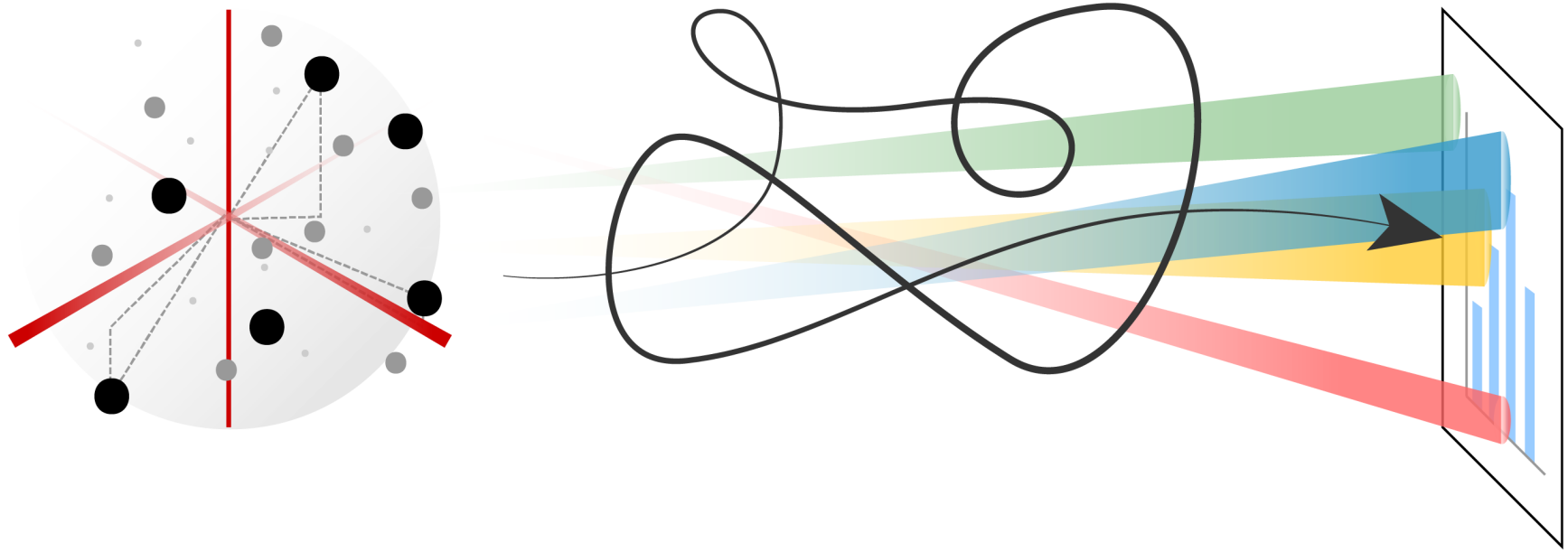
constructed space

Data are manifold, and our choices of representation have a direct impact on their interpretation and use



data

representation



data

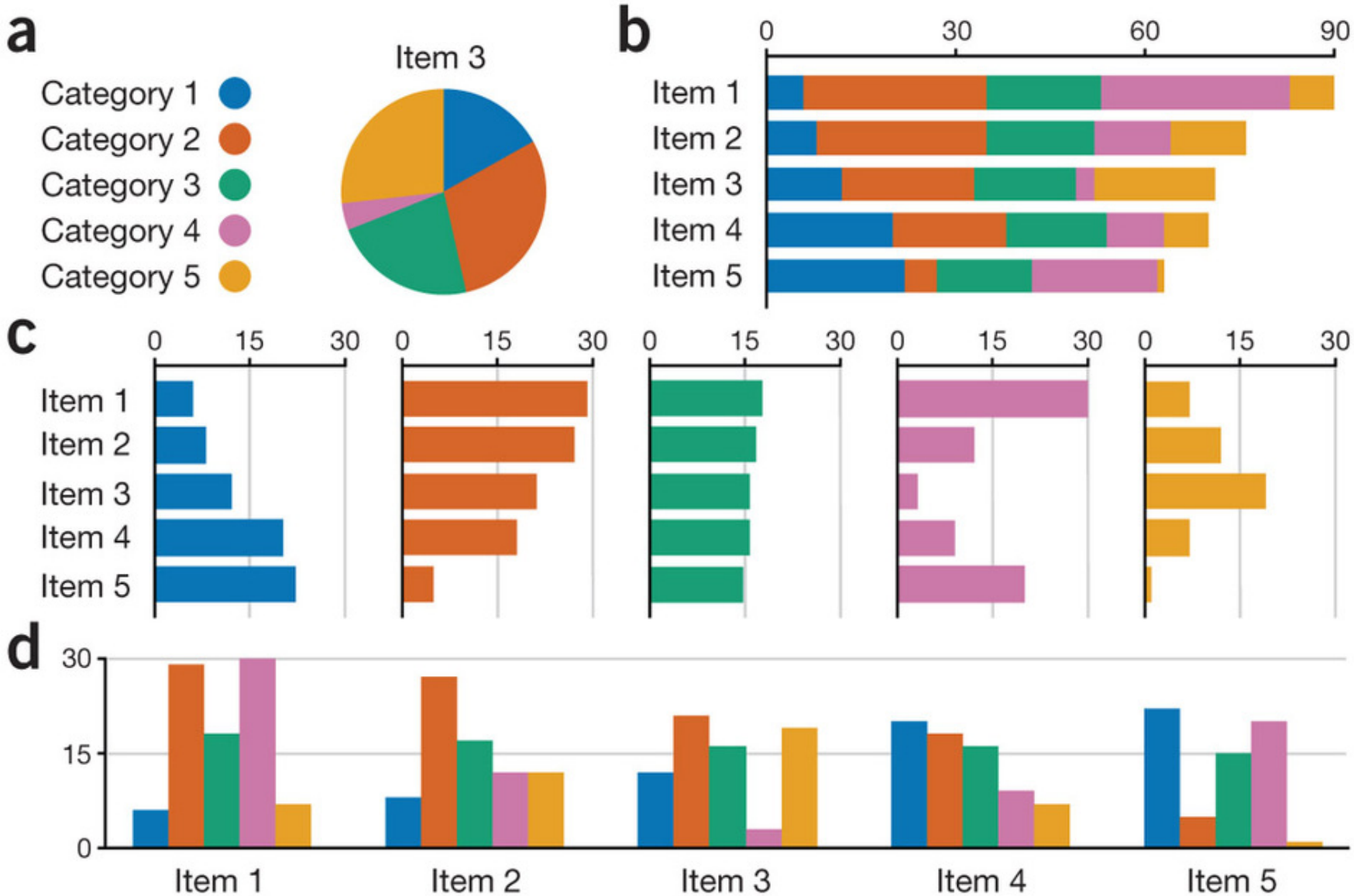
representation

Use the right chart type
for the right kind of data

Bar Charts, Box Plots, and Histograms

Bar charts are used to represent counts in data

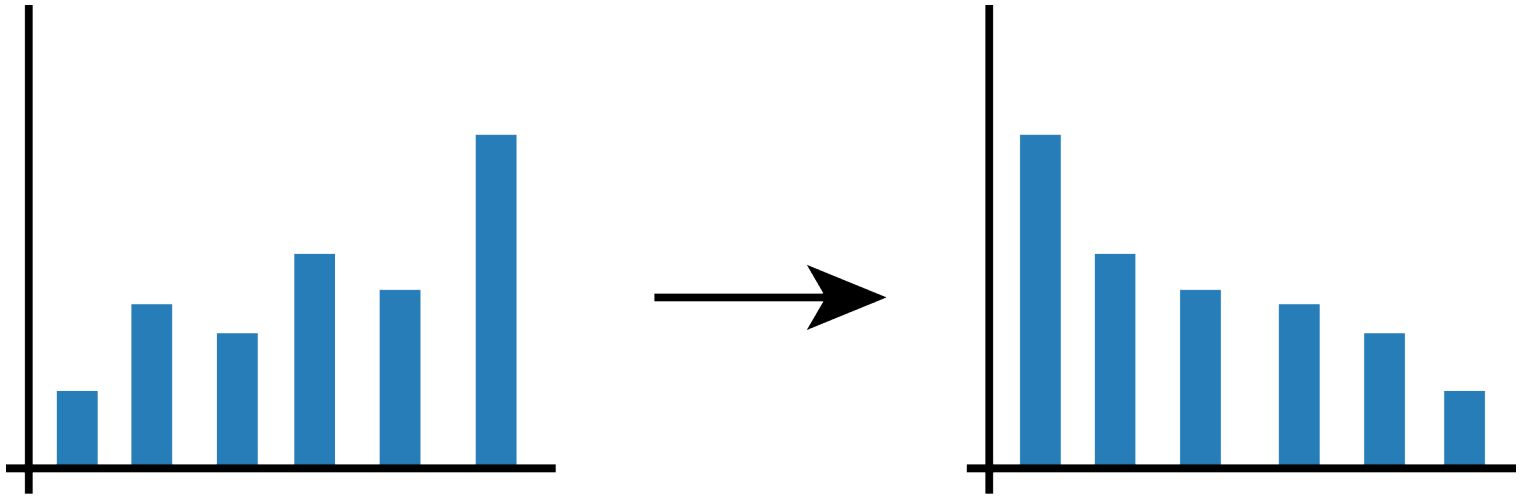
Bar charts are effective because they encode quantitative data by length, which is a highly accurate encoding for making comparisons



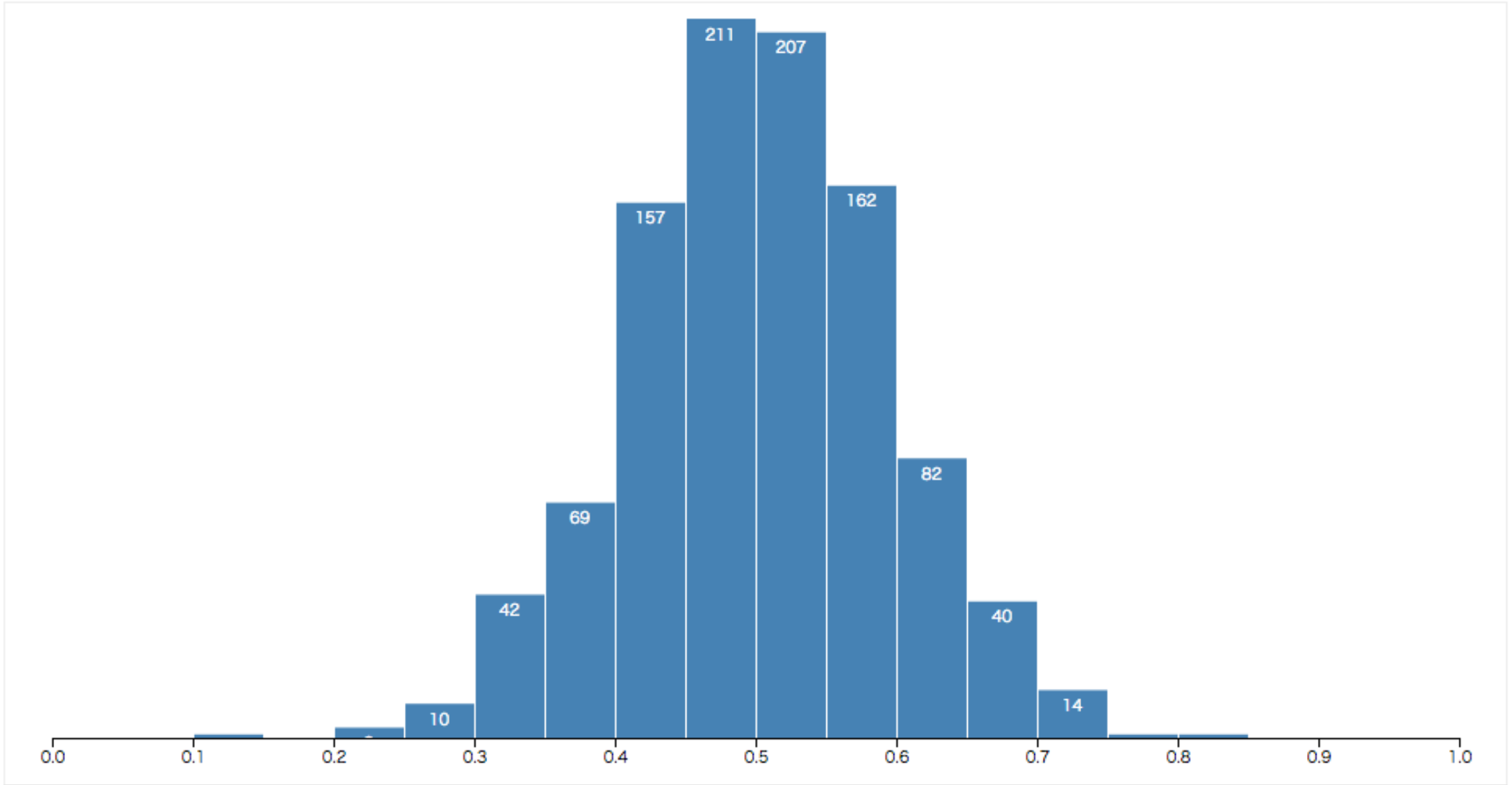
Gehlenborg, Nils and Streit, Marc. Points of View: Bar charts and box plots. *Nature Methods* 11, 117 (2014)

When possible, order bar charts by descending magnitude to make them easier to read

(Prägnanz)



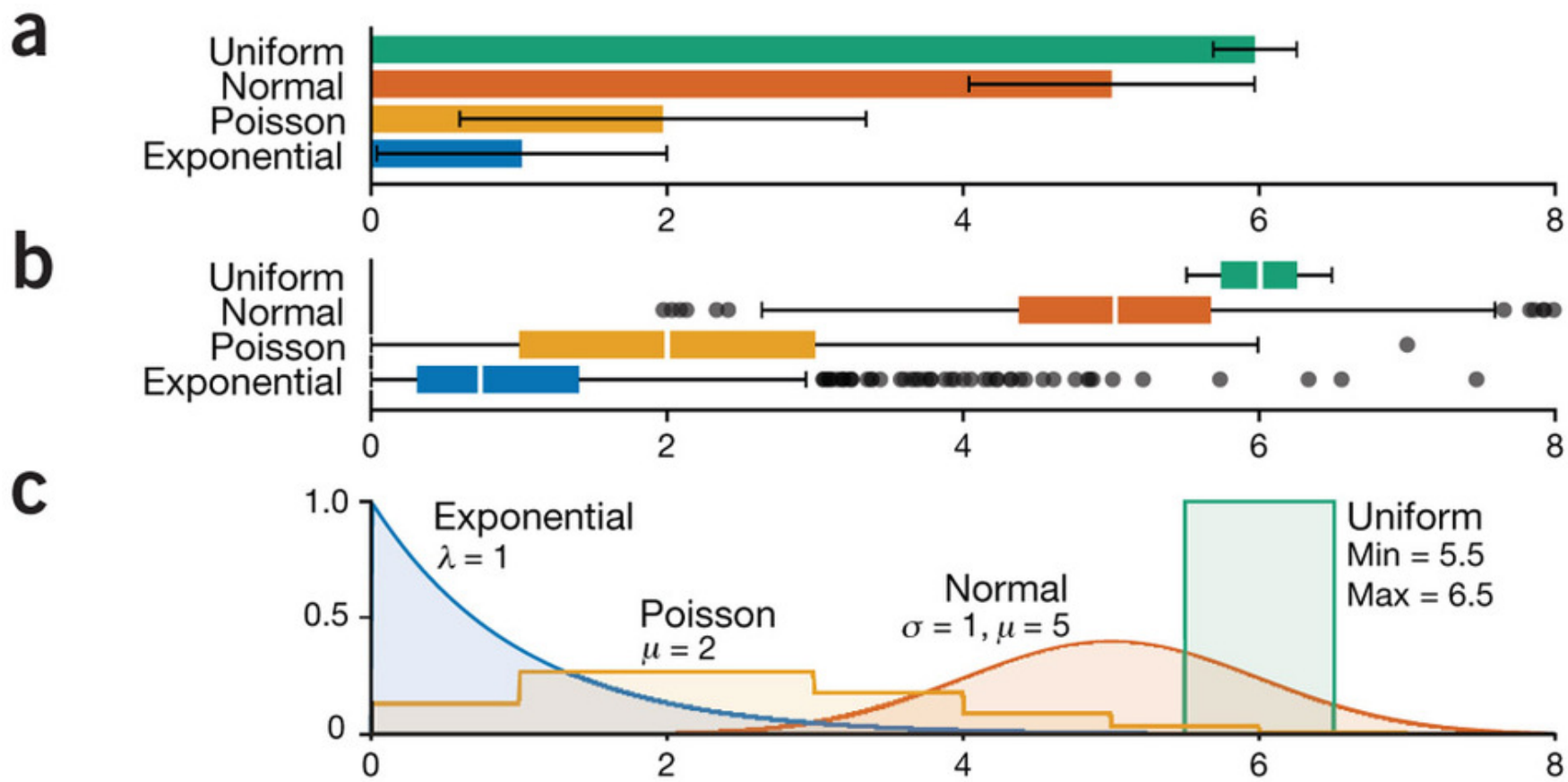
Bar charts are different from
histograms,
which show binned distributions of
populations or sets of data



https://bl.ocks.org/mbostock/3048450

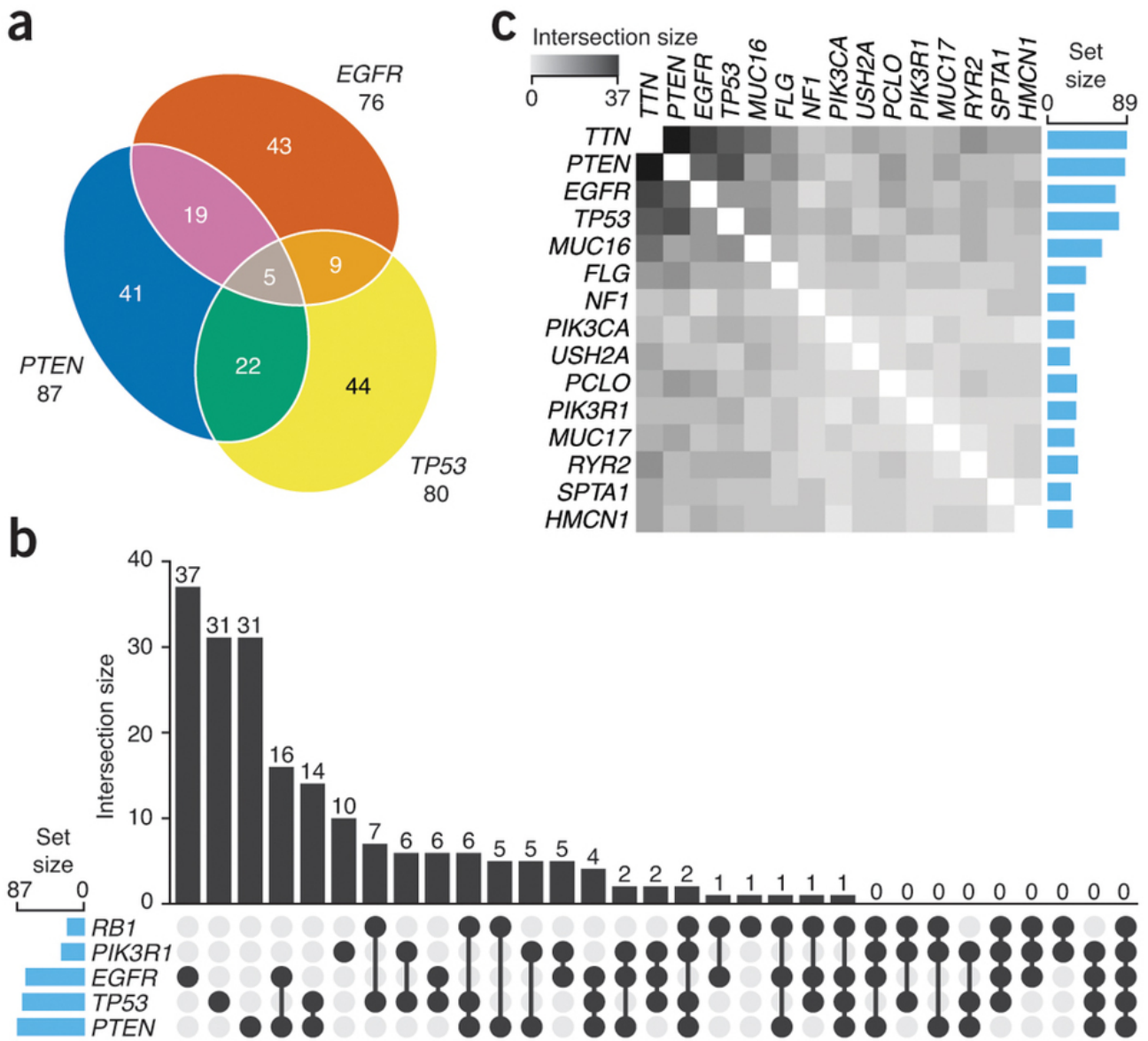
Distributions

Box plots are ideal for communicating information about distributions in data



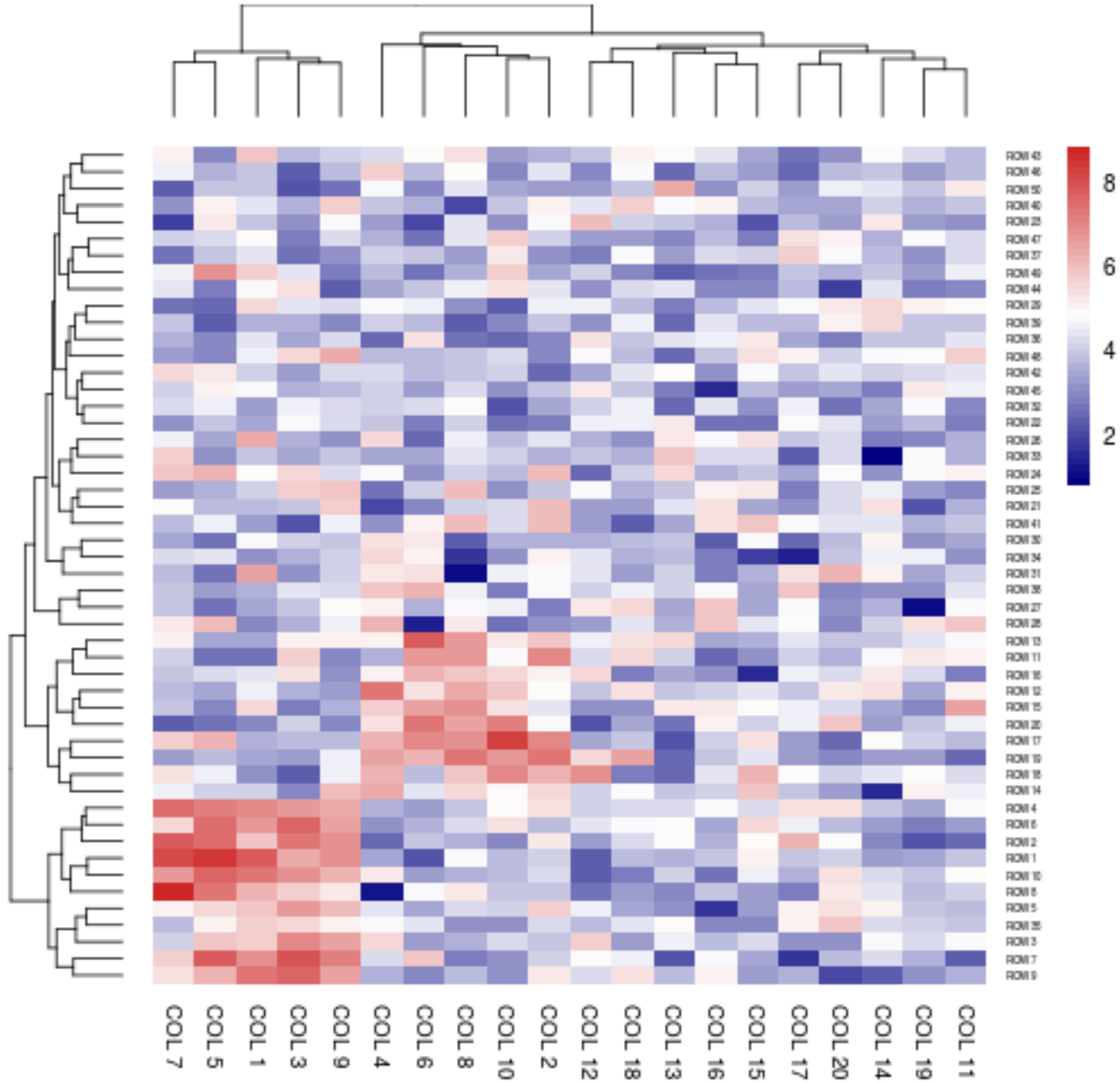
Gehlenborg, Nils and Streit, Marc. Points of View: Bar charts and box plots. *Nature Methods* 11, 117 (2014)

Sets and Intersections

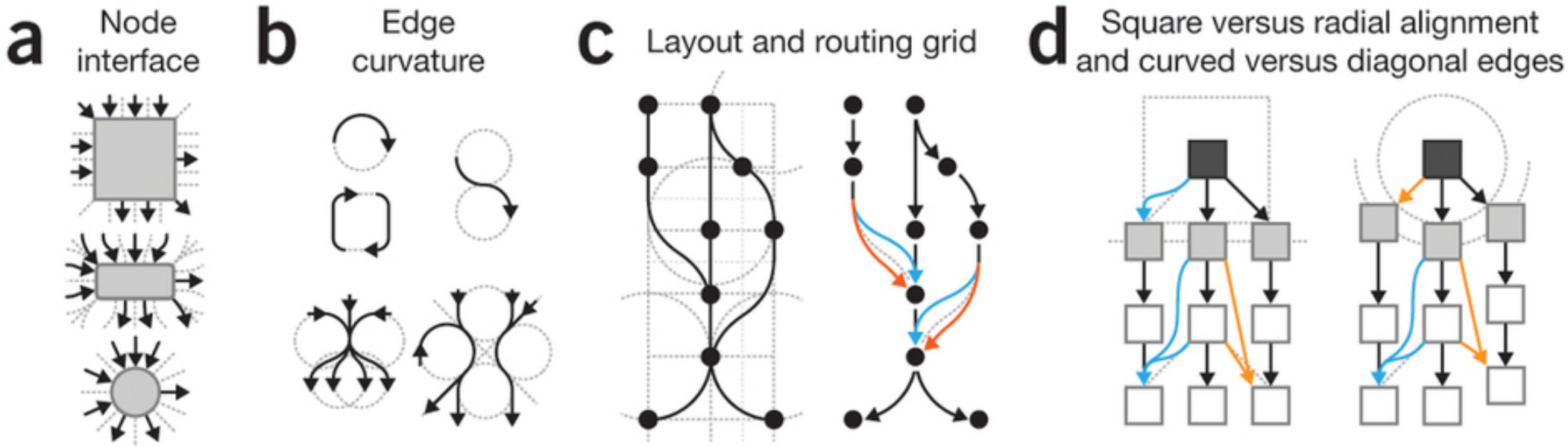


Lex, Alexander and Gehlenborg, Nils. Points of View: Sets intersections. *Nature Methods* 11, 779 (2014)

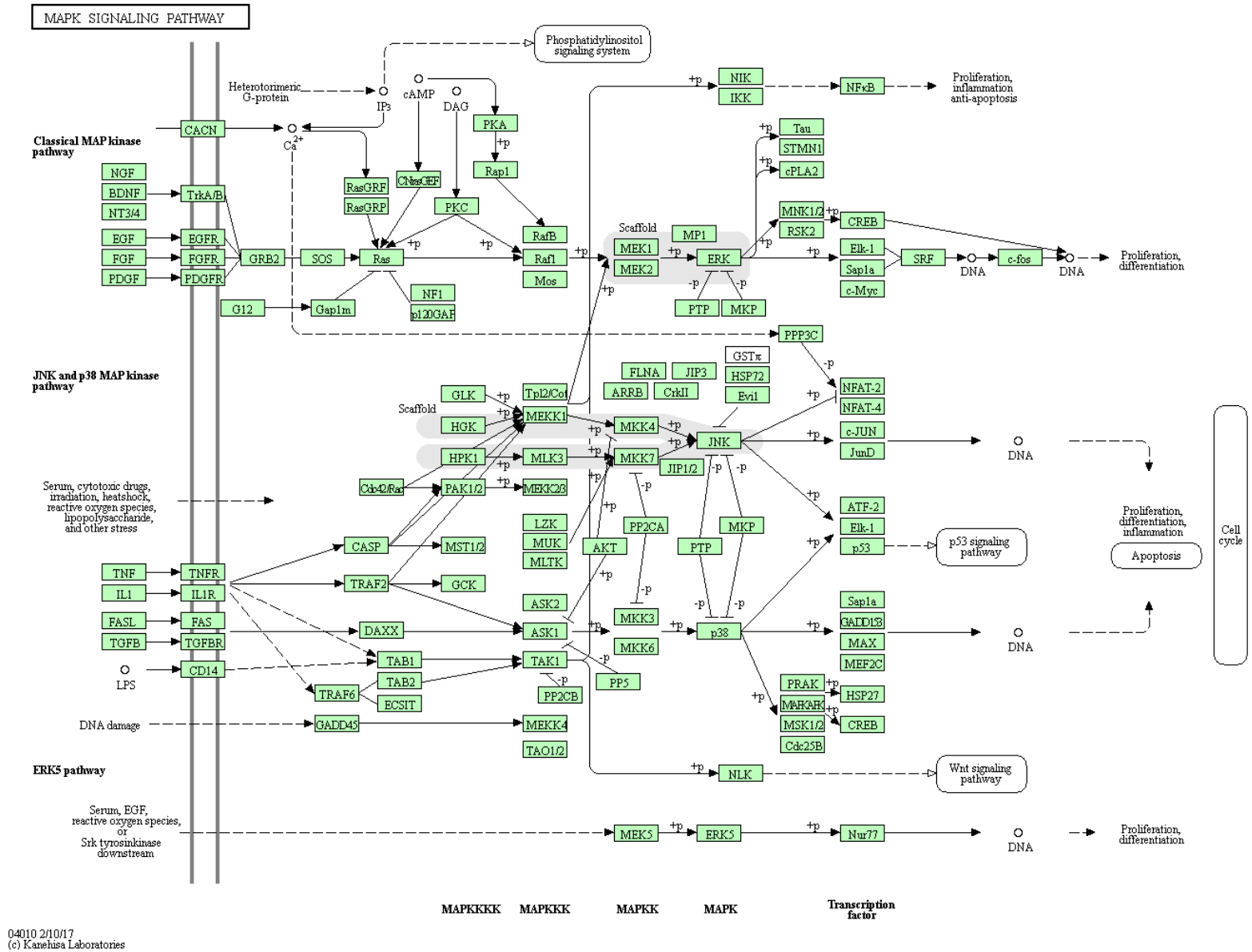
Heat Maps


8
6
4
2
COL 7
COL 5
COL 1
COL 3
COL 9
COL 4
COL 6
COL 8
COL 10
COL 2
COL 12
COL 18
COL 13
COL 16
COL 15
COL 17
COL 20
COL 14
COL 19
COL 11

Pathway Visualizations



Hunnicutt, Barbara and Krzywinski, Martin. Points of View: Pathways. *Nature Methods* 13, 5 (2016)



http://www.genome.jp/kegg-bin/show_pathway?hsa04010

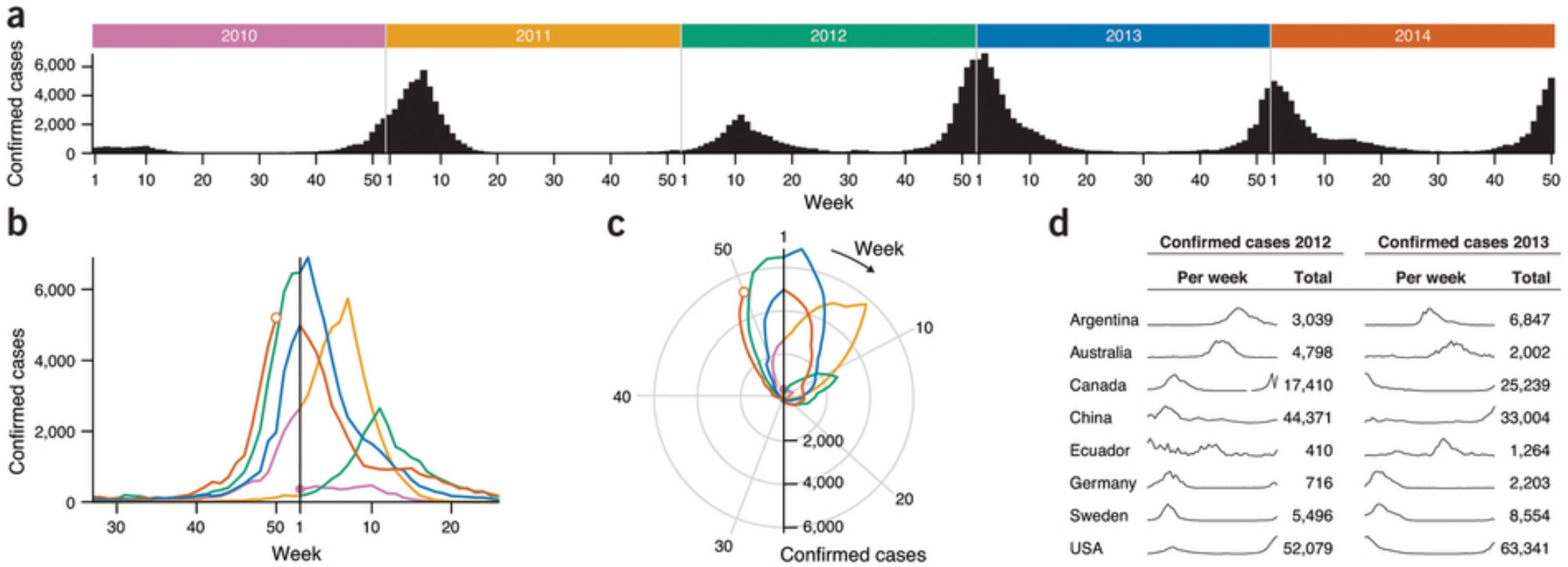
Encoding Temporal Data

WAYS OF ENCODING TIME

Position

Brightness and Saturation

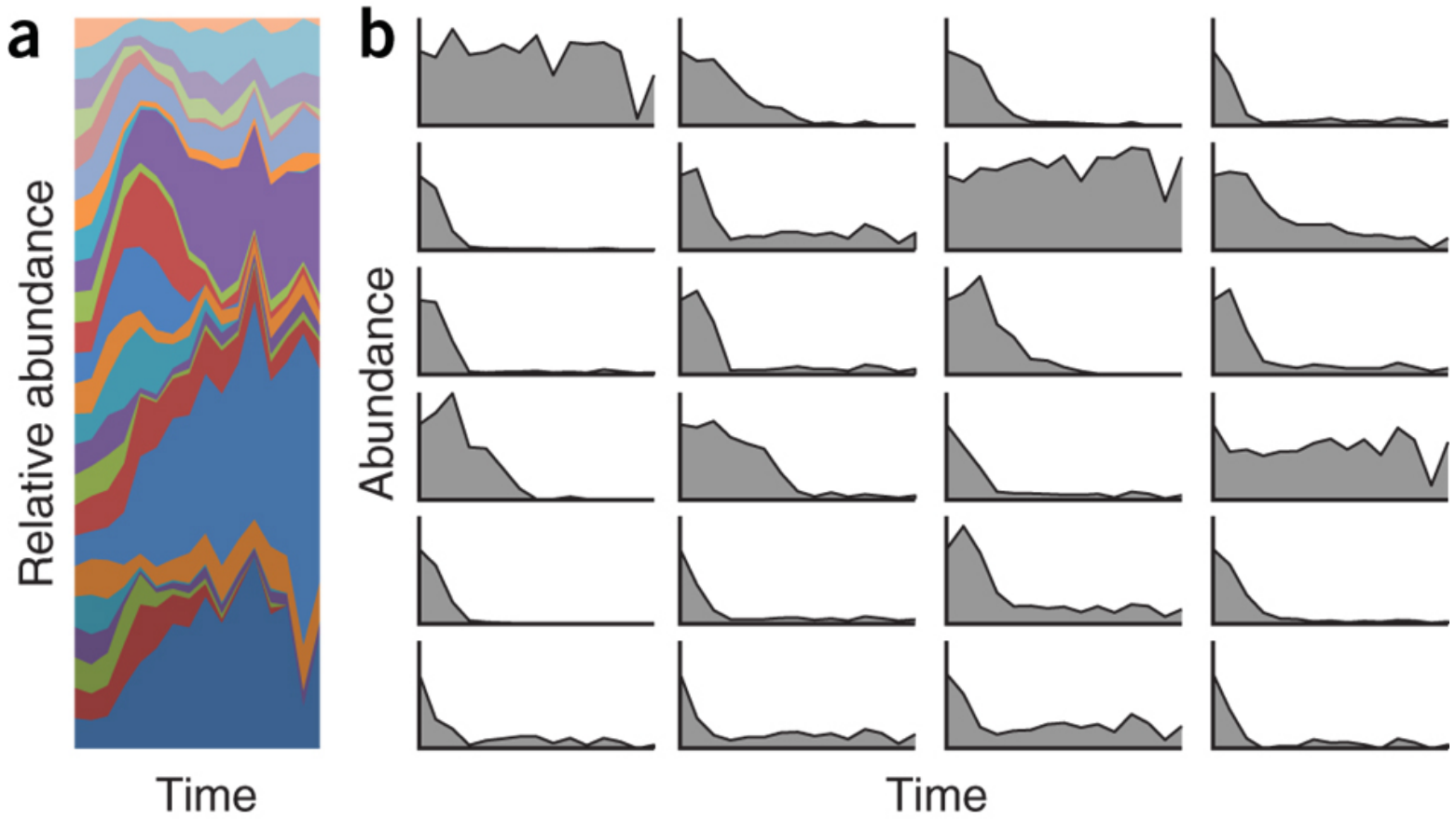
Animation



Streit, Marc and Gehlenborg, Nils. Points of View: Sets intersections. *Nature Methods* 12, 97 (2015)

An alternative to using animation is

using small multiples to compare data over time



Shoresh, Noam and Wong, Bang. Points of View: Data exploration. *Nature Methods* 9, 5 (2012)