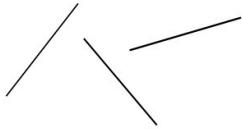


Data visualization: basic principles

Length



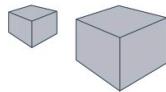
Slope



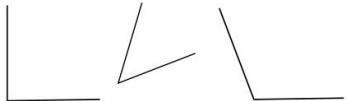
Color hue



Volume



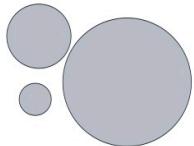
Angle



Length (aligned)



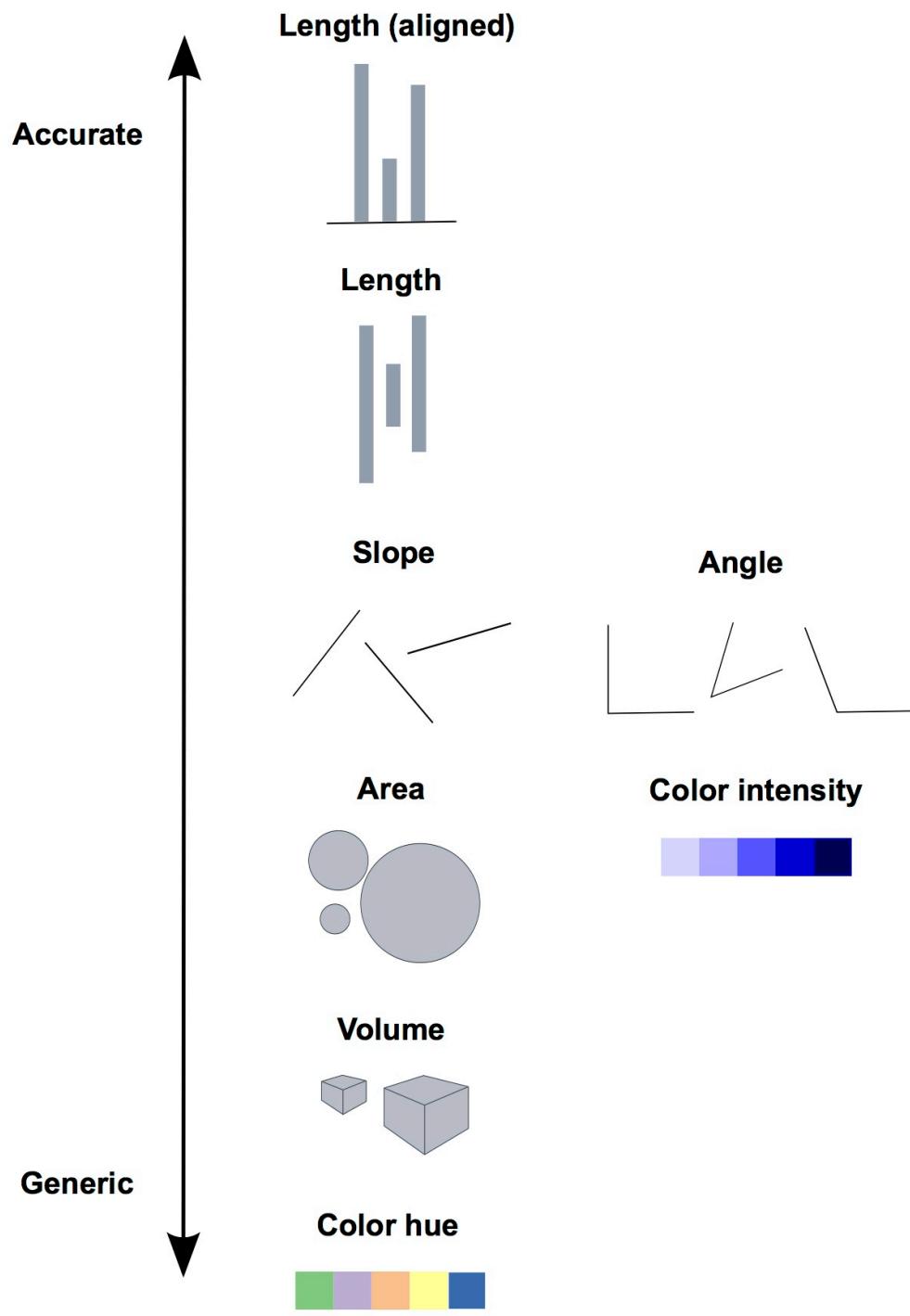
Area



Color intensity

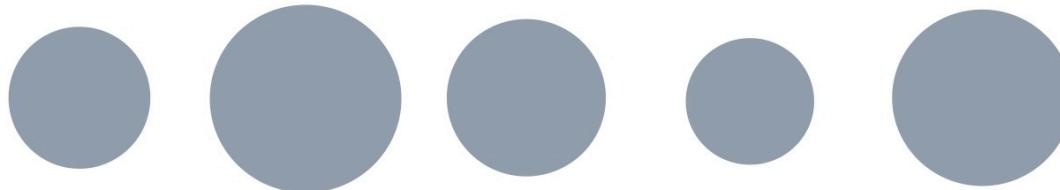
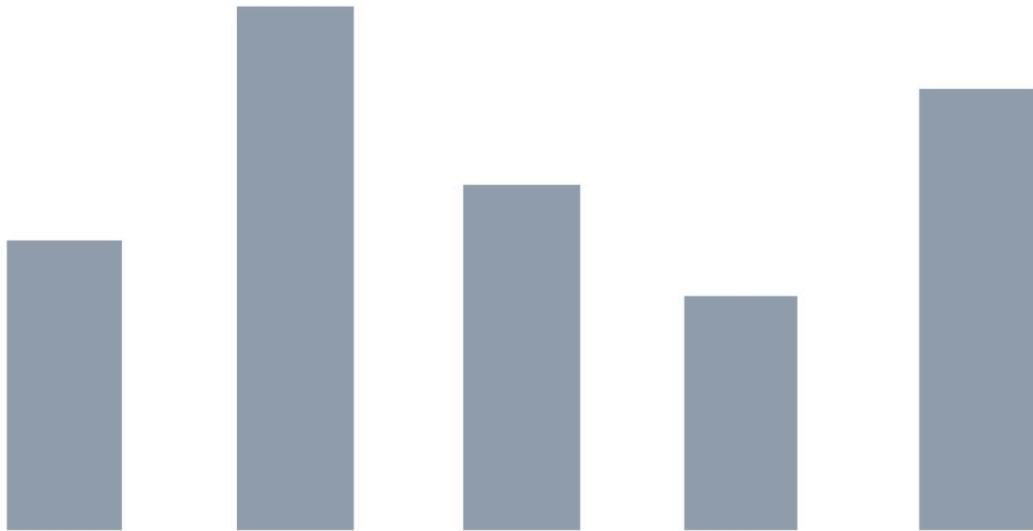


**Visualization:
encoding data
by visual cues**



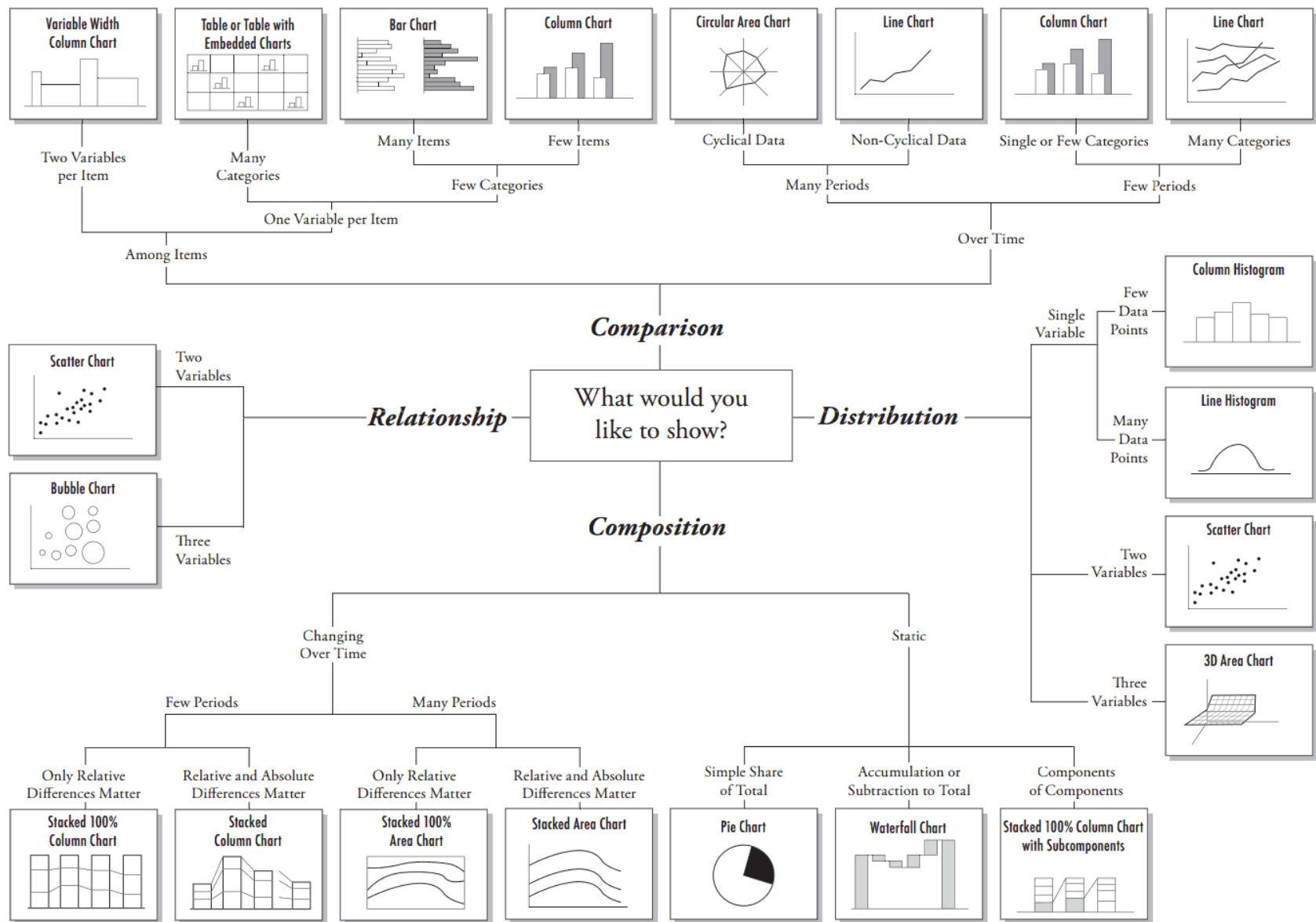
**Our brains do not
treat those cues
equally!**

Design for the human brain!



What type of chart should I use?

Chart Suggestions—A Thought-Starter



Distribution

Relationship

Comparison

What do you want to show?

Connection

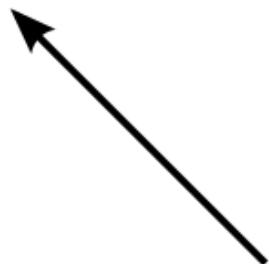
Composition
(parts of the whole)

Location

Distribution

Relationship

Comparison



What do you want to show?

Connection

Composition
(parts of the whole)

Location

Consider the distribution

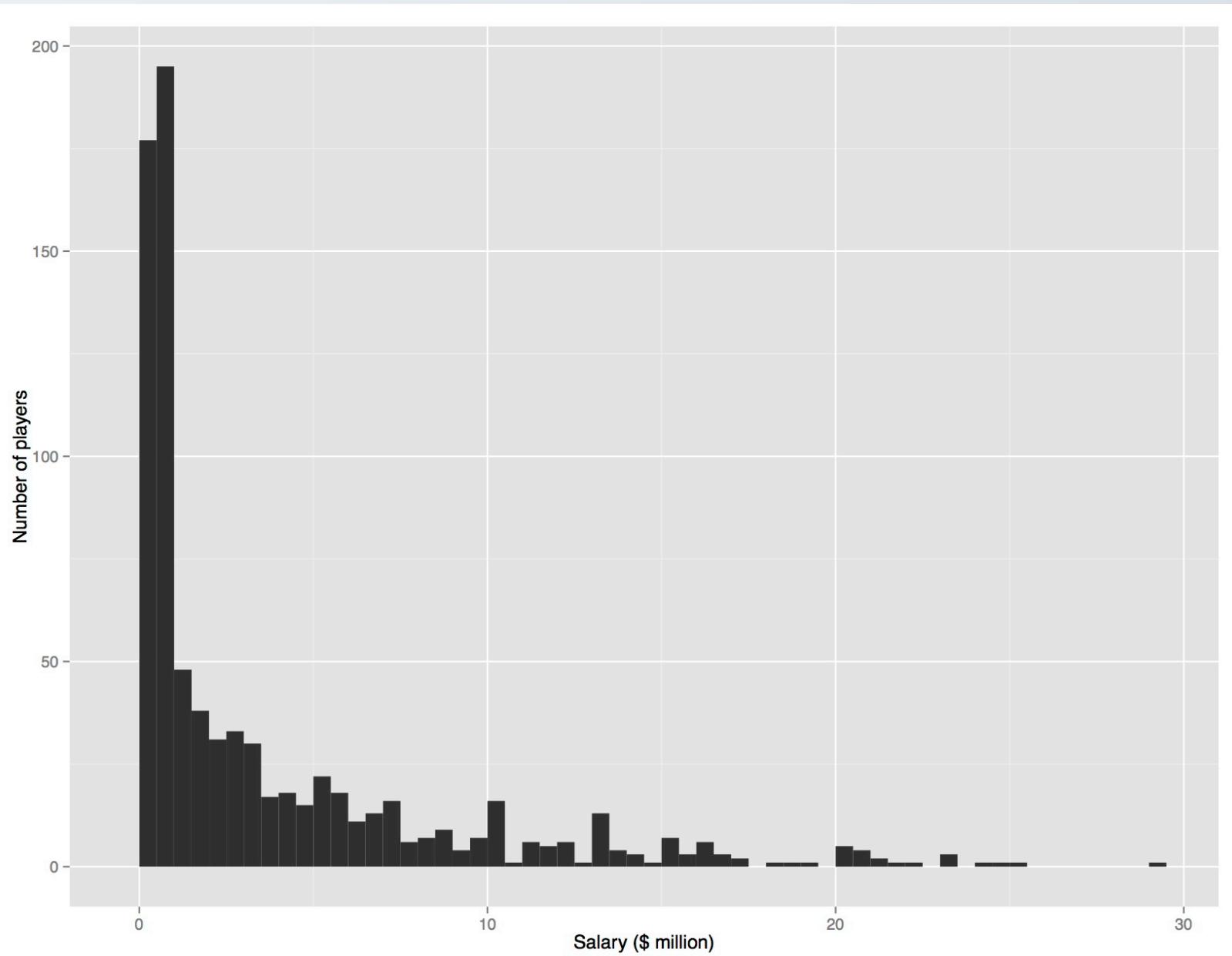
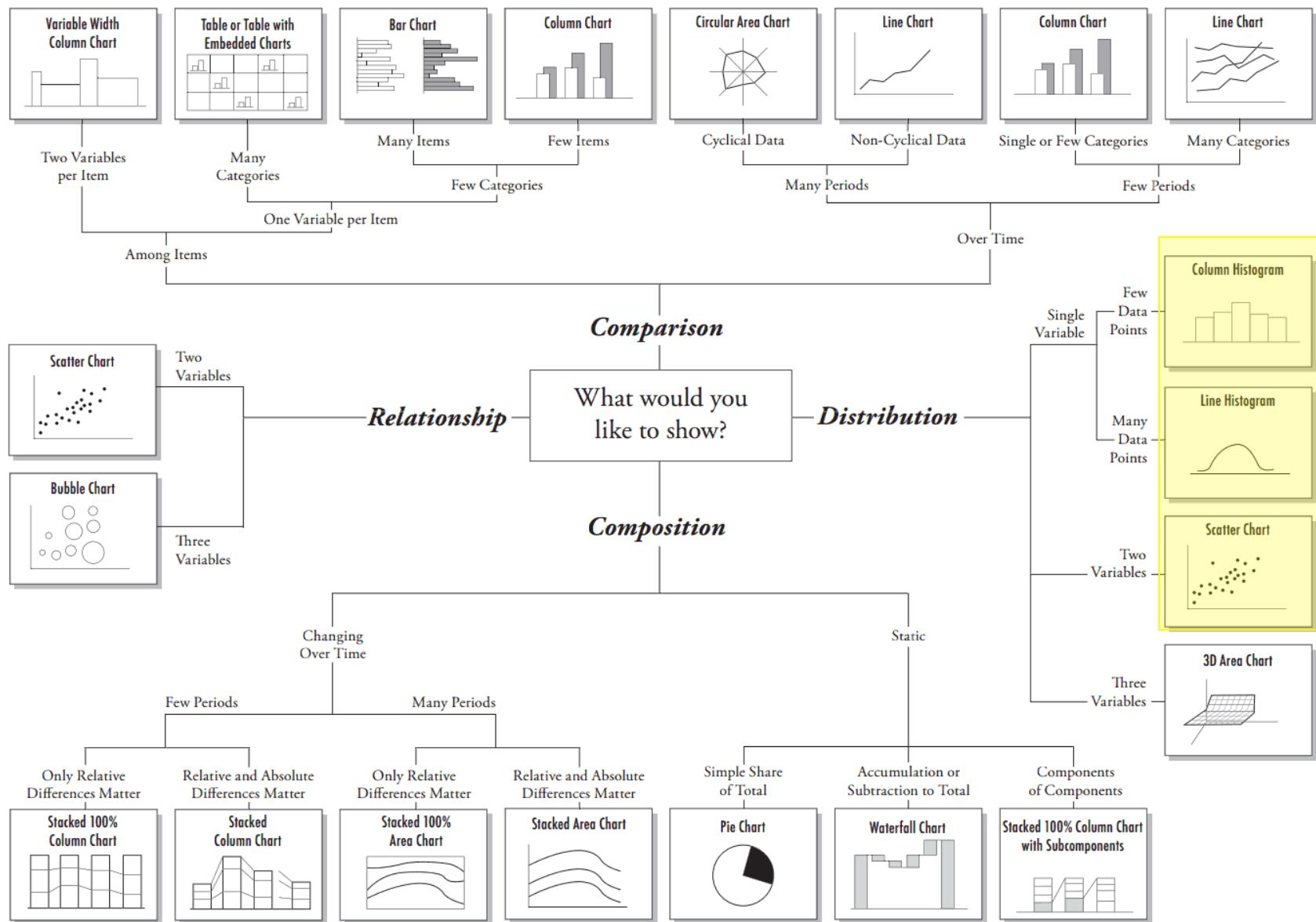


Chart Suggestions—A Thought-Starter



Distribution

Relationship

Comparison



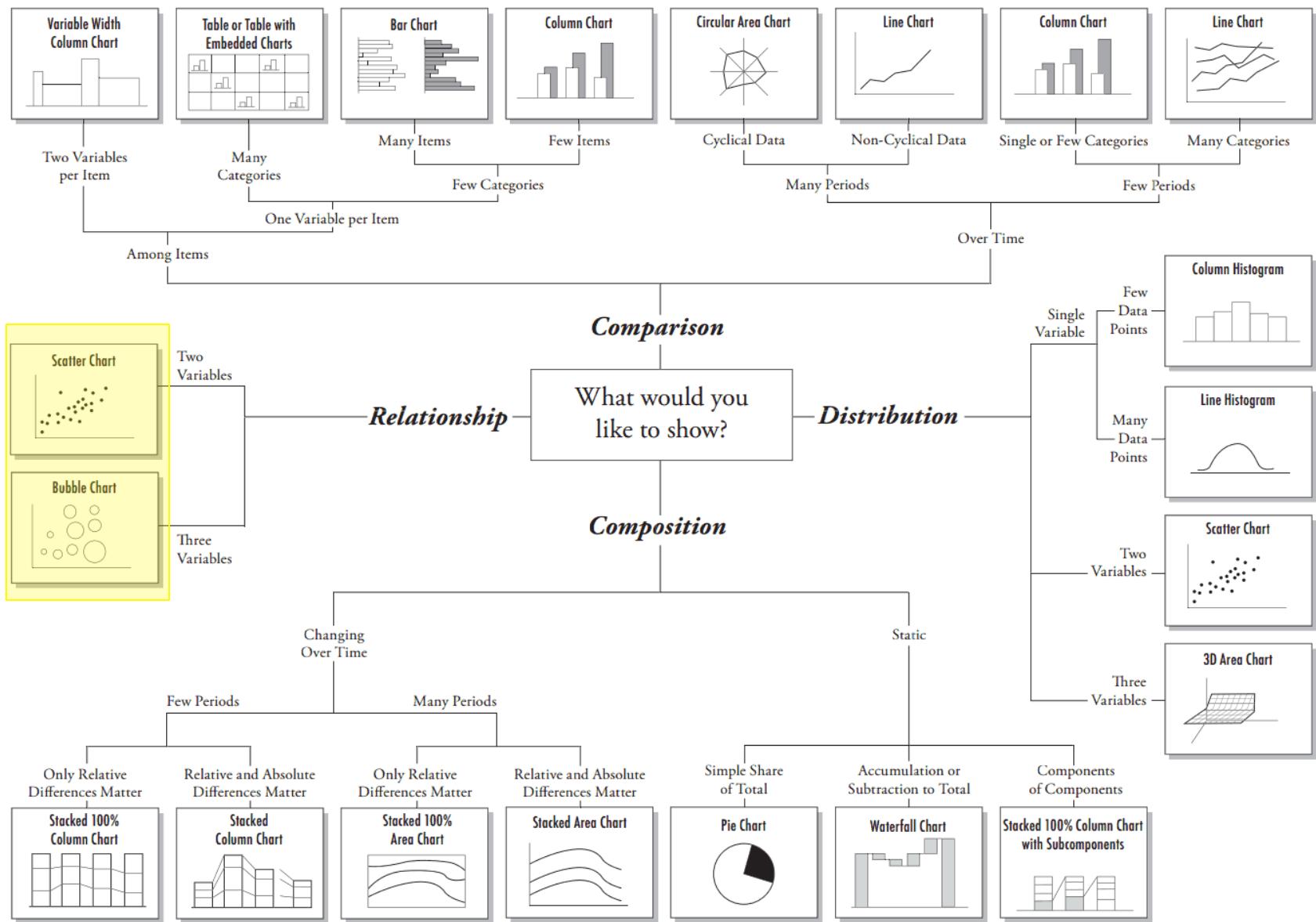
What do you want to show?

Connection

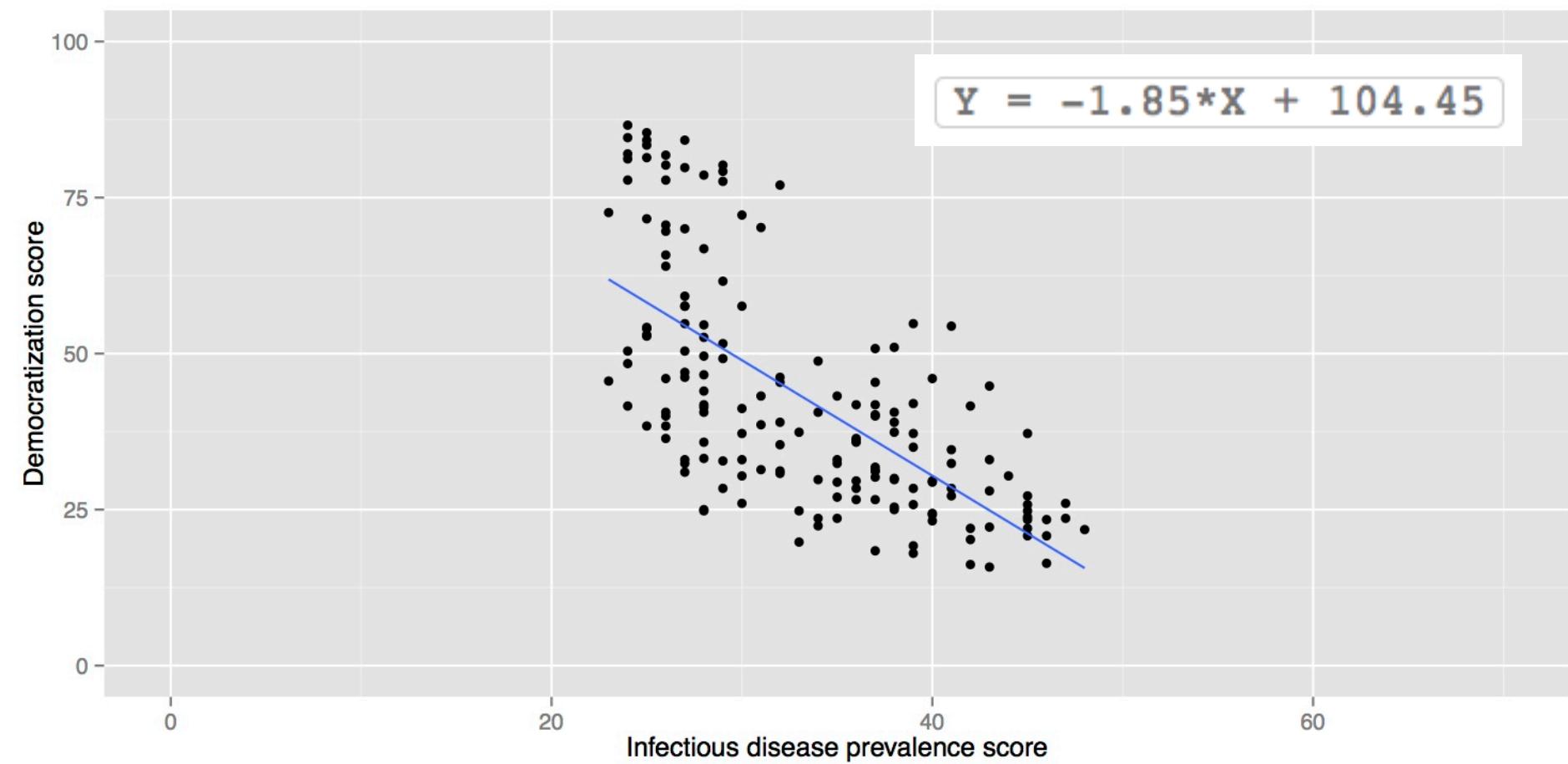
Composition
(parts of the whole)

Location

Chart Suggestions—A Thought-Starter



Relationships between variables: scatter plots and trend lines



Distribution

Relationship

Comparison



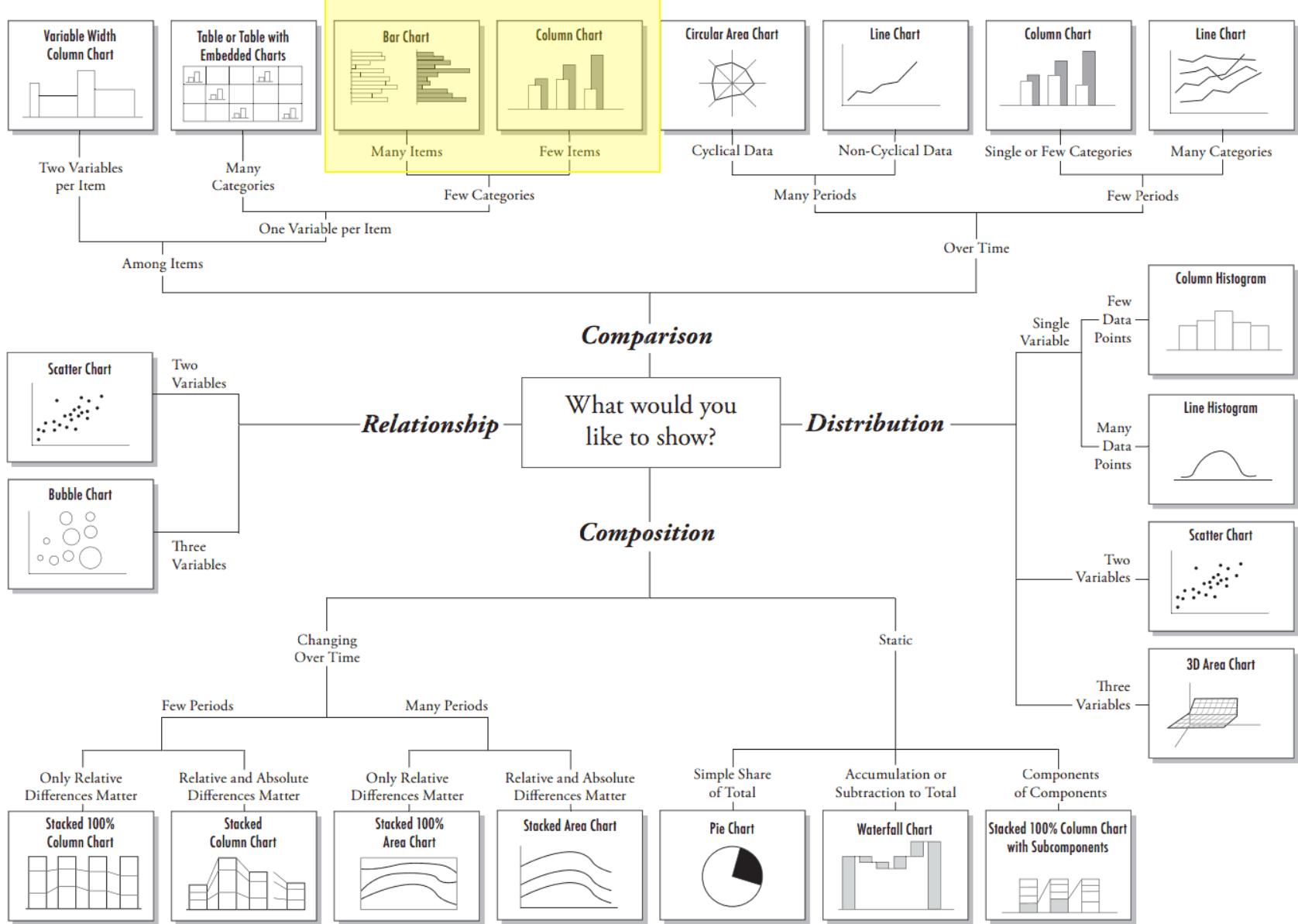
What do you want to show?

Connection

Composition
(parts of the whole)

Location

Chart Suggestions—A Thought-Starter



Simple comparisons: bars and columns

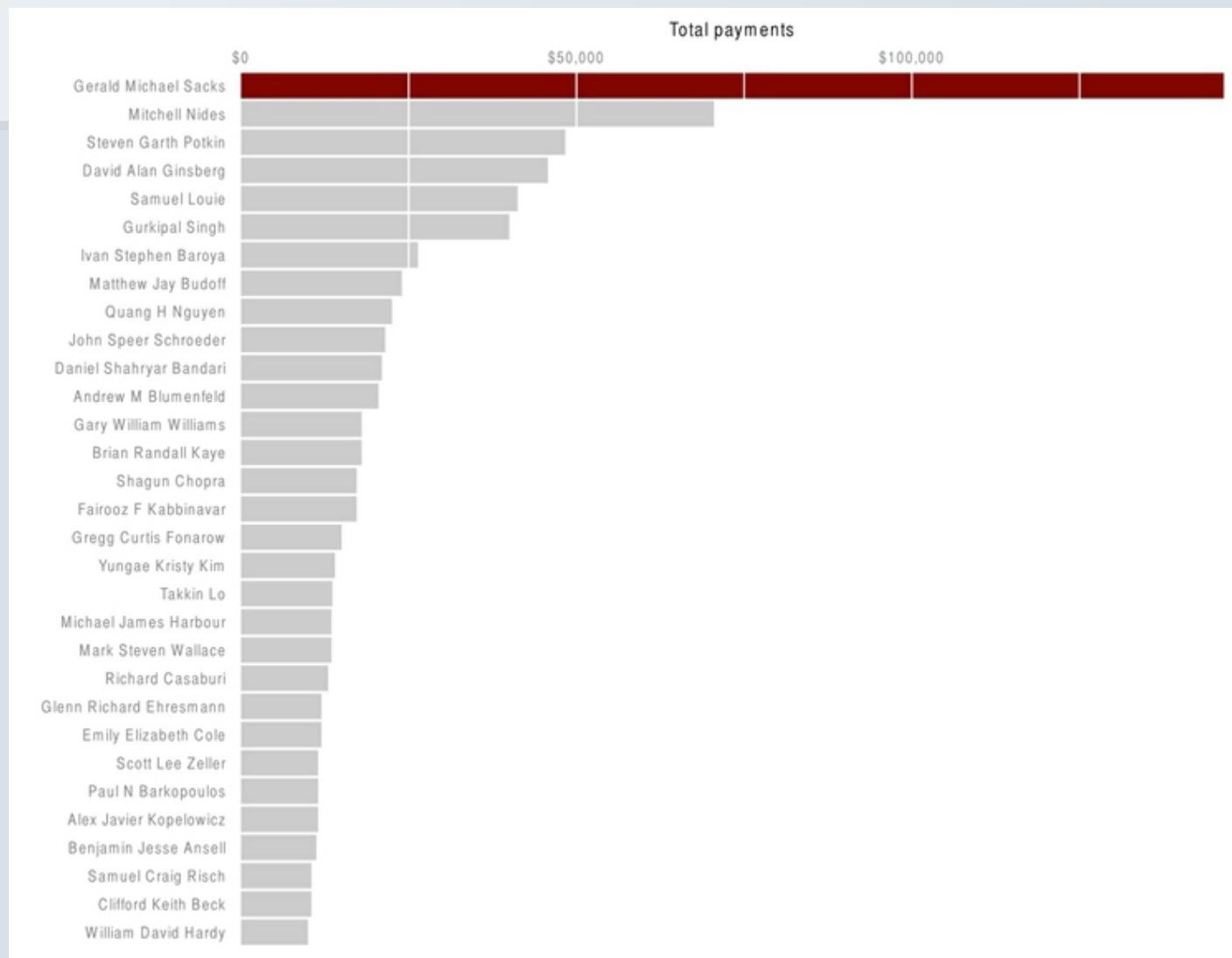
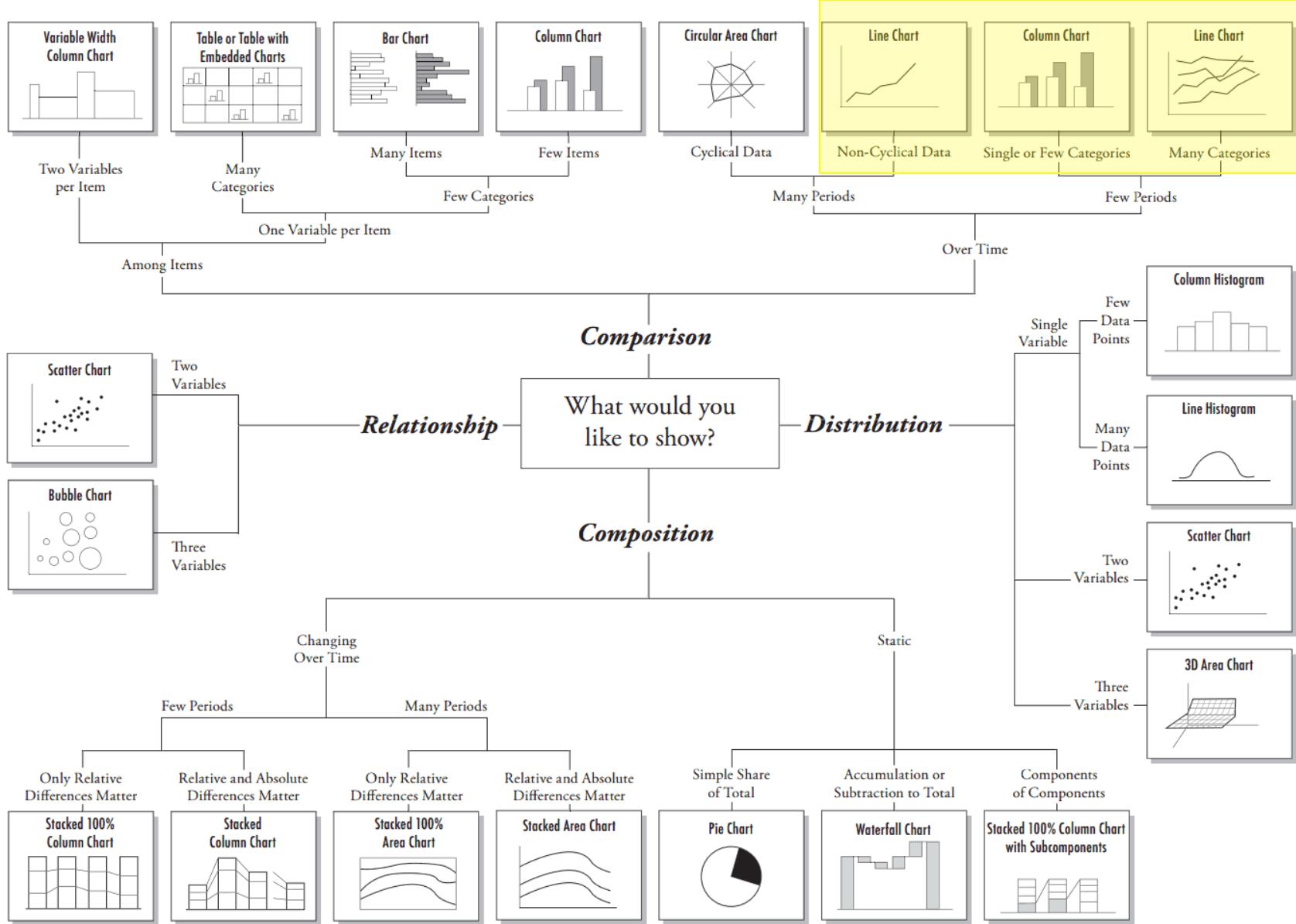
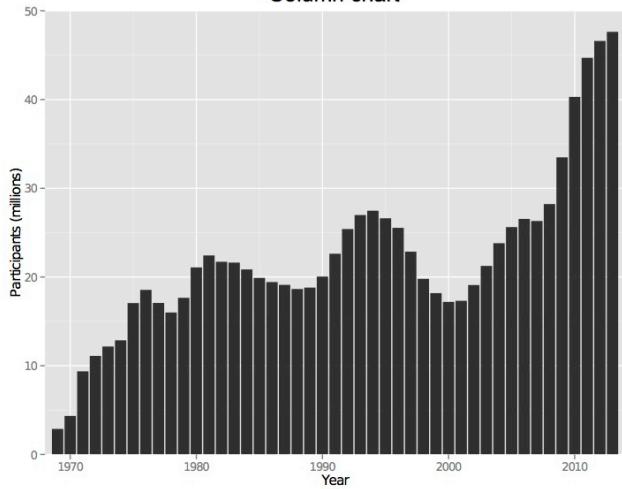


Chart Suggestions—A Thought-Starter

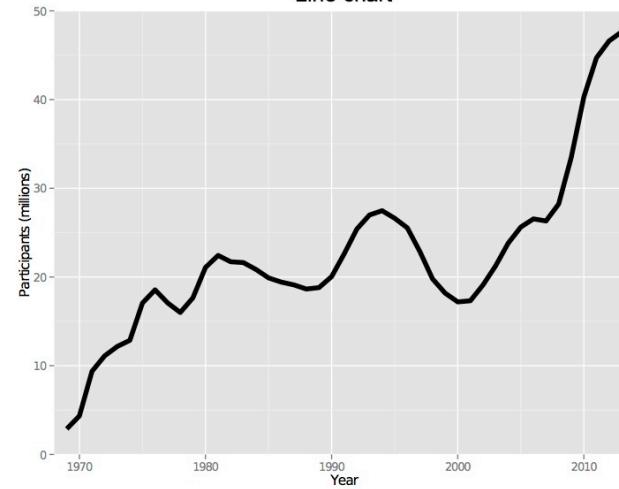


Comparisons: change over time

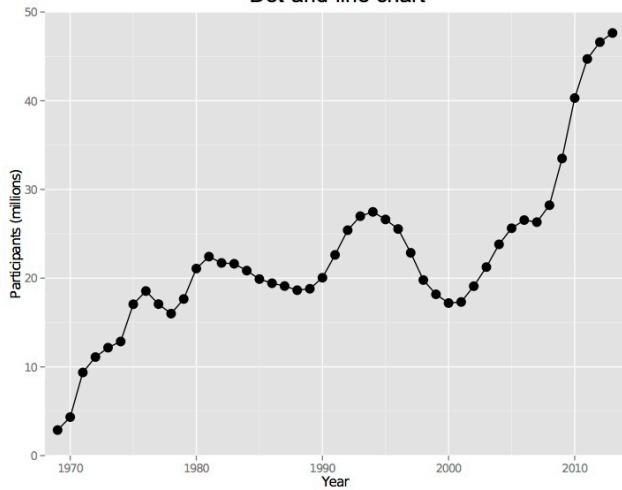
Column chart



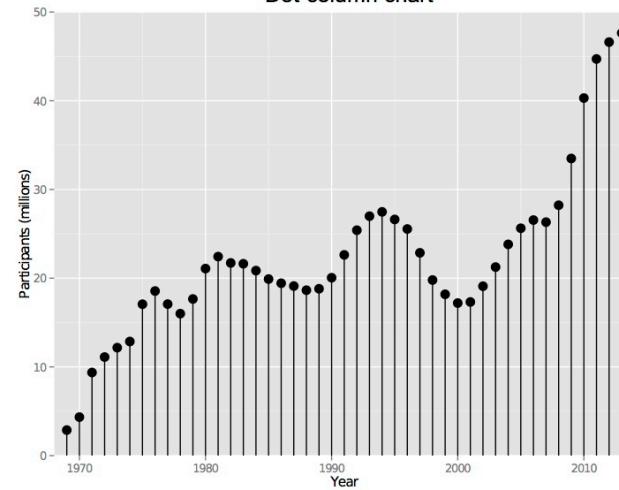
Line chart



Dot-and-line chart



Dot-column chart



Distribution

Relationship

Comparison

What do you want to show?

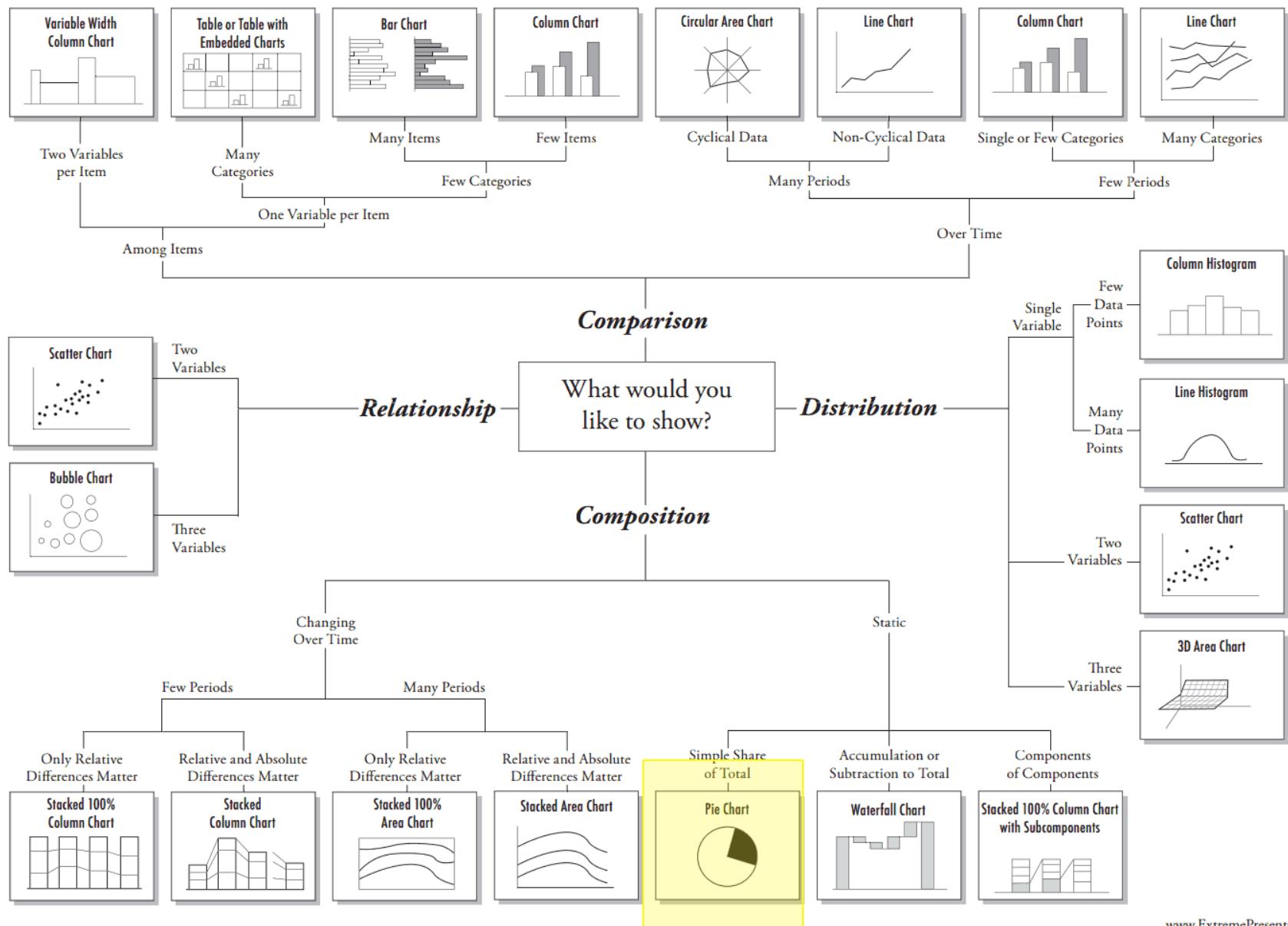


Connection

**Composition
(parts of the whole)**

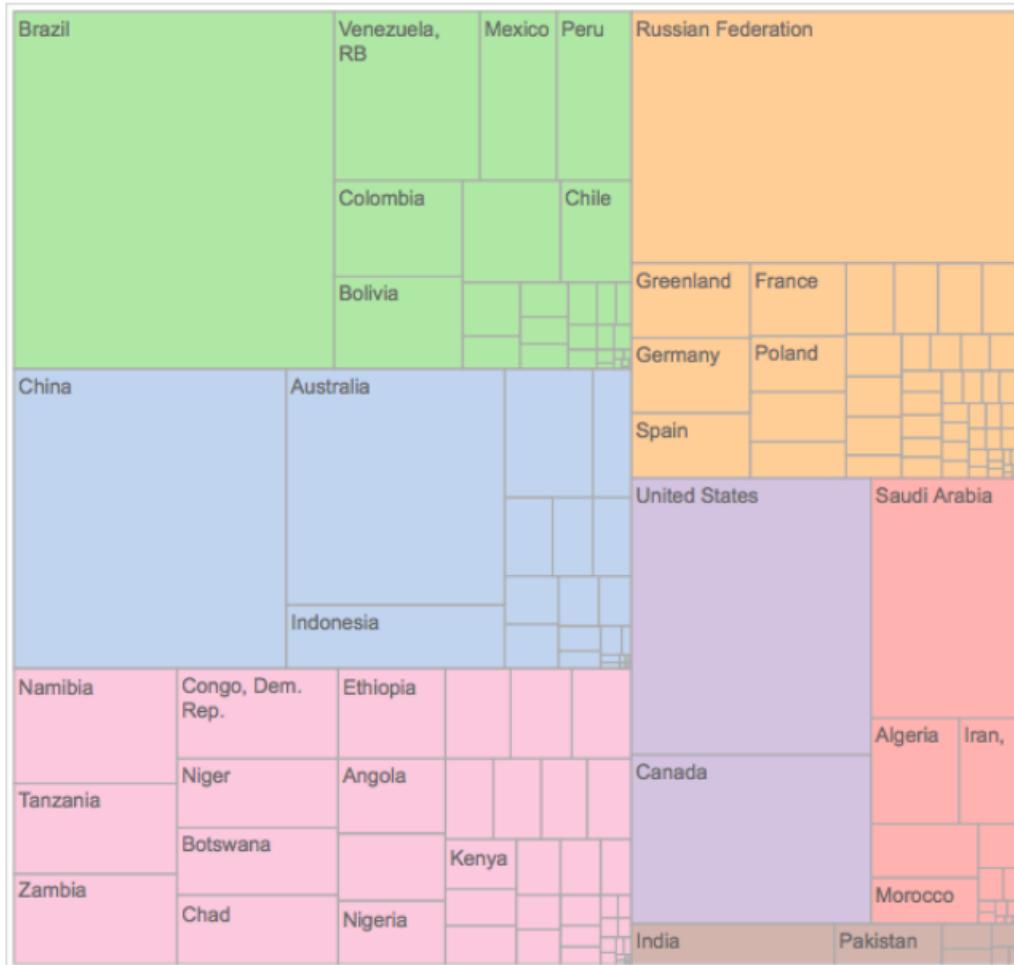
Location

Chart Suggestions—A Thought-Starter



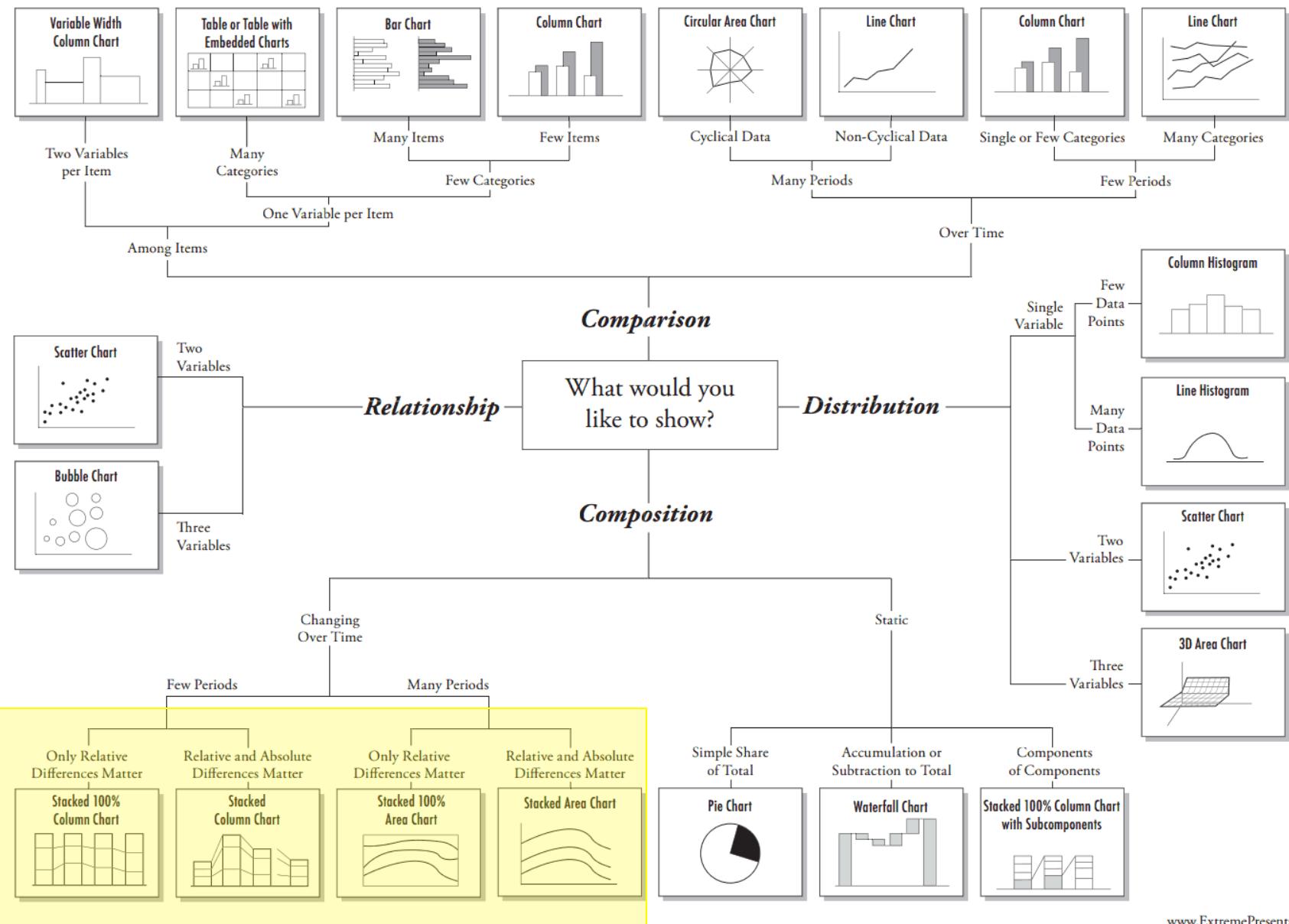
Composition: parts of the whole

Protected land in 2012



Source: World Bank Indicators

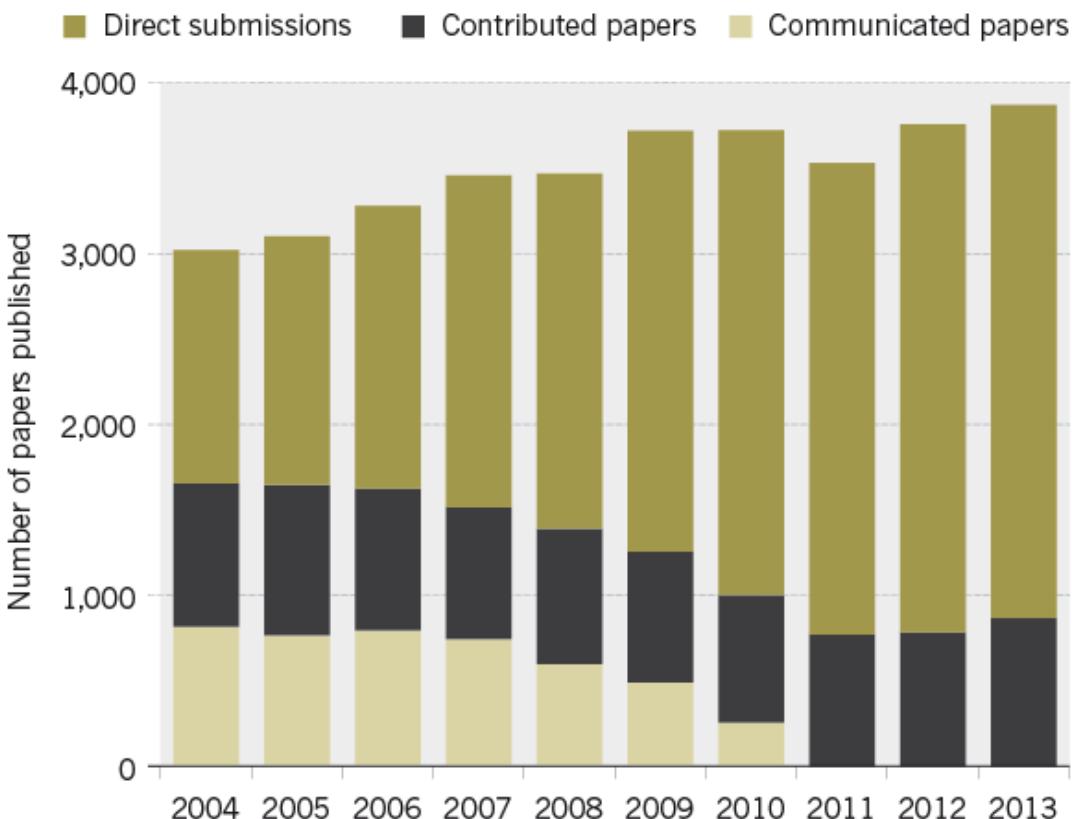
Chart Suggestions—A Thought-Starter



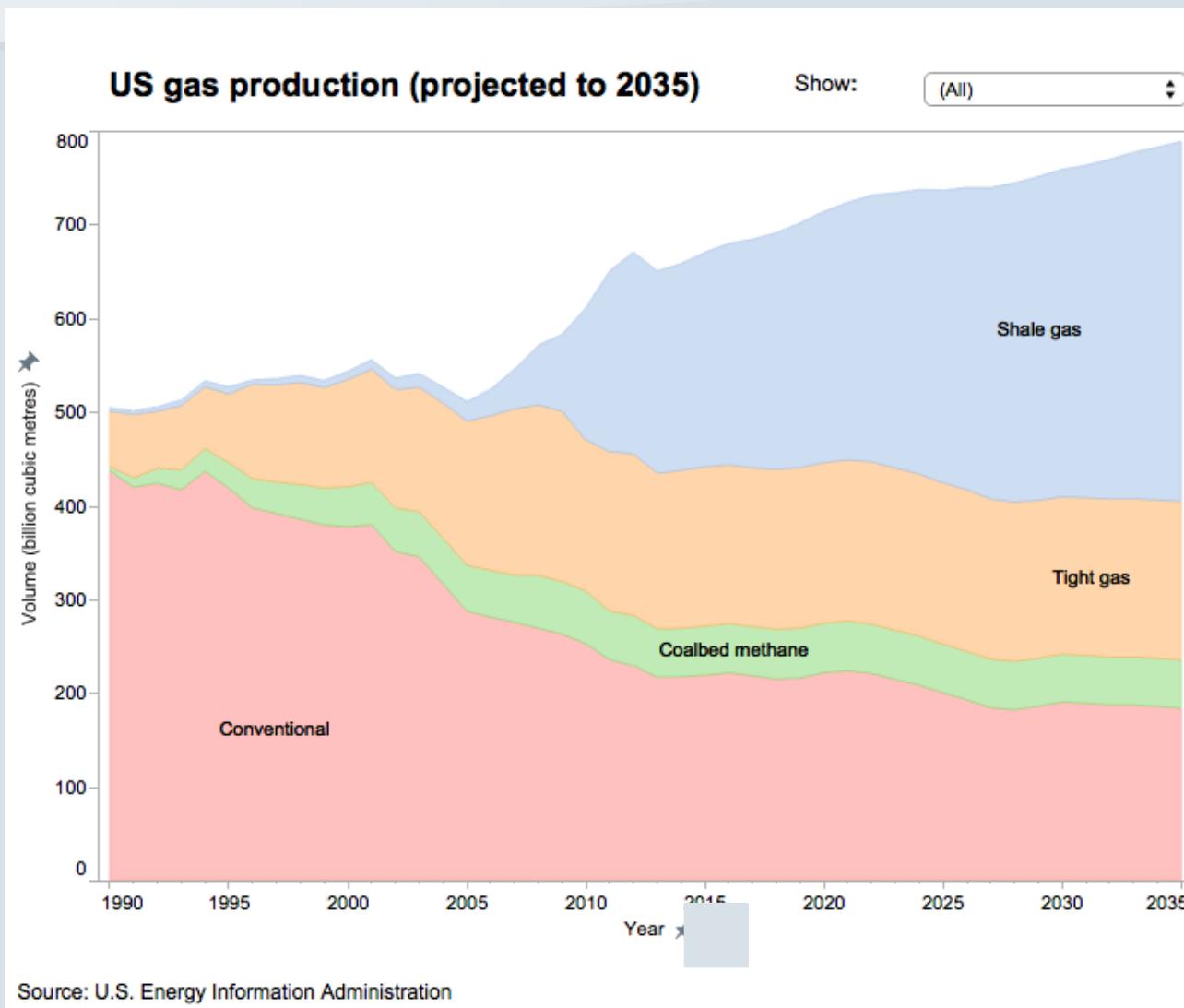
Composition: change over time

A changing journal

The number of direct submissions to *Proceedings of the National Academy of Sciences* has been increasing steadily over the past decade. Communicated papers were phased out in 2010, but the contributed track has remained constant.



Composition: change over time



Distribution

Relationship

Comparison

What do you want to show?



Connection

Composition
(parts of the whole)

Location

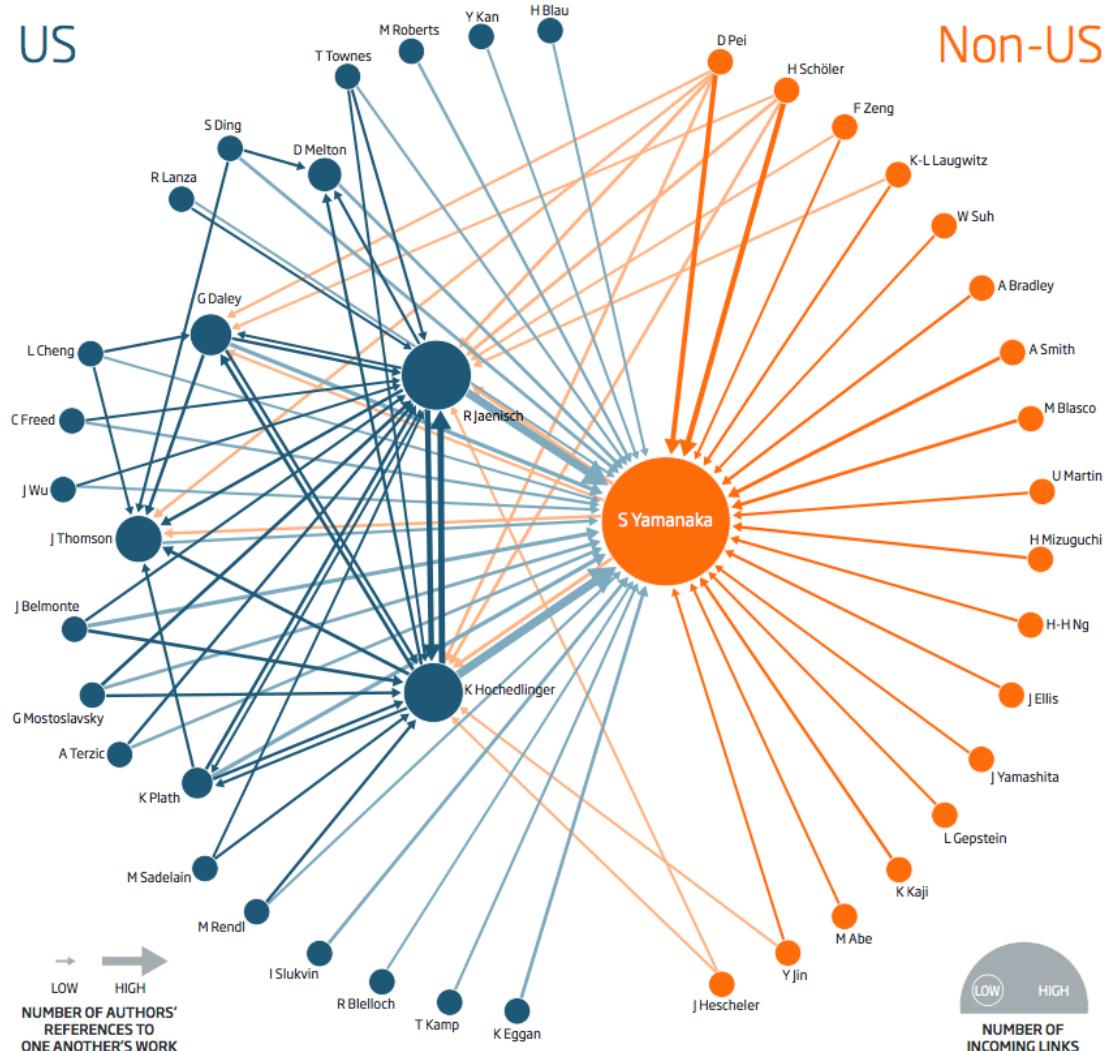
THE STEM CELL WARS

When a Nobel prize is up for grabs, do scientists across the globe compete on a level playing field? **Peter Aldhous** investigates

The most influential players in cellular reprogramming are revealed by recording how many times the scientists have referred to each other's work. Each link shows where one researcher cited another four or more times in papers in leading journals (for analysis, see "The strongest link", below right)

US

Non-US



Connection: network graphs

Distribution

Relationship

Comparison

What do you want to show?

Connection

Composition
(parts of the whole)

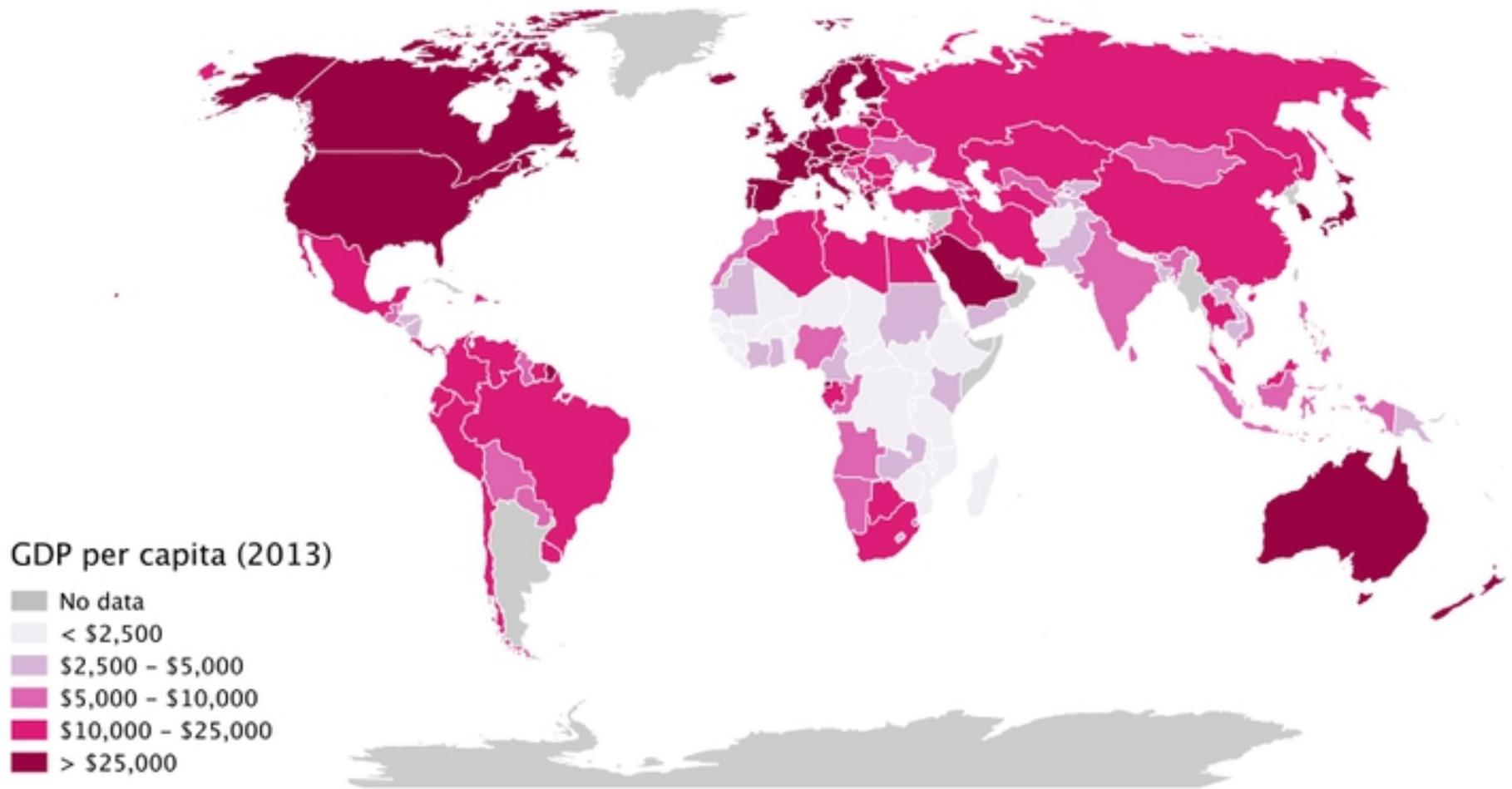
Location



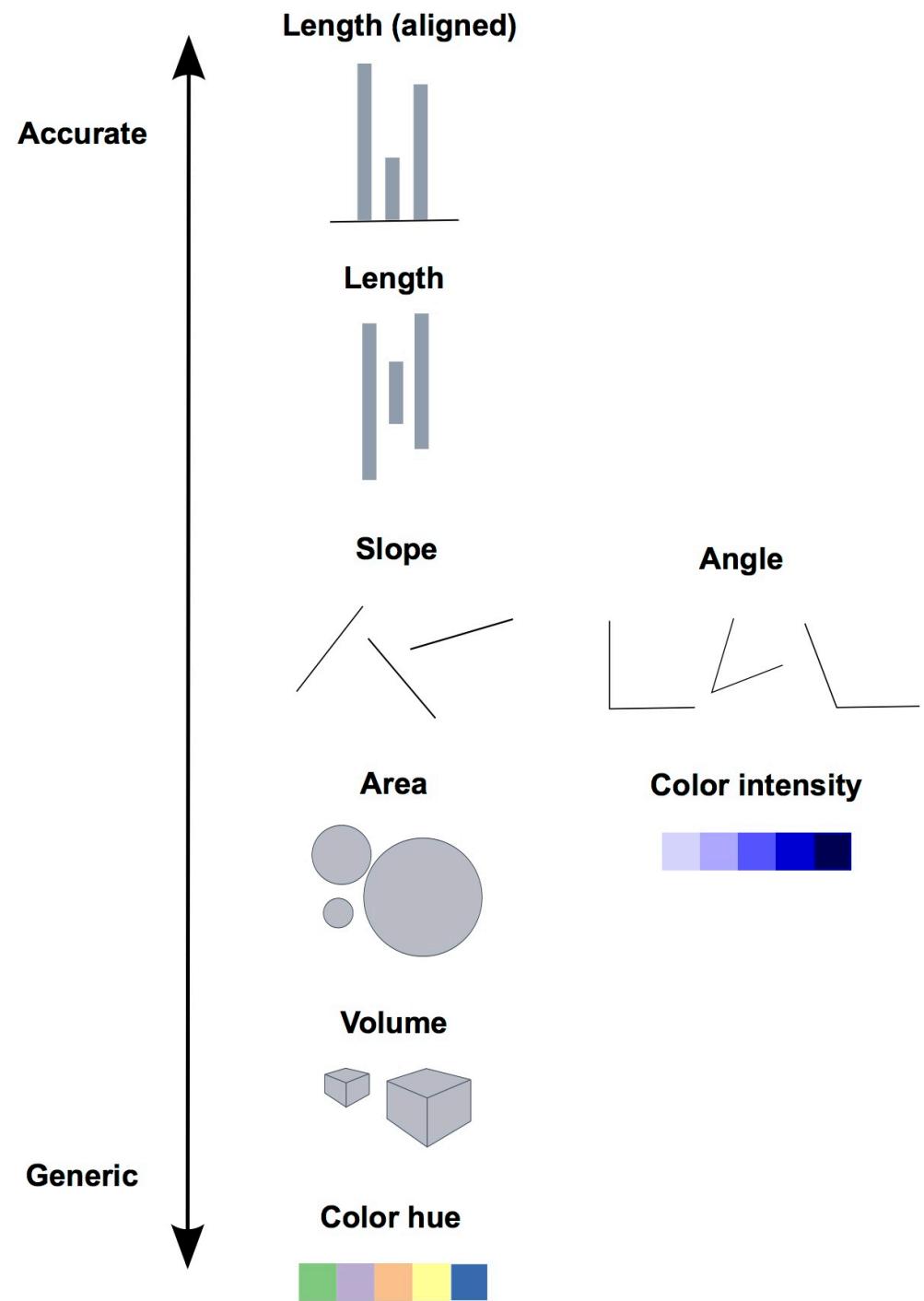
Location plus data: scaled circles



Location plus data: choropleth maps



Remember the perceptual hierarchy of visual cues!

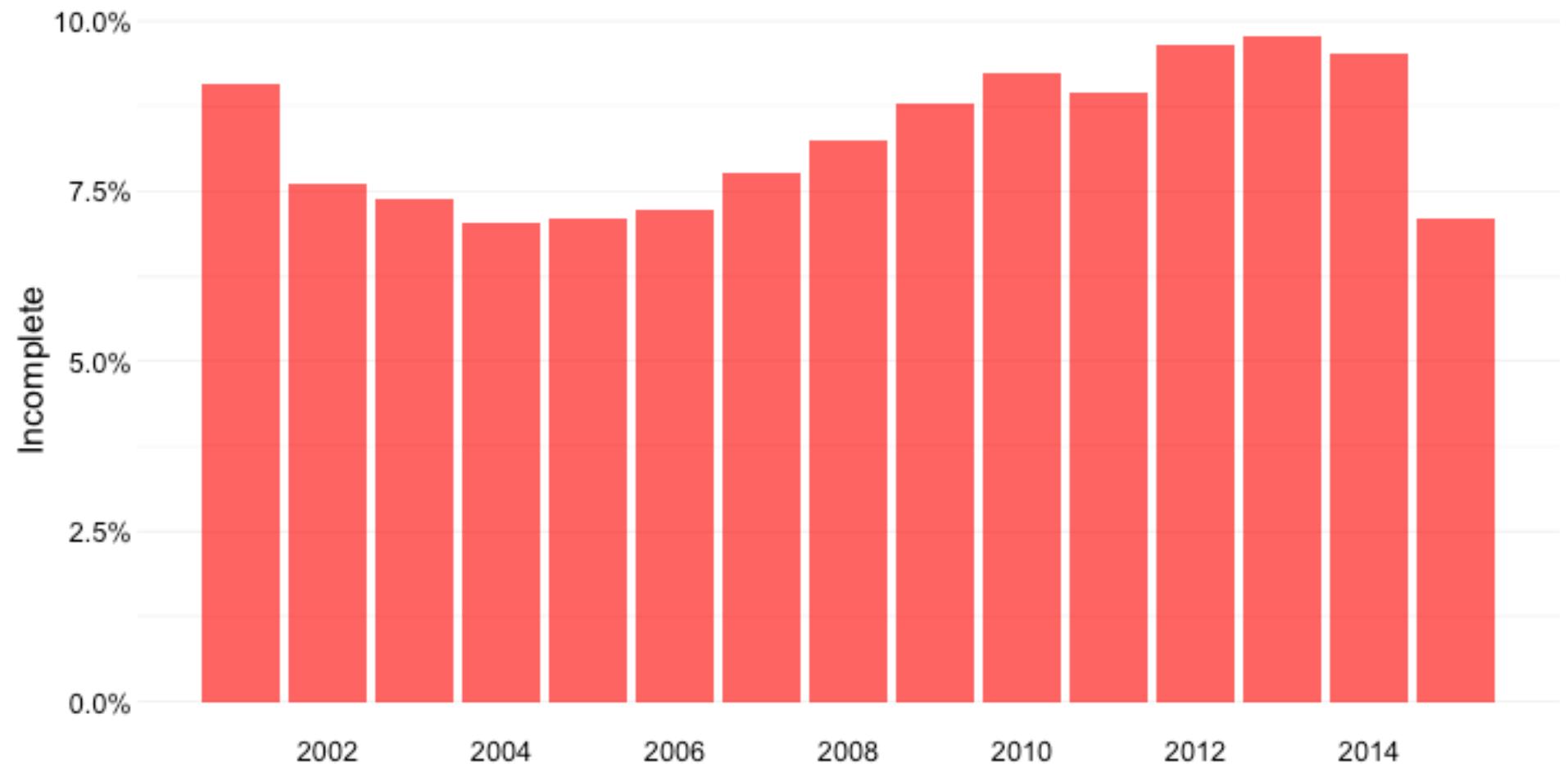


So ask yourself: Is a map the best way to tell the story?

Case study: Immunization in California kindergartens

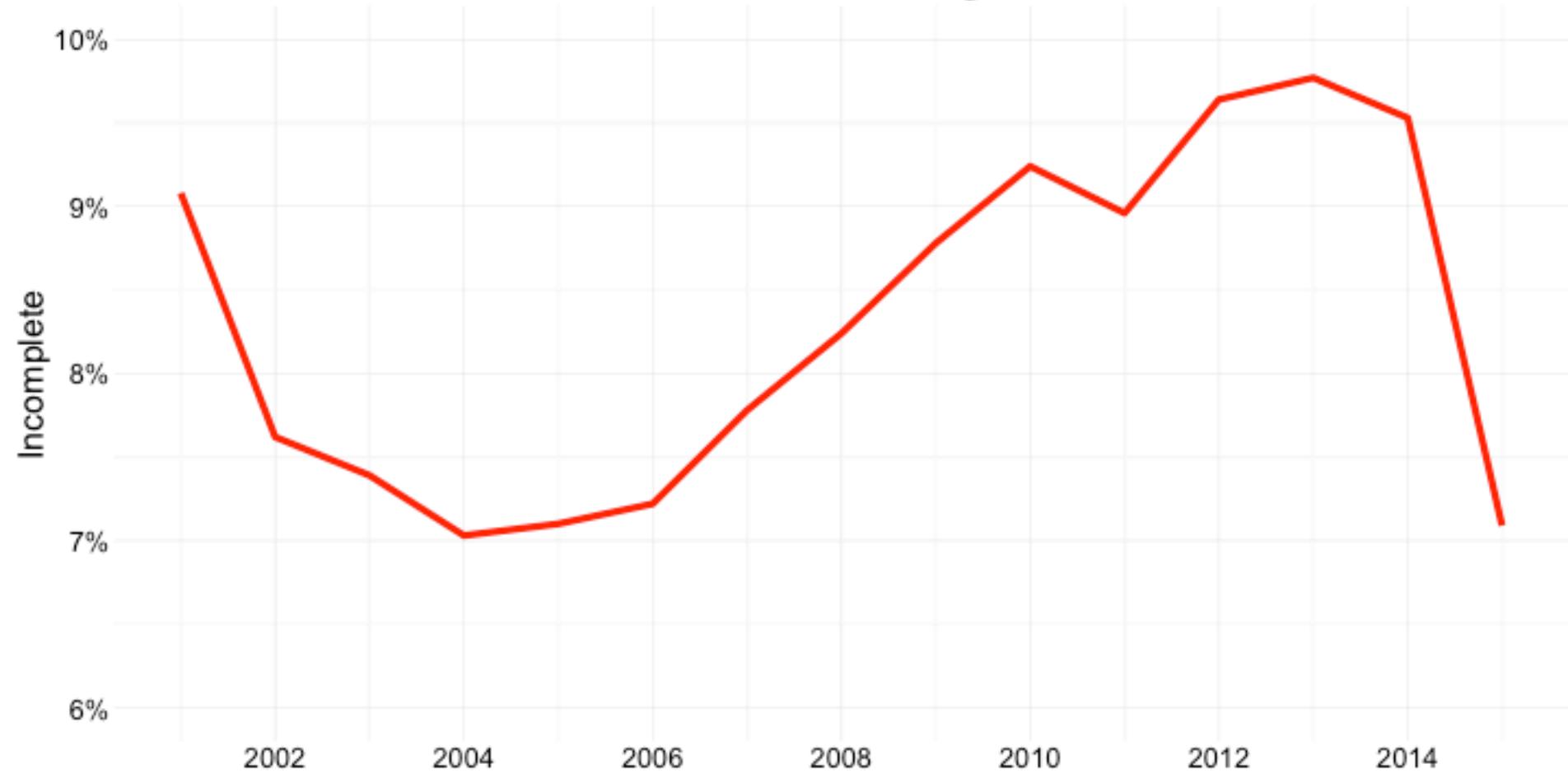
Length on aligned scale

Immunization in California kindergartens, entire state



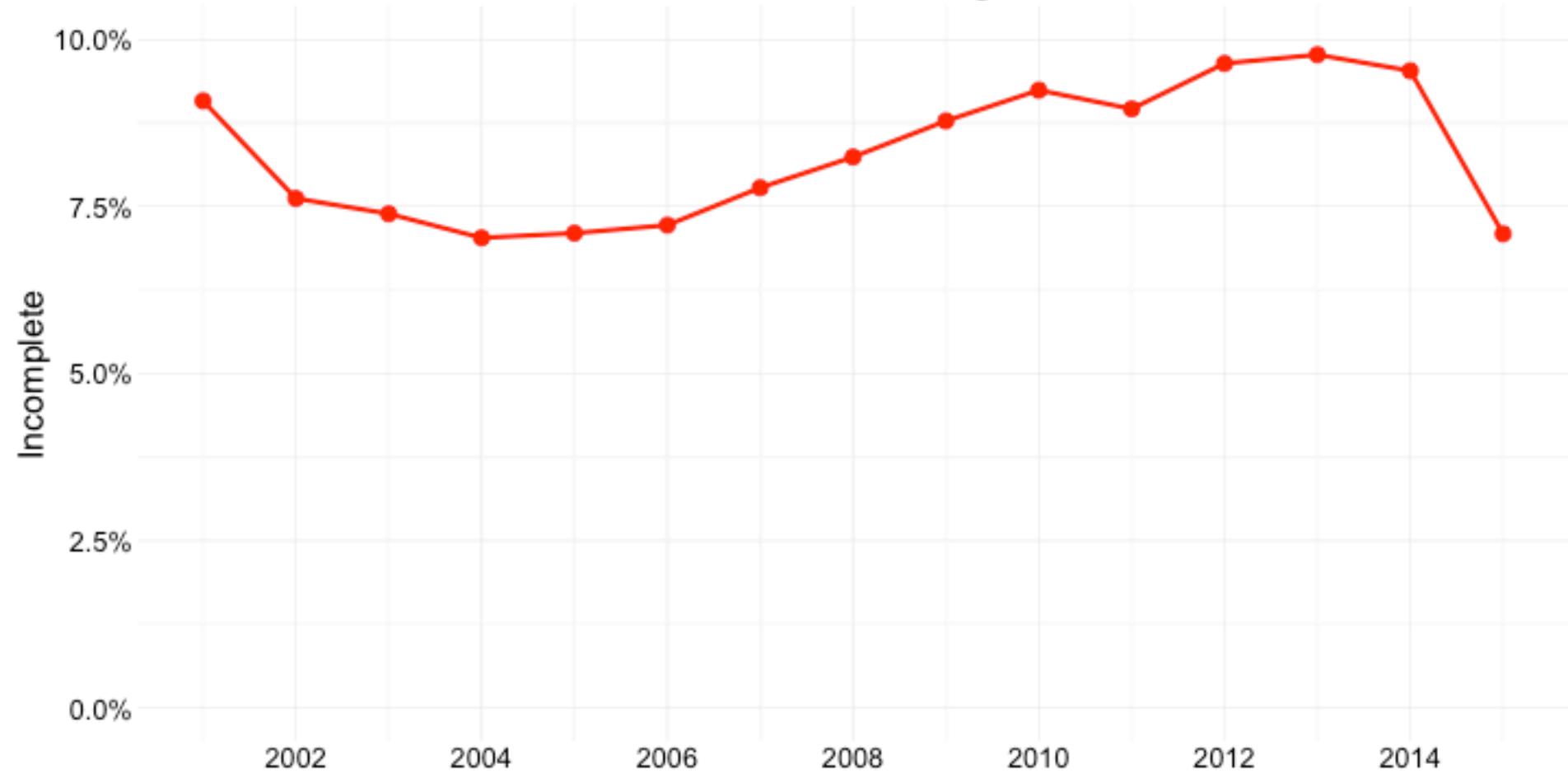
Slope, note the y axis scale

Immunization in California kindergartens, entire state



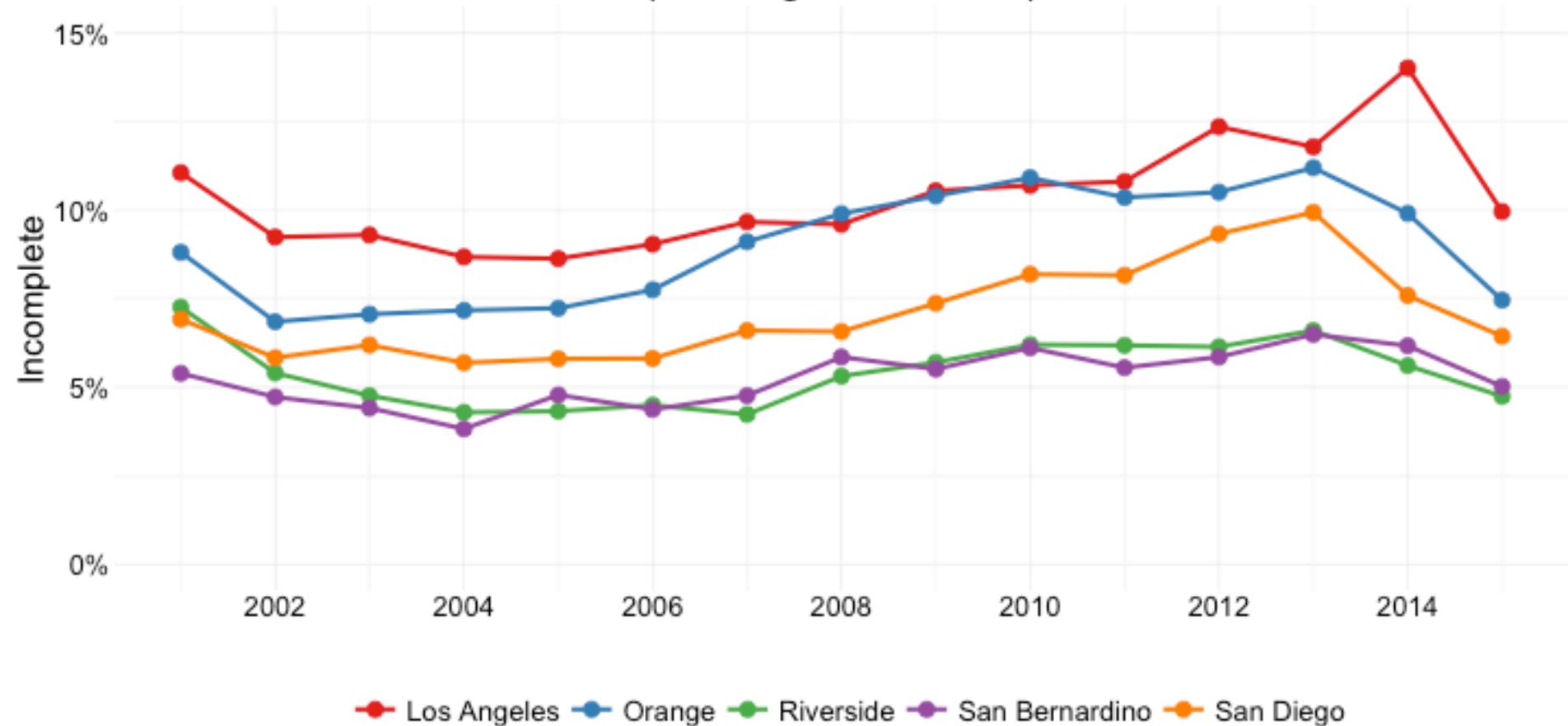
Position on aligned scale + slope

Immunization in California kindergartens, entire state



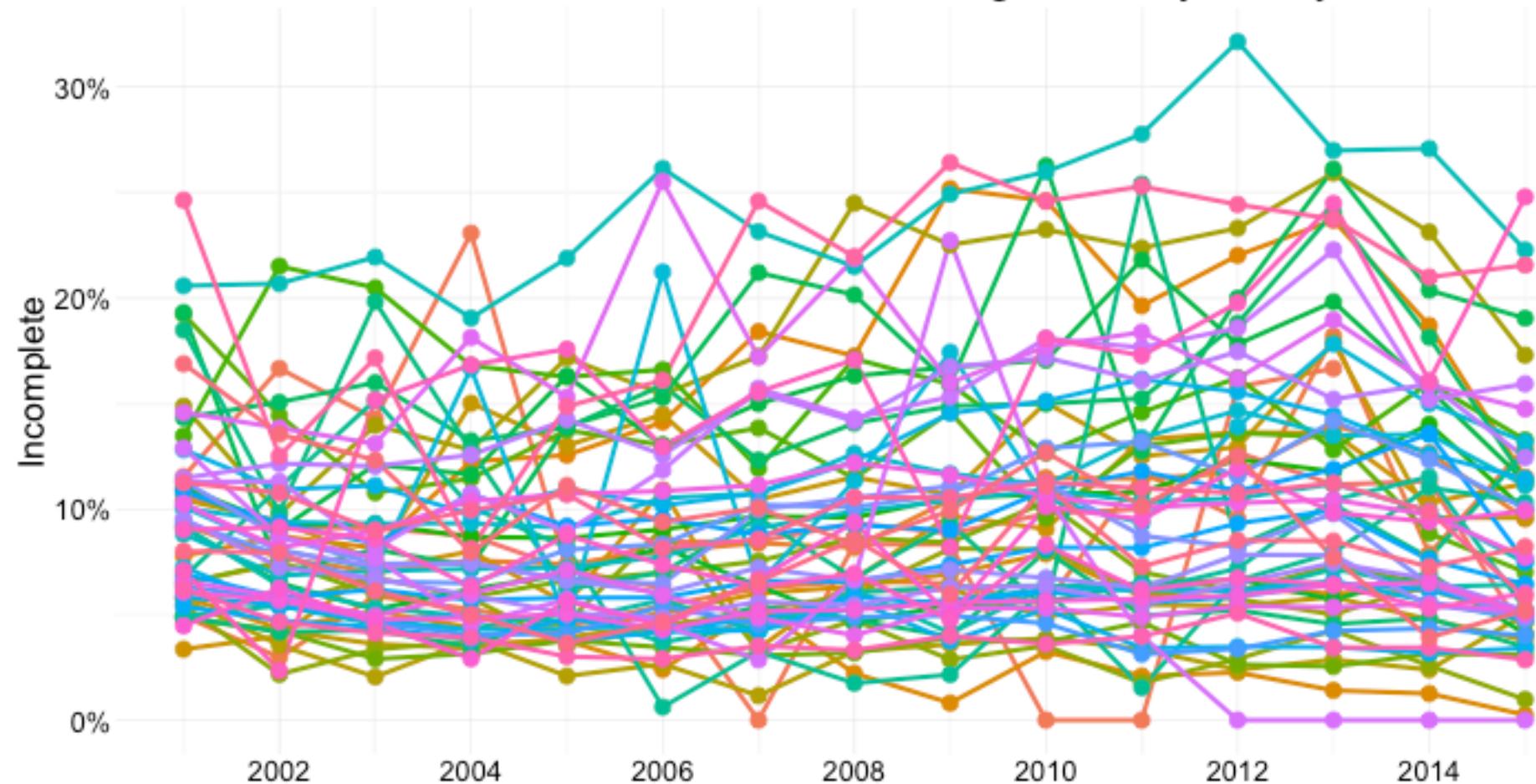
Several counties

Immunization in California kindergartens (five largest counties)



All the counties: Too many lines, too few colors

Immunization in California kindergartens, by county

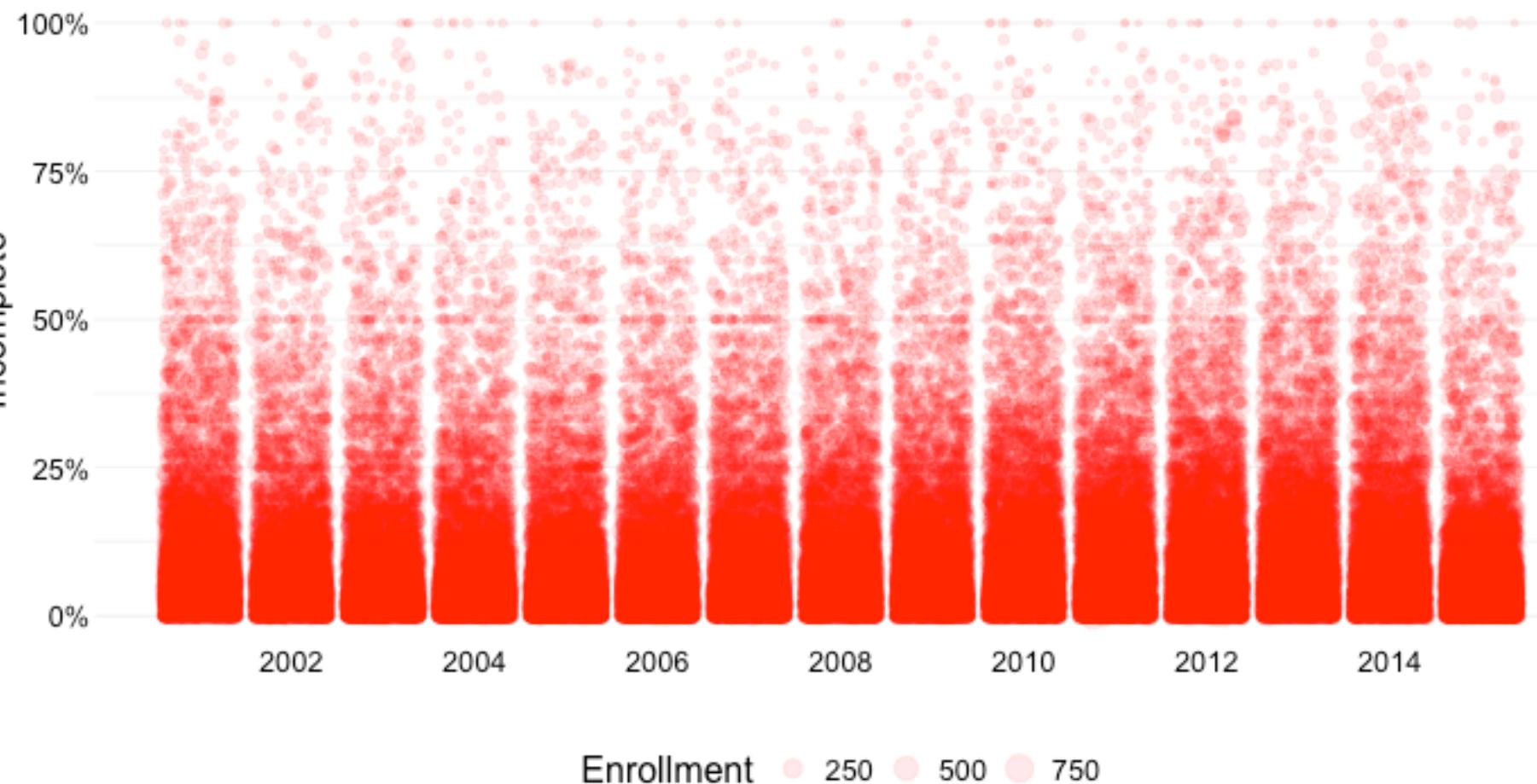


A solution: color intensity



All the schools: Position on aligned scale + area

Immunization in California kindergartens



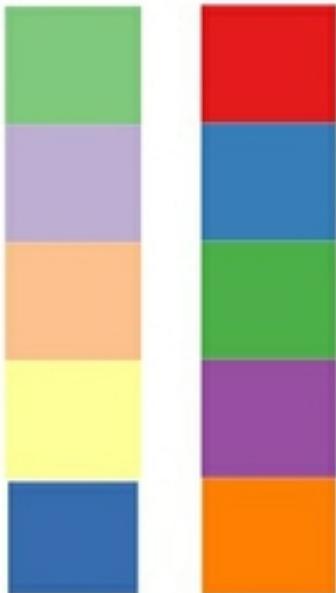
Using color effectively

The color wheel



Using color: fit to your data

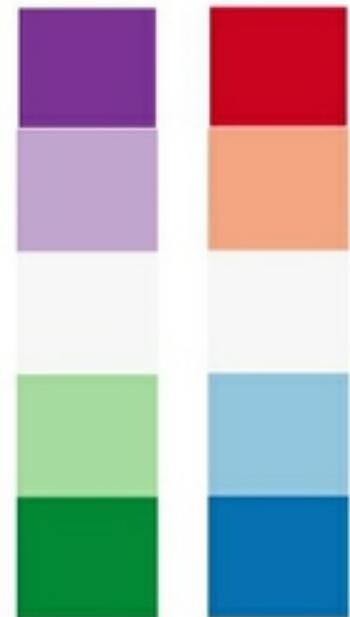
Qualitative



Sequential



Diverging



ColorBrewer is your friend

number of data classes on your map
3 [learn more >](#)

the nature of your data
sequential [learn more >](#)

pick a color scheme: BuGn

multihue single hue

(optional) only show schemes that are:
 colorblind safe print friendly
 photocopyable [learn more >](#)

pick a color system
229, 245, 249 RGB CMYK HEX
153, 216, 201
44, 162, 95

adjust map context
 roads
 cities
 borders

select a background
 solid color
 terrain

[learn more >](#) color transparency

how to use | updates | credits

COLORBREWER 2.0
color advice for cartography

EXPORT YOUR COLORS >> SCORE CARD

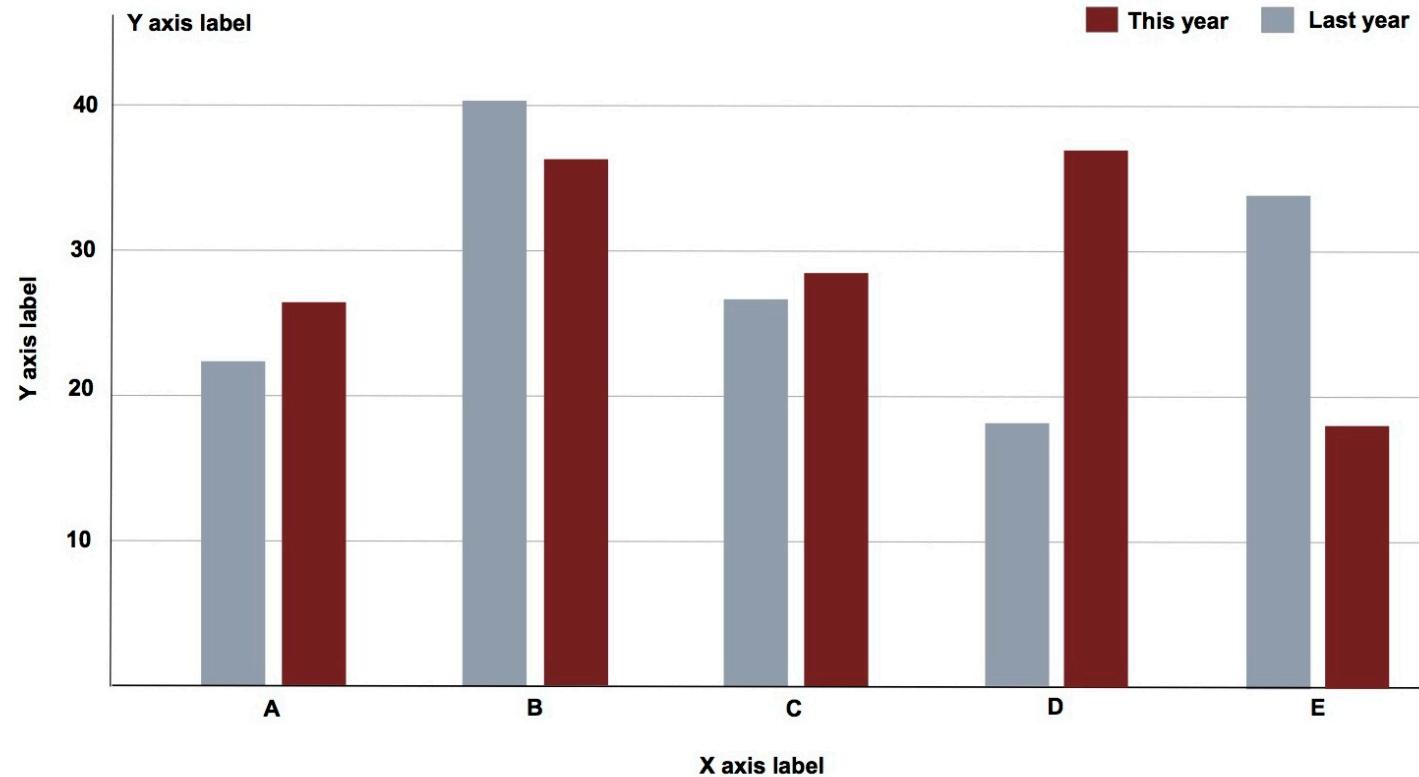
© Cynthia Brewer, Mark Harrower and The Pennsylvania State University
[Support](#)
[Back to ColorBrewer 1.0](#)

axm

Chart furniture

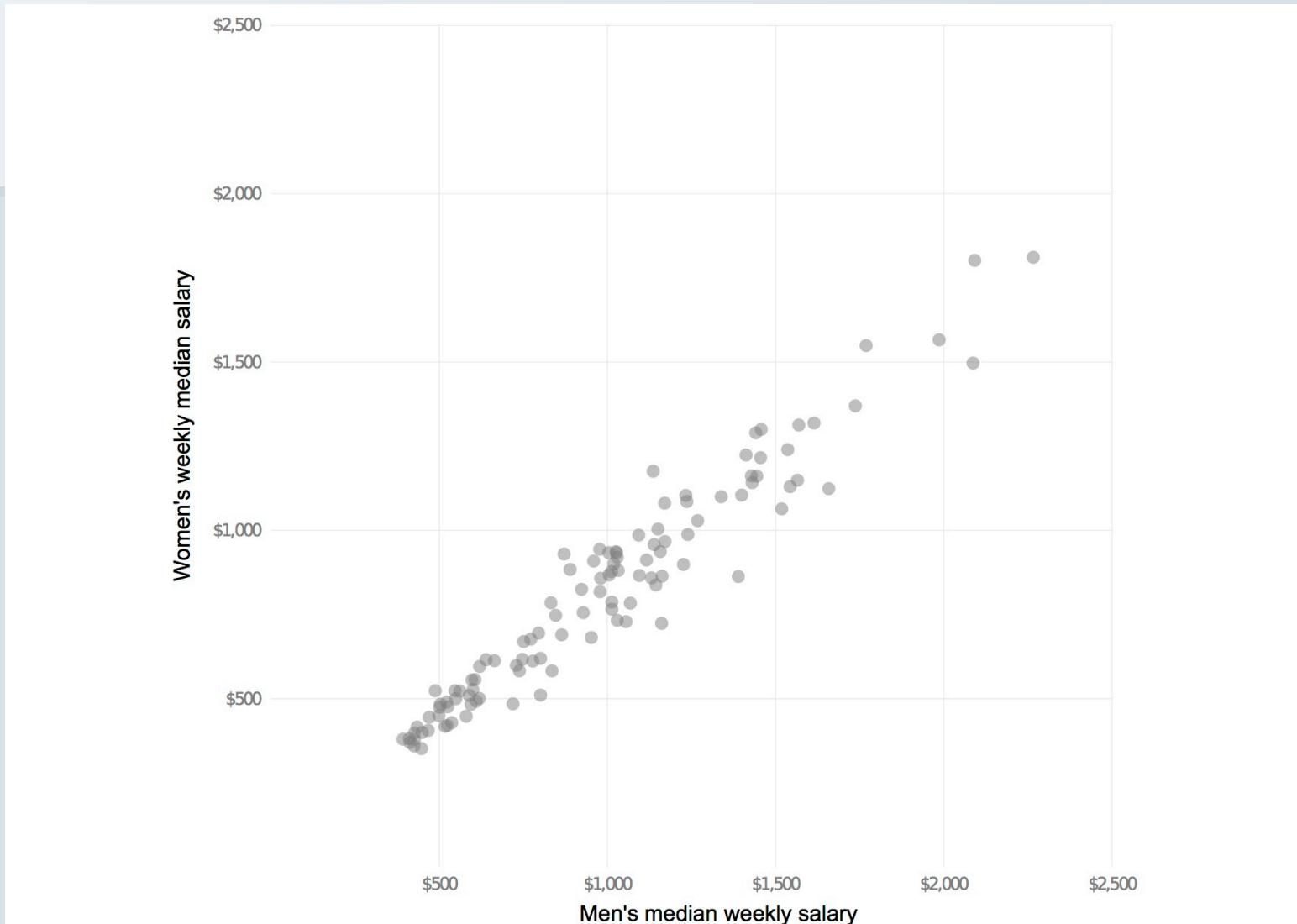
A title for the chart

And a subtitle, telling us some more about what it shows.

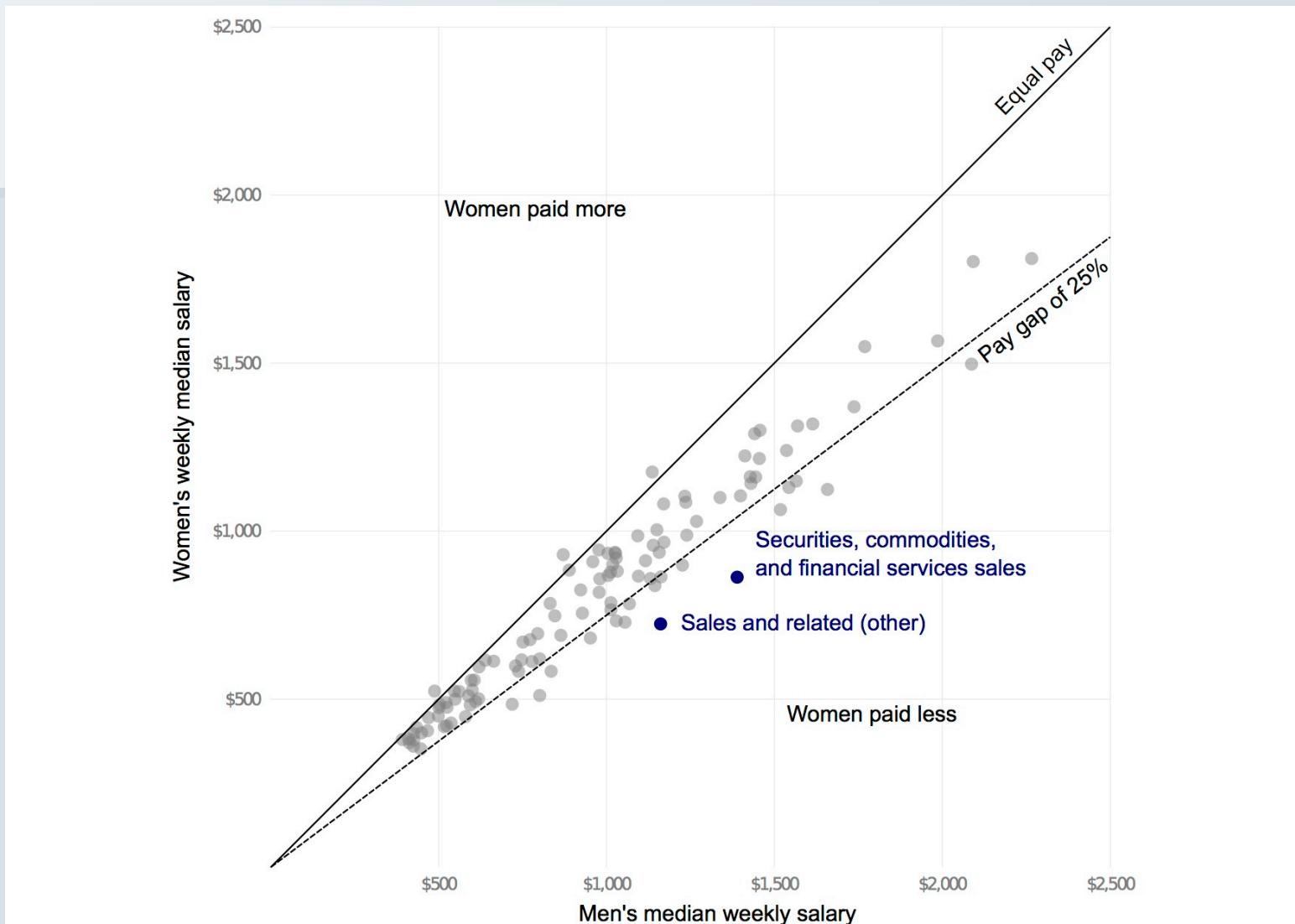


Source information

Highlight the story: labels and annotation



Highlight the story: labels and annotation



**When in doubt:
keep it clean, clear and simple!
(But aim for clarity over simplicity)**

Experiment! Sketch!

That may be how you find the story

Show people. If they're confused, try another approach

Recommended reading

