



Bubble Map



Calendar



Candlestick Chart



Chord Diagram



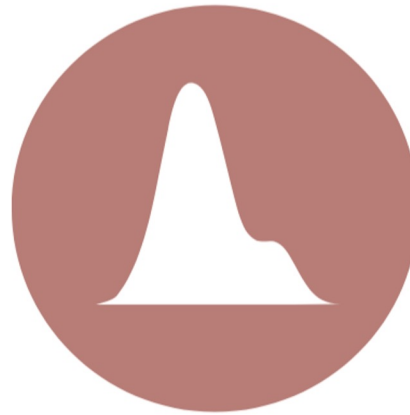
Choropleth Map



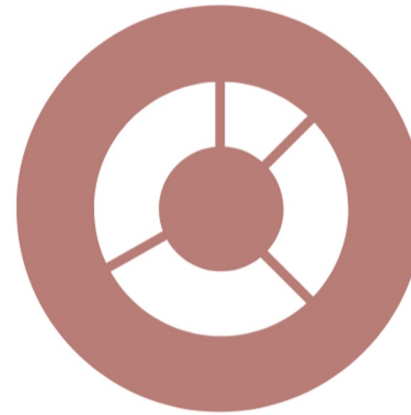
Circle Packing



Connection Map



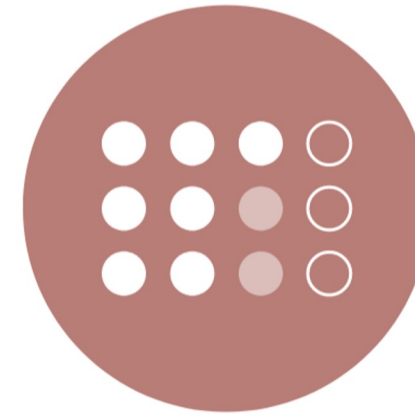
Density Plot



Donut Chart



Dot Map



Dot Matrix Chart

3. Visualization Catalogue

Data comparison charts

Data reduction charts

Comparison

Composition

Distribution

Evolution

Relationship

Profiling

Bars



Pie



Histogram



Line



Scatterplot



Grouped bars



Dot plot



Bullet



Pareto



ID Scatterplot



Horizon



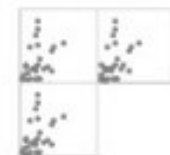
Connected Scatterplot



Cycle plot



Scatterplot matrix



ID Scatterplot



Heat map



Multidimensional Pie



Boxplot



Step



Bubble



Reorderable matrix



Horizon



Slope



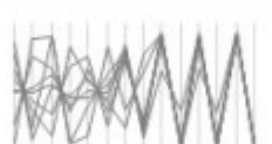
Alert



Connected Scatterplot



Parallel Plot



Trellis



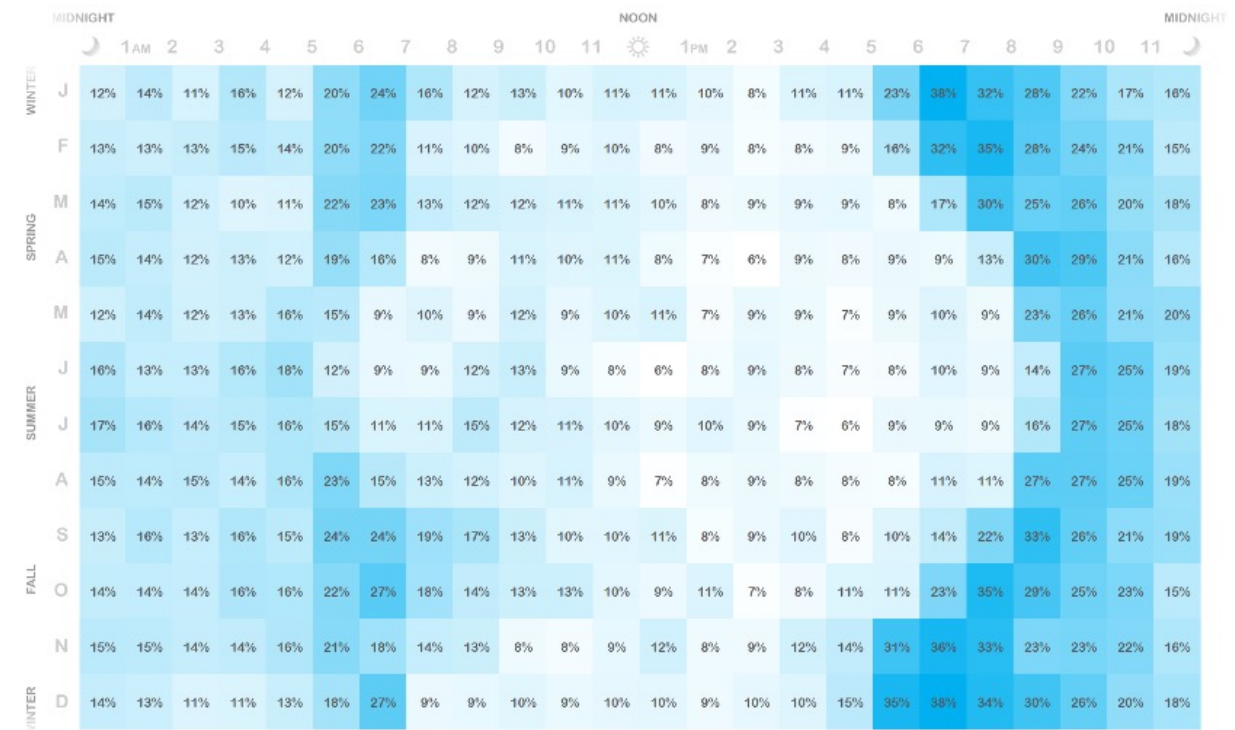
Heat Maps

The Horizon of Pedestrian Risk

The rate of fatal traffic incidents involving pedestrians, each hour of the day, throughout the seasons of the year.

The seasonal shift of our setting sun traces an ark of elevated risk – an echo of the curve of the Earth, itself (Note: ???).

Source: Fatality Analysis Reporting System (NHTSA 2006-2010)

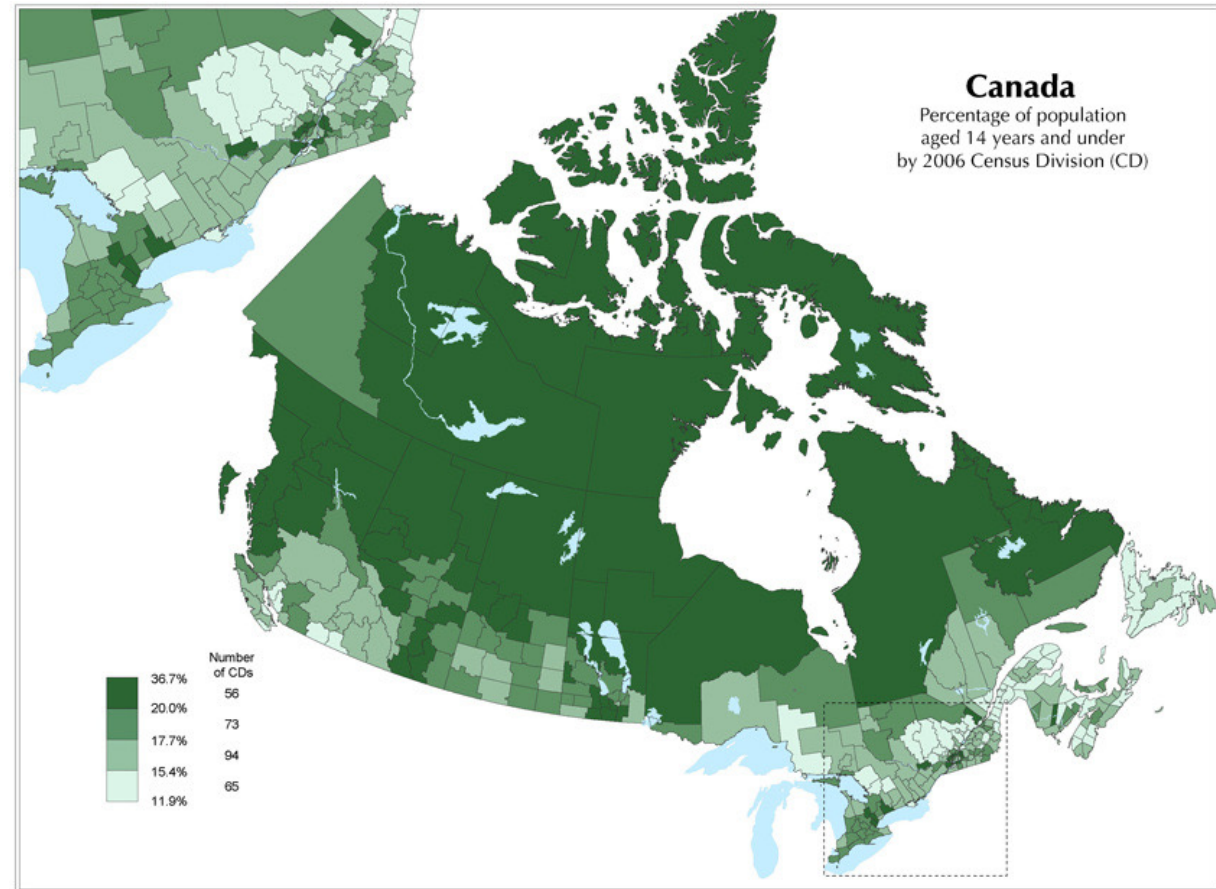
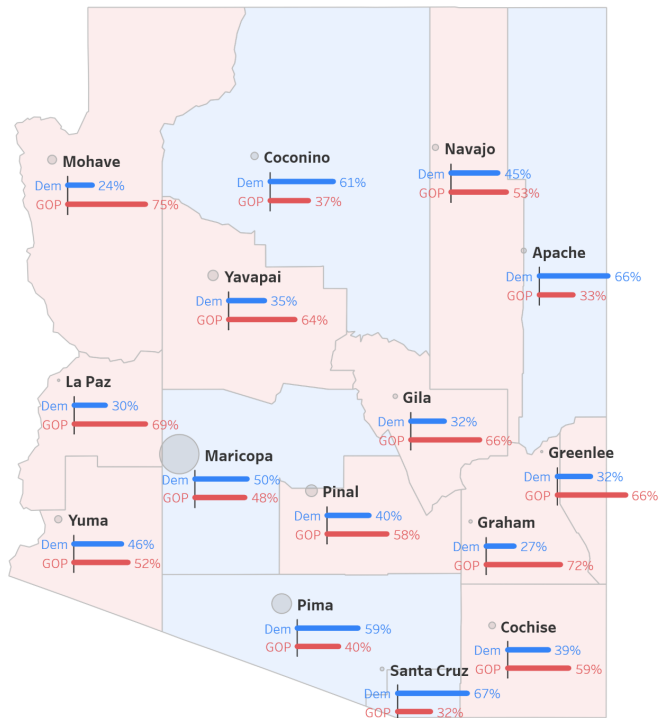


Heat Maps (Choropleths)

2020 Arizona Presidential Election Results by County

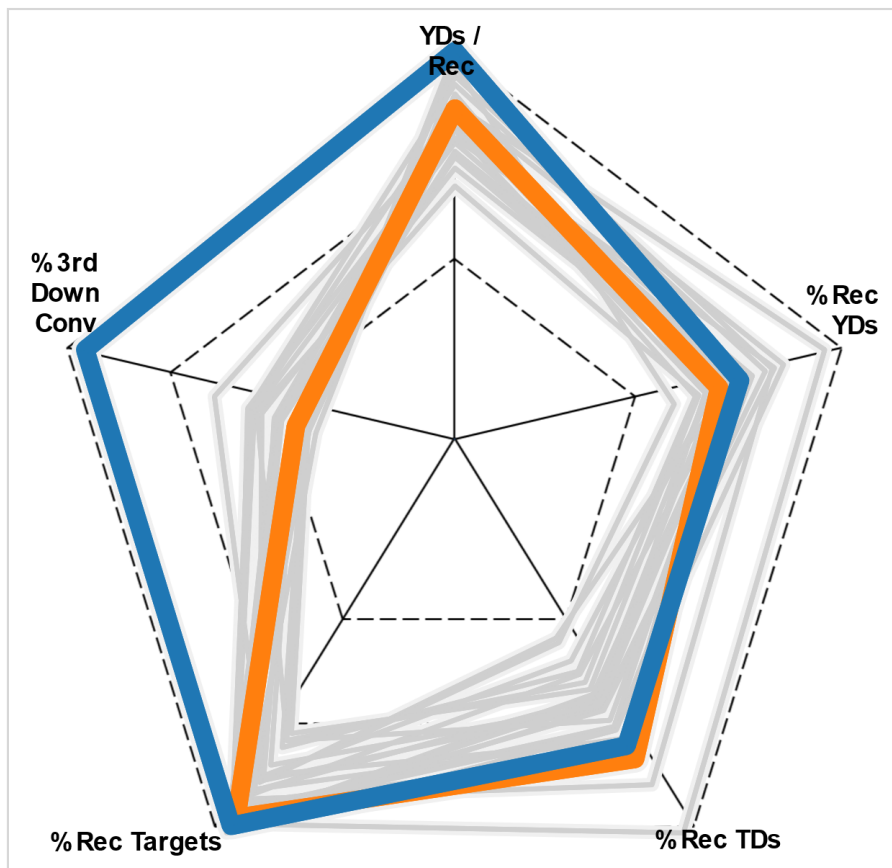
County color = 2020 winner. Blue = Dem. Red = GOP. Source NY Times

Change Year —●— 2020

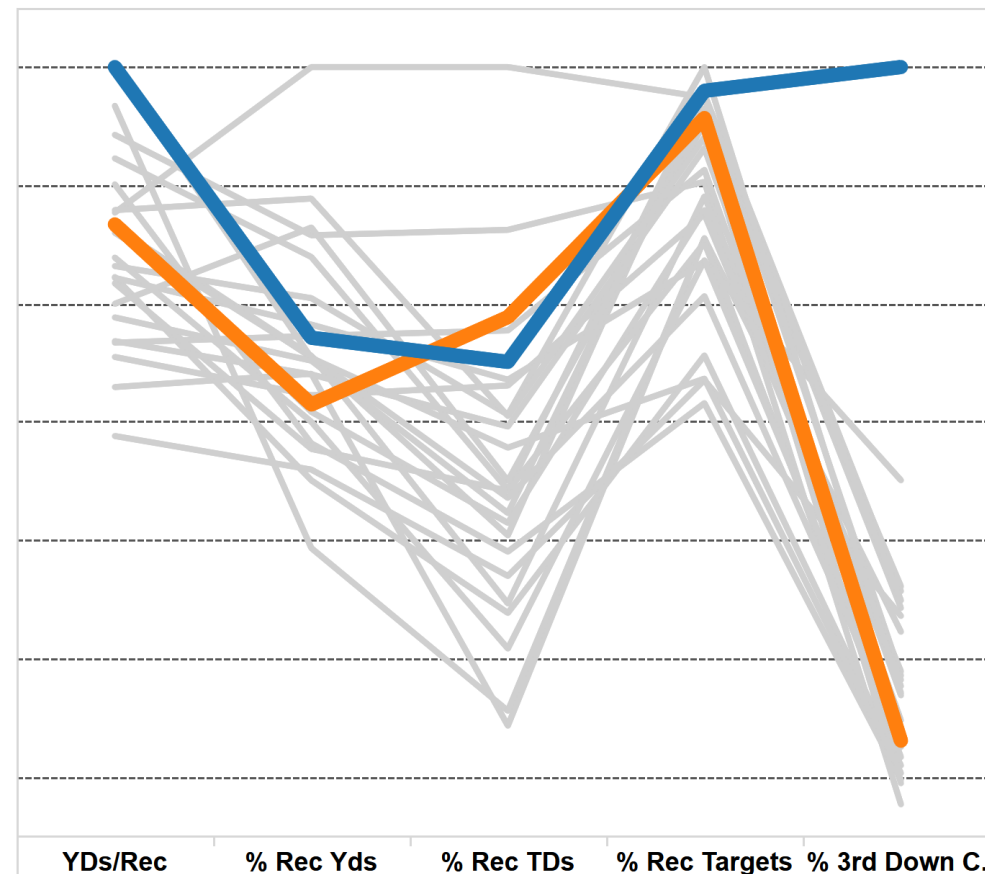


Parallel Coordinates / Radar Charts

Radar Chart



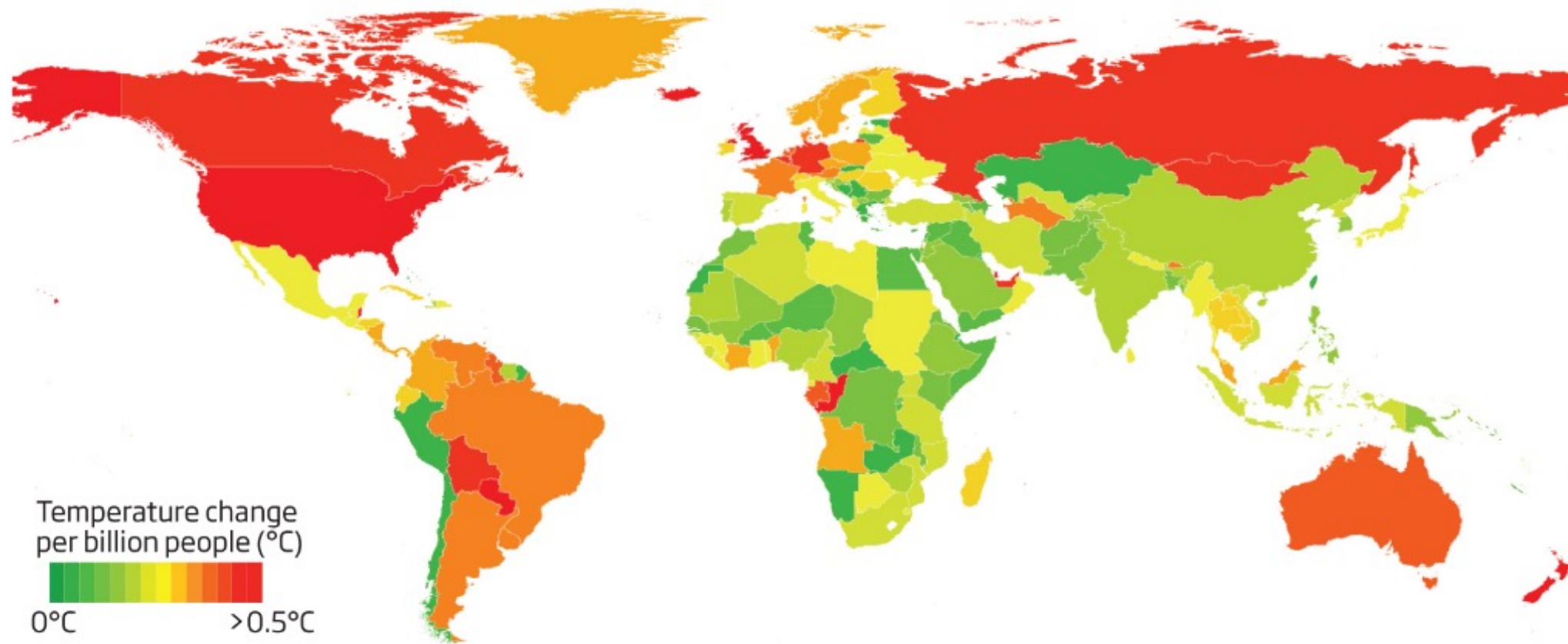
Parallel Coordinate



Geographical Maps

Global warming culprits, judged by population

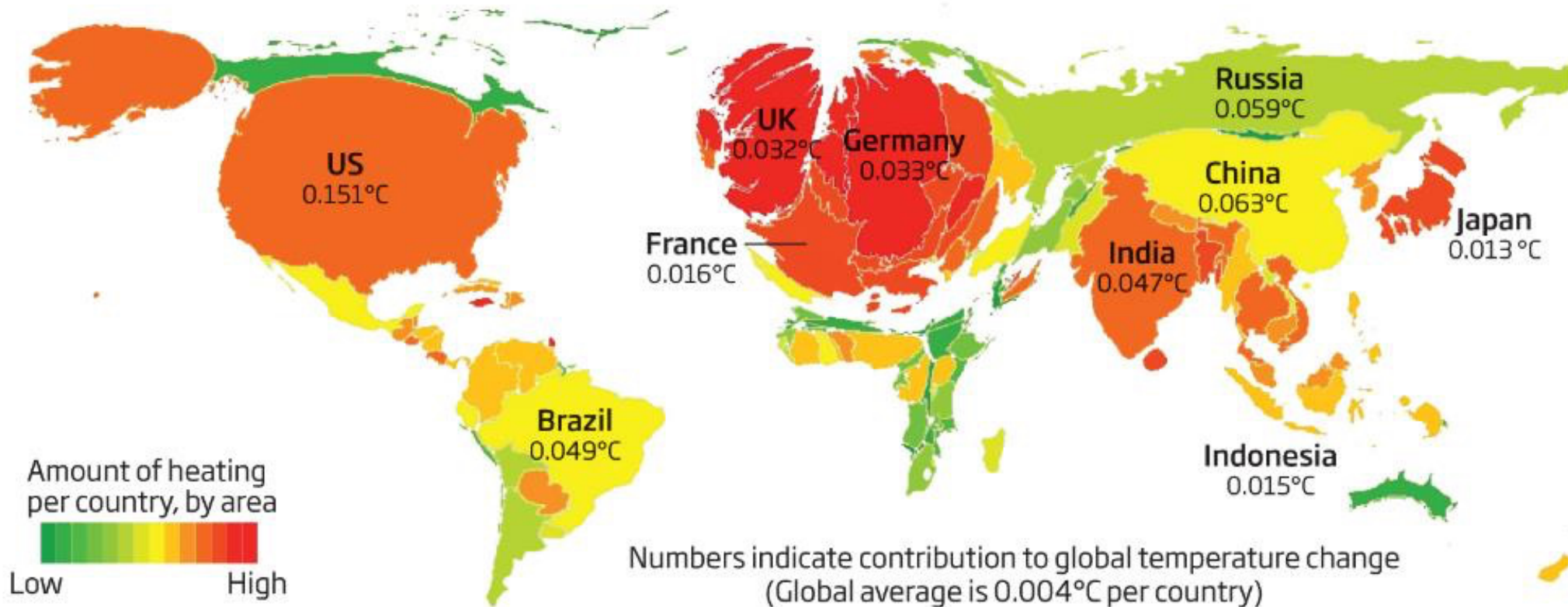
Countries that have caused more global warming per billion people are coloured red and low-emitters are dark green



Distorted Geographical Maps

Global warming culprits, judged by size

Countries that have caused disproportionately more global warming than their area would suggest are shown swollen, while low-emitters in relation to their size are shrunken



Bubble Charts

Ottawa Senators Player Usage Chart

Season: 2020-2021

Game Played: 10 / 84

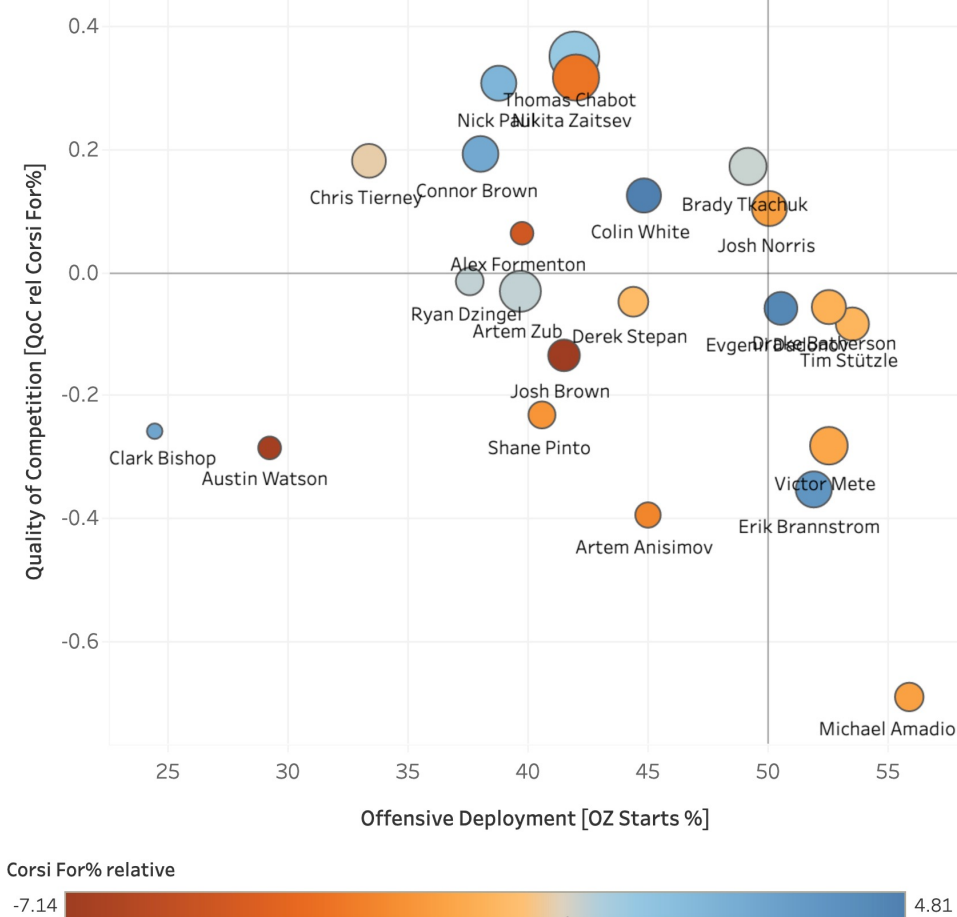
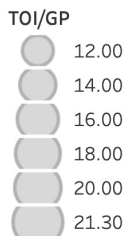
Time on Ice (season total): 100 / 1,697

Position: (All)

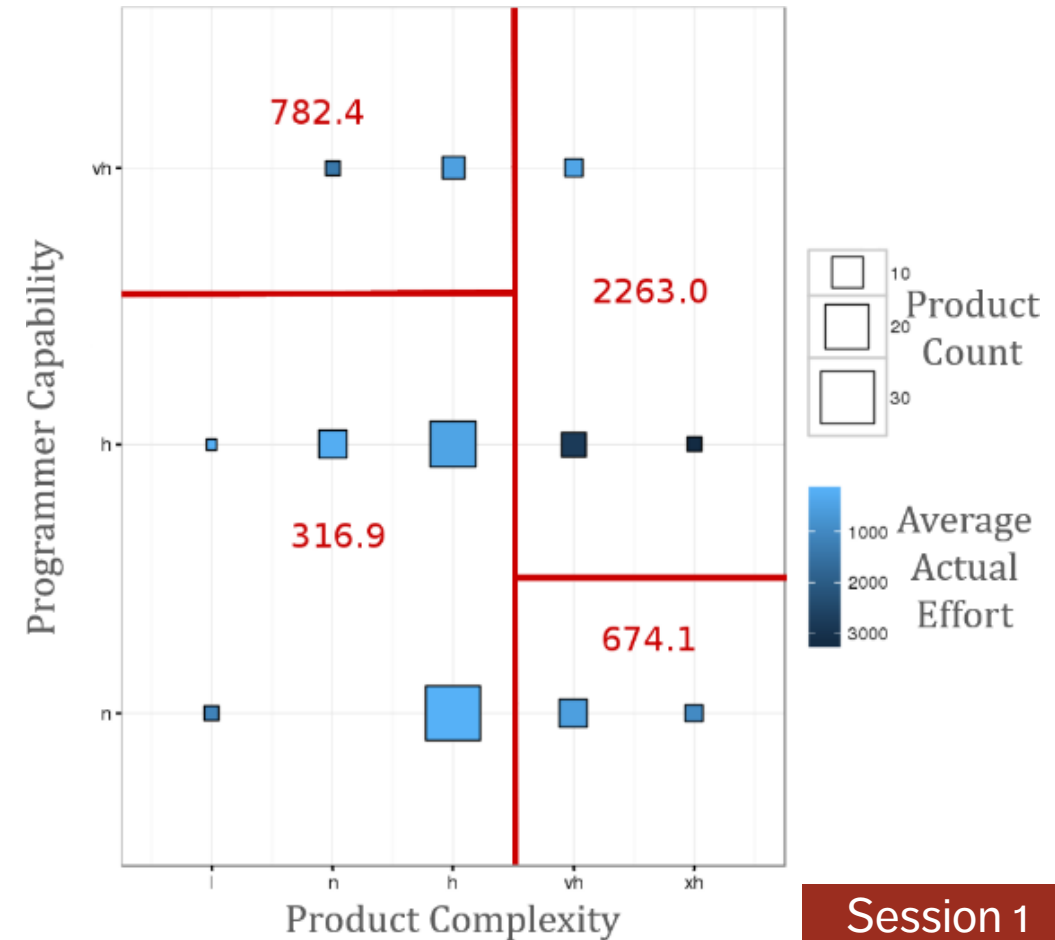
Team: OTT

Players: (All)

Show player names: Yes

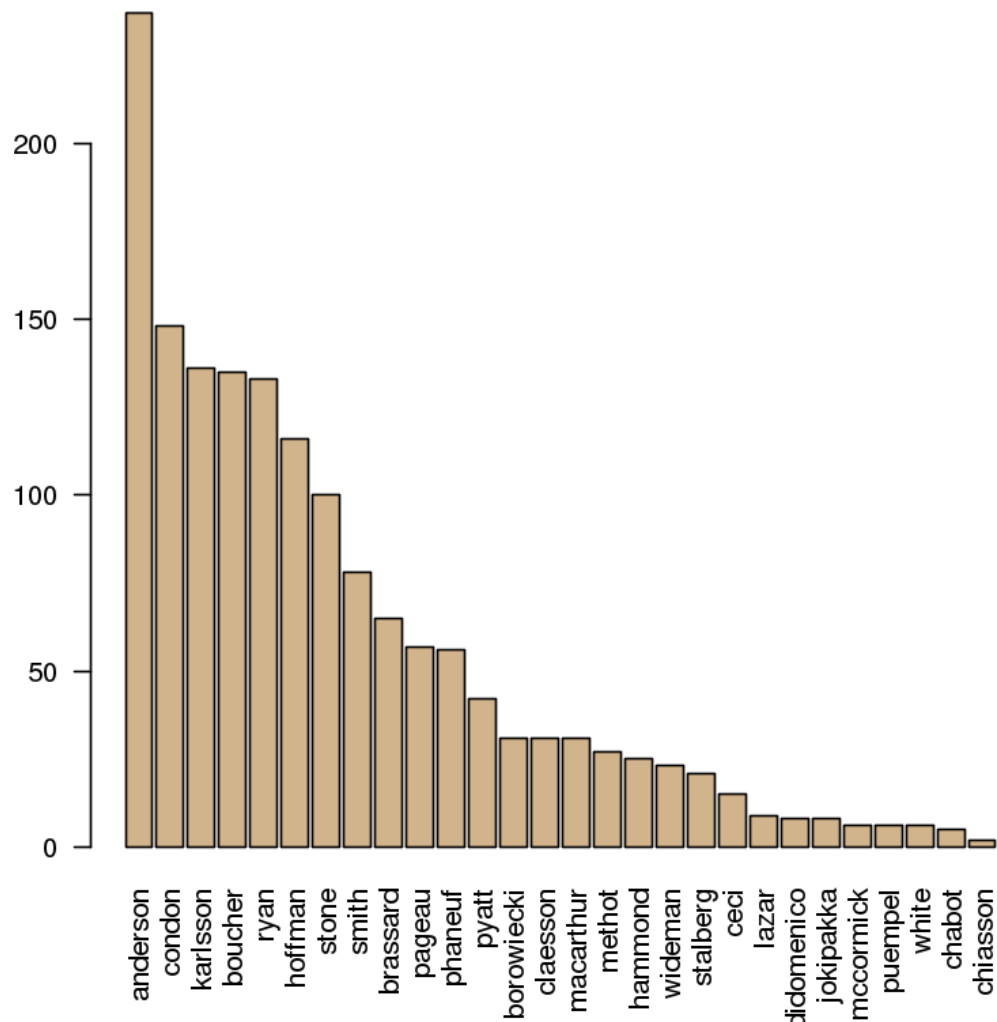


NASA COCOMO Dataset



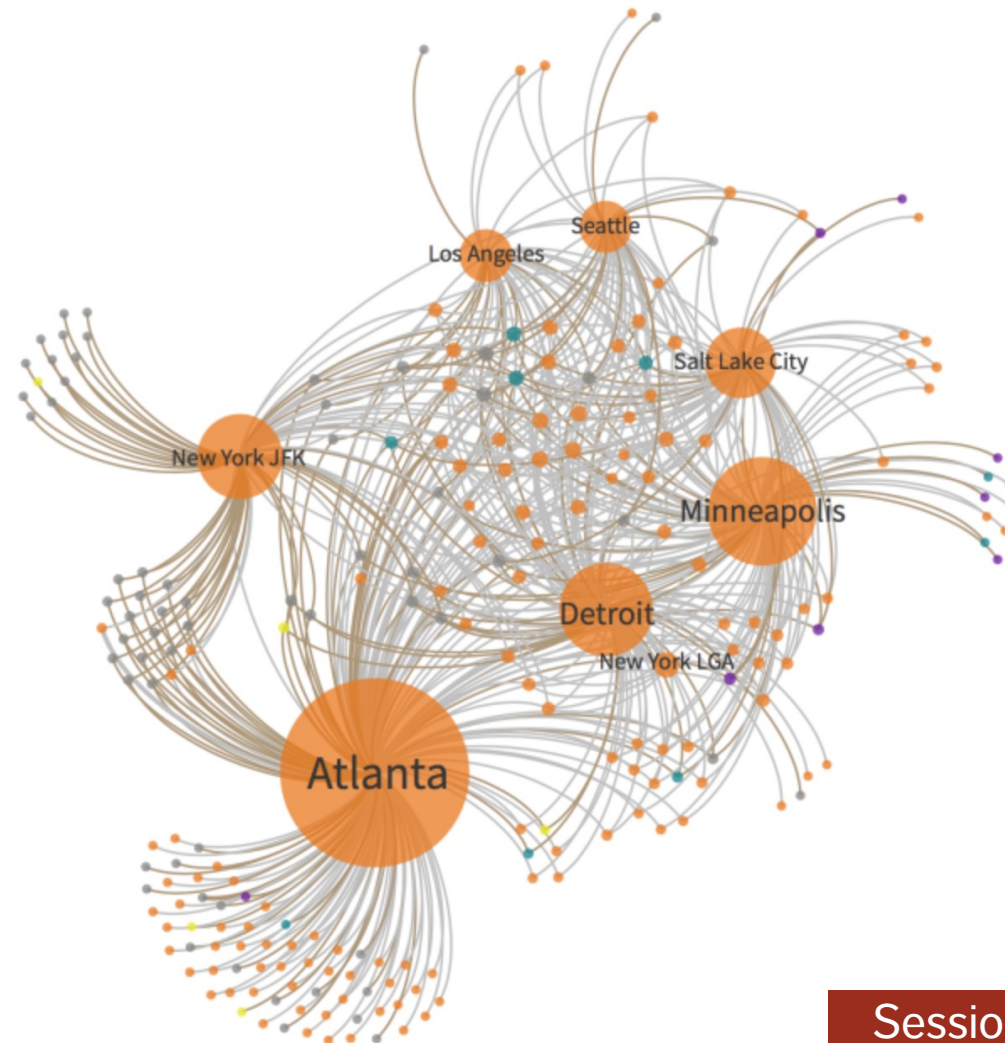
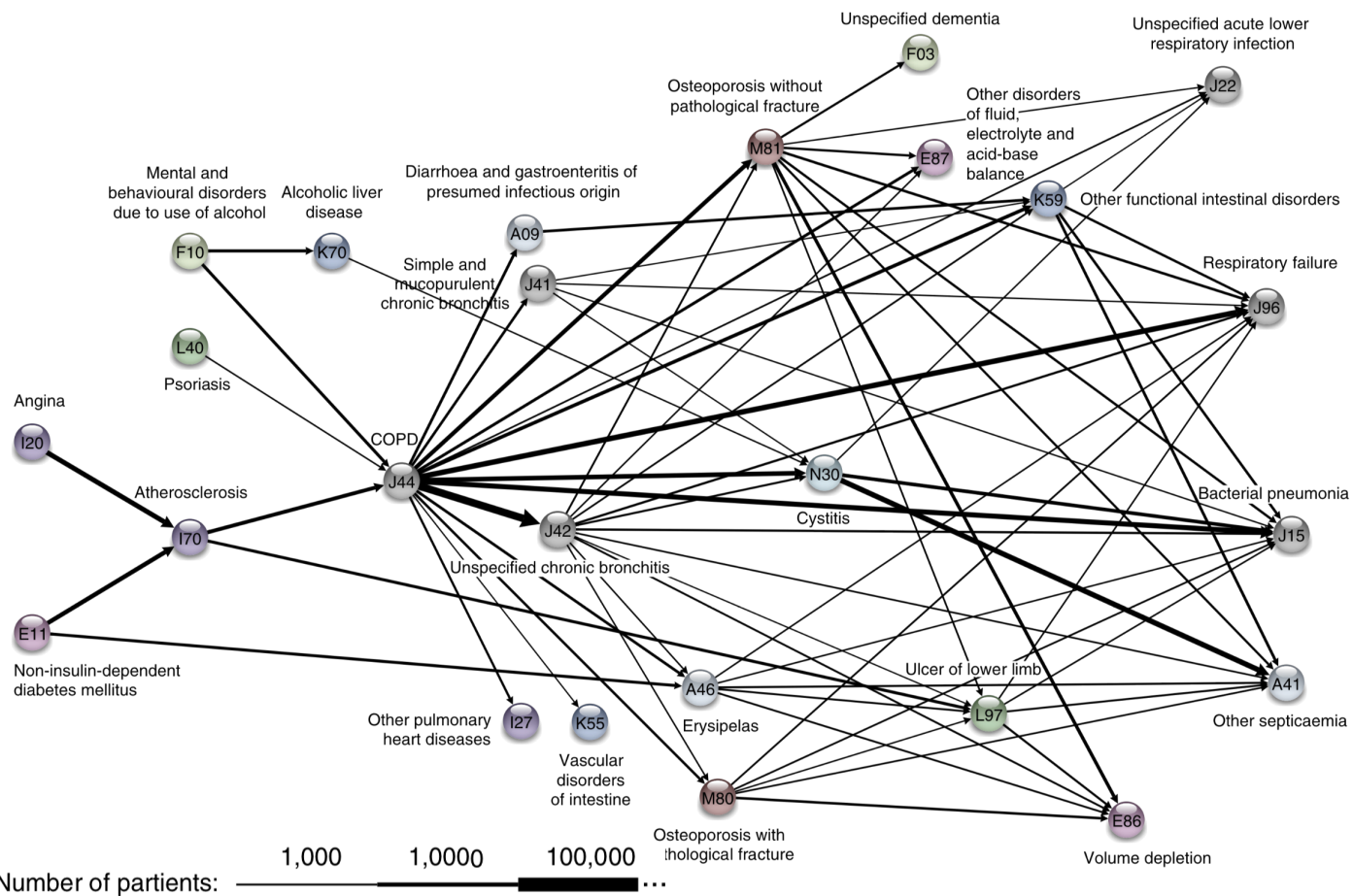
Session 1

Text Visualization & Representation



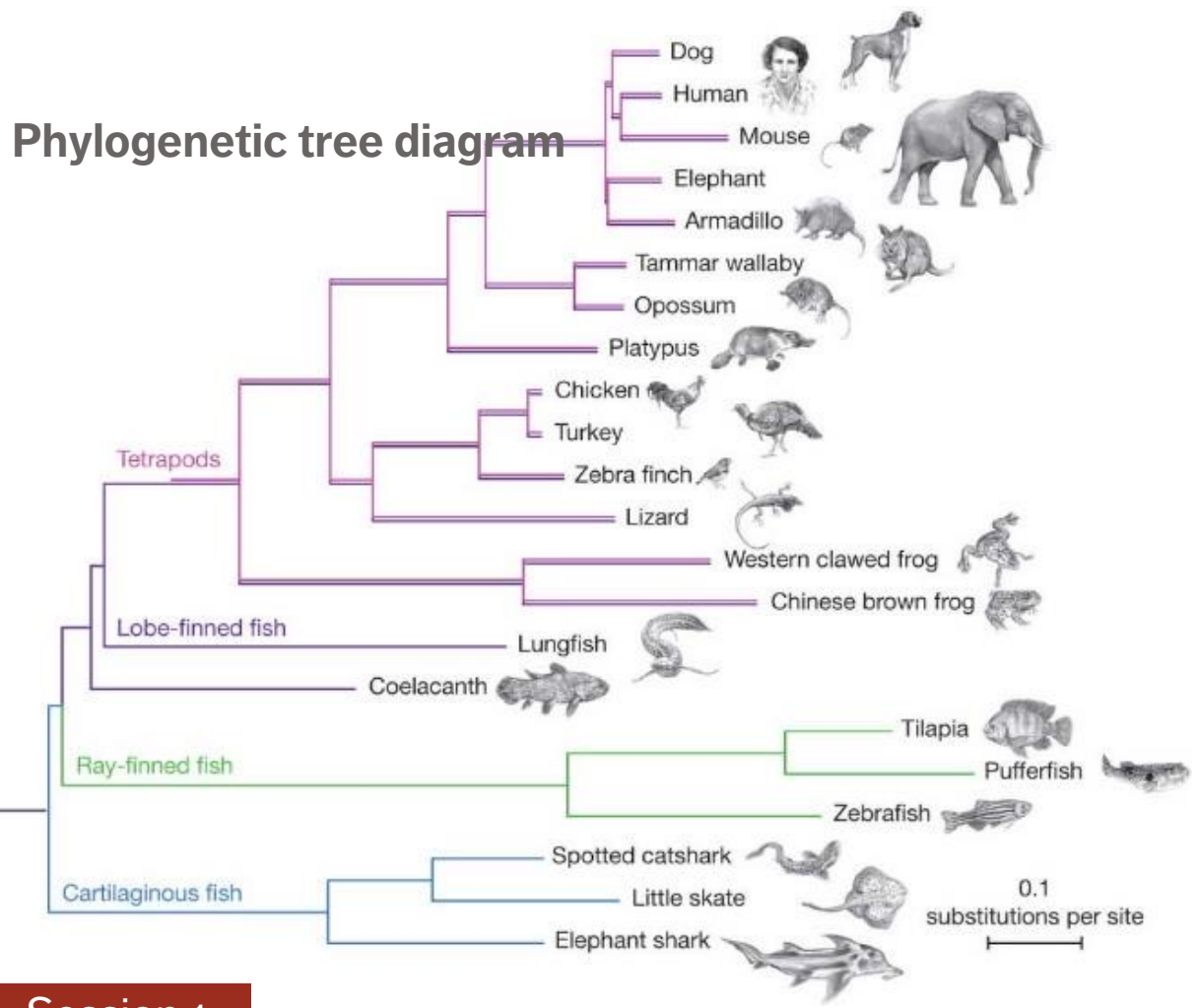
Network Diagrams

Diagnosis path around COPD in Danish population

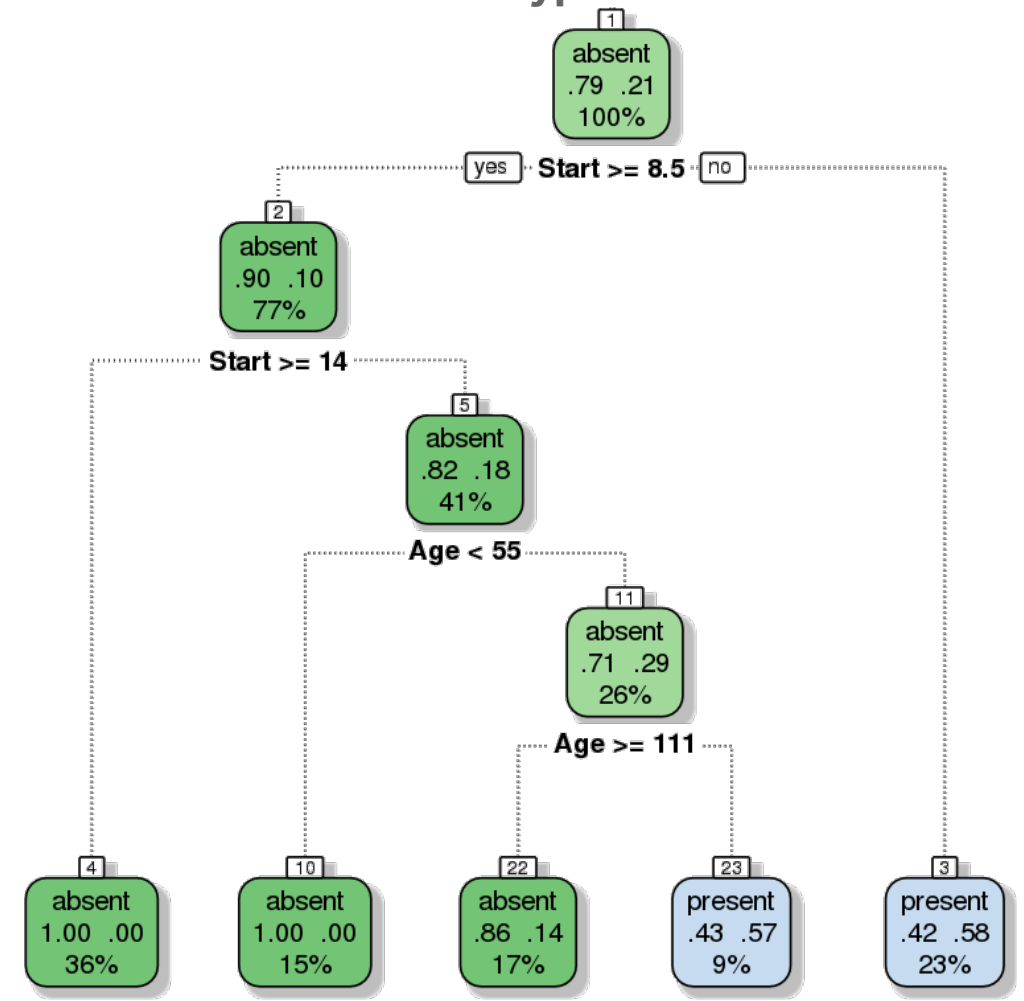


Decision Trees and Dendrograms

Phylogenetic tree diagram



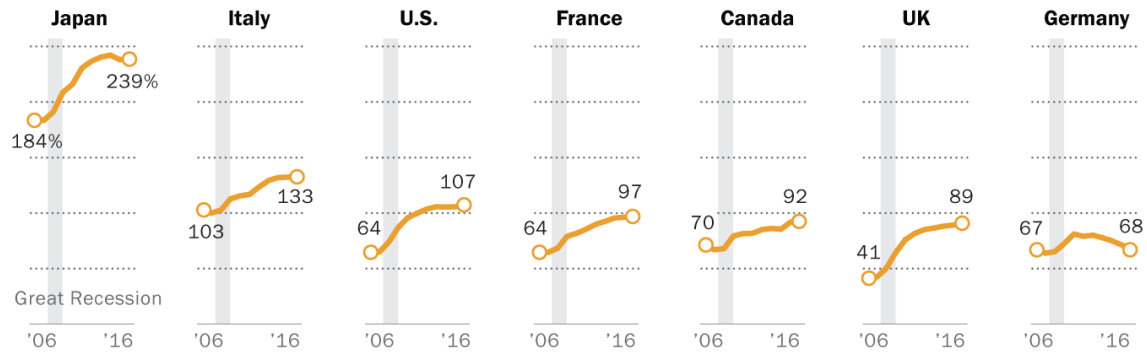
Classification of kyphosis dataset



Small Multiples

After Great Recession, debt increased substantially in most G-7 economies

Total gross debt as a share of GDP in the Group of Seven nations

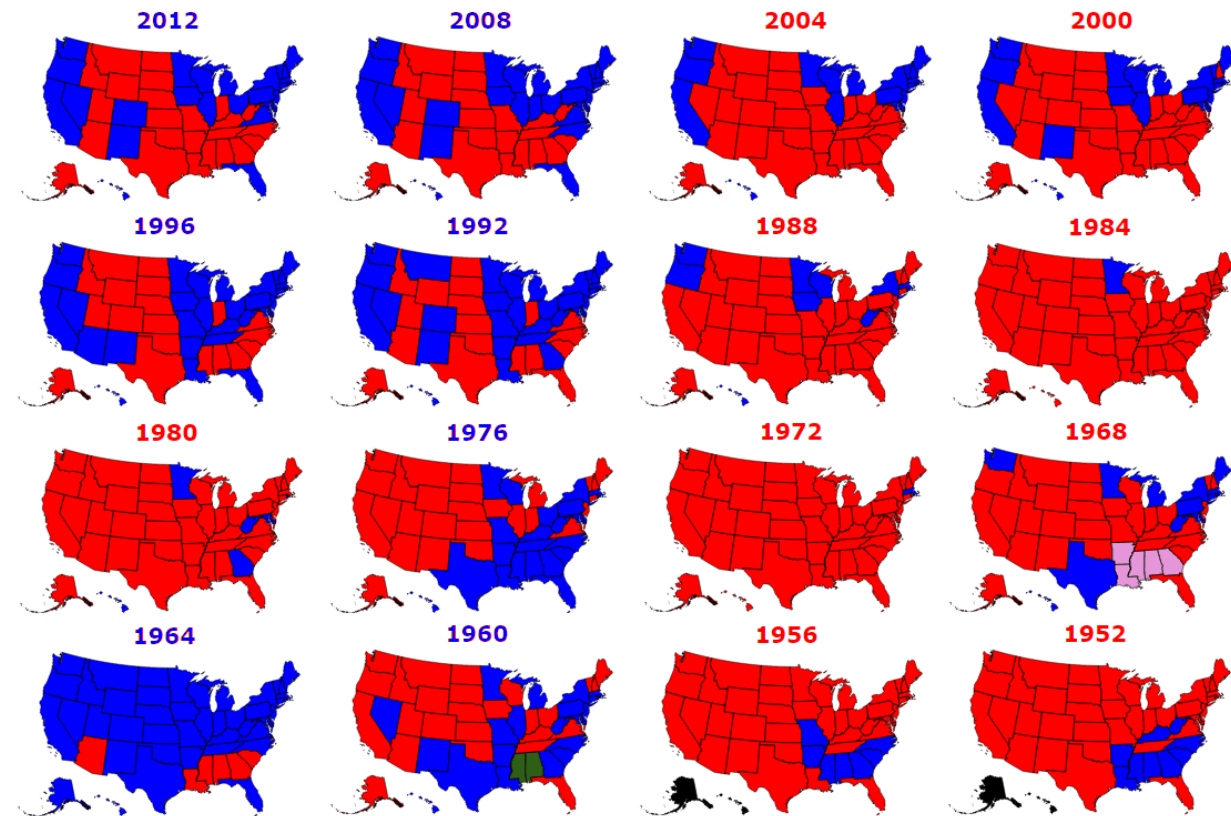


Note: Gross debt represents total liabilities of all levels and units of government — national, state/provincial and local — less liabilities held by other levels or units of government, unless otherwise noted by source.




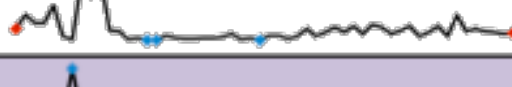
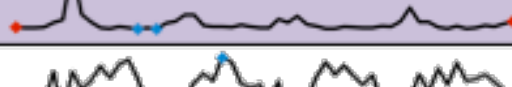




Source: The International Monetary Fund, World Economic Outlook, accessed Sept 7, 2017.

PEW RESEARCH CENTER

U.S. Electoral College Results 1952 – 2012



Sparklines

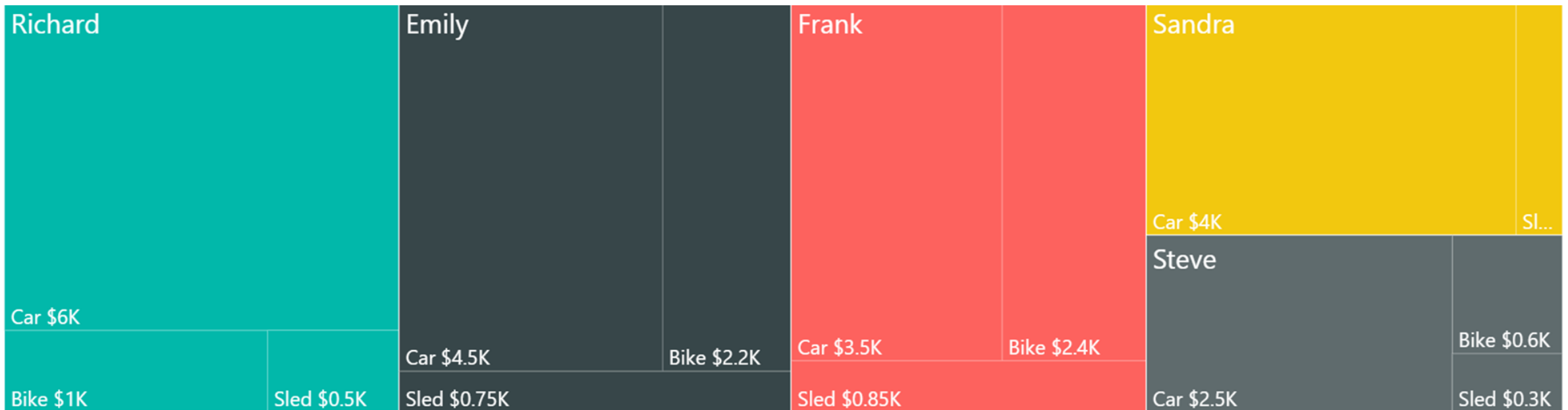
	Start	Monthly Number of Cases	End	Low	High	Mean	Std Dev	Blanks	Zeros	Trend
TOTAL	19502		17265	15150	25072	19903	2612	0.0	0.0	379.2
Hospital #1	46		19	3	46	19	9	0.0	0.0	-1.6
Hospital #2	156		240	101	326	194	60	0.0	0.0	9.7
Hospital #3	16		11	2	76	15	15	0.0	0.0	-2.9
Hospital #4	3		13	0	105	9	15	0.0	0.4	-1.8
Hospital #5	42		50	25	91	61	16	0.0	0.0	1.2
Hospital #6	48		53	34	169	67	25	0.0	0.0	0.6
Hospital #7	0		N.A.	0	0	0	0	2.2	9.8	0.0
Hospital #8	56		104	34	150	73	25	0.0	0.0	4.6

Treemaps

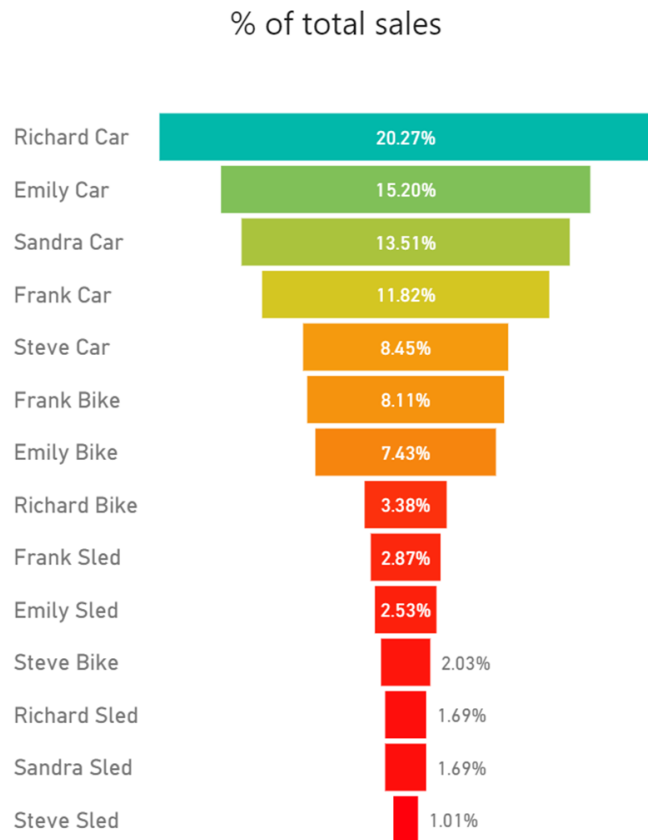
Simultaneously show big picture and can compare related easily. Easy to process data sub-categories.

Useful to prioritize “big ticket items” in dynamic dashboards.

Labeling and colouring are tricky.



Funnel Charts

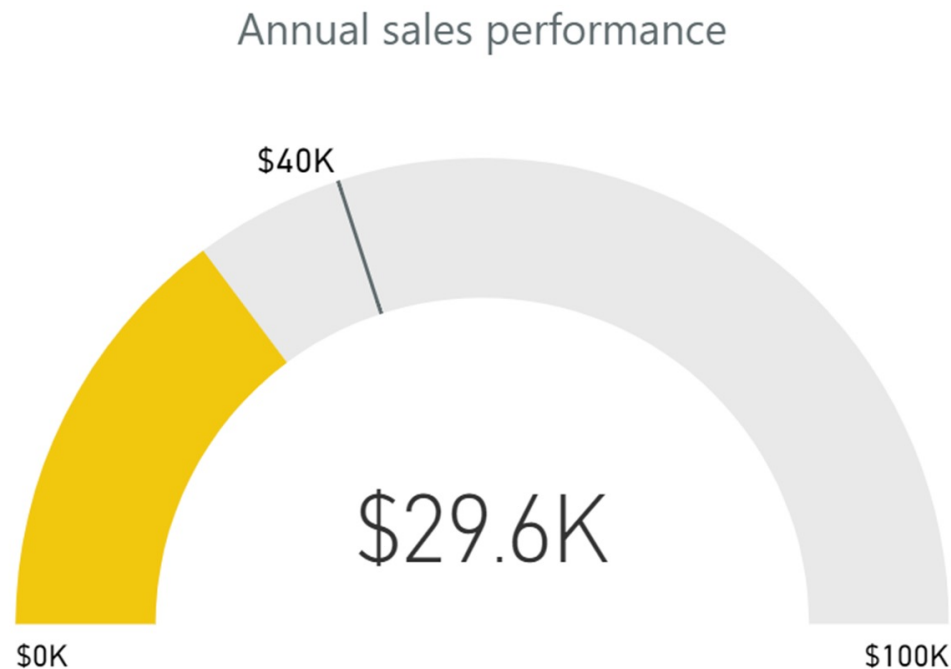


Typically represents **decreasing proportions** amounting to 100% total (not always though).

If this is not the default sort, users should manually sort from high to low (otherwise, plot looks messy).

VERY useful to help audience quickly prioritize items without having to actively filter.

Gauge Charts



Often used as a dashboard component (with or without needle).

Displays single value measures towards goal / KPI.

Great to show progress (a bit of a management fad, though...)

Displays information that can be quickly **scanned** and **understood**.

Interactive & Animated Visualizations

Animation **does not always** improve a visualization. What insights can interactivity provide? That depends on the data, and on the visualization method.

Examples:

- [The Clubs That Connect the World Cup](#), NY Times, 2014
- [Who Marries Whom](#), Bloomberg, 2016
- [Hipparcos Star Mapper](#), European Space Agency, 2016
- [The Internet of Things – a Primer](#), Information is Beautiful, 2016
- [The Genealogy and History of Popular Music Genres](#), Musicmap, 2016

Interactive & Animated Visualizations

Examples (continued):

- [Sequences Sunburst](#), Kerry Rodden, 2015
- [Health and Wealth of Nations](#), Gapminder Foundation
- [Mobius Transformations Revealed](#), Arnold D.N, Rogness, J, 2007
- [Visualizing the Riemann \$\zeta\$ Function and Analytic Continuation](#), 3Blue1Brown, 2016
- [Small Arms and Ammunition – Imports and Exports](#), Google, 2012
- [The Evolution of the Web](#), Google, Hyperakt, Vizzuality, 2012
- [peoplemovin](#), Carlo Zapponi, 2012

Interactive & Animated Visualizations

“There is always a danger that if certain types of visualization techniques take over, the kinds of questions that are particularly well-suited to providing data for these techniques will come to dominate the landscape, which will then affect data collection techniques, data availability, future interest, and so on.”
(P. Boily)

Even when done well, 85% of users don't bother with interactive viz (NY Times).

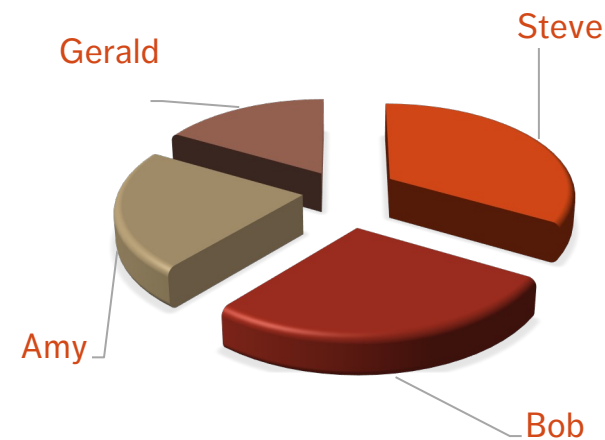
Take-Away: explore the data and try different methods

Charts to Avoid

ANYTHING with an arc (except gauge)

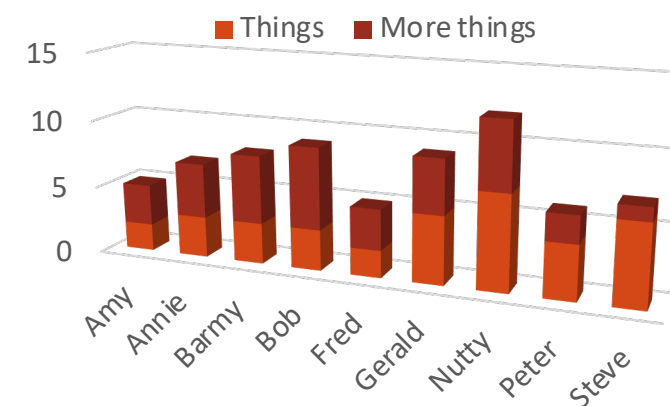
- pie
- donut

Brain cannot compare arcs and they can be misleading:
how different are Steve & Bob in the pie chart?



ALL 3D IS EVIL!

- as with arc, we cannot easily visually compare data series
- adds way too much clutter



Suggested Reading

Visualization Catalogue

The Practice of Data Visualization
Basics of Data Visualization

[Visualization Toolkit](#)