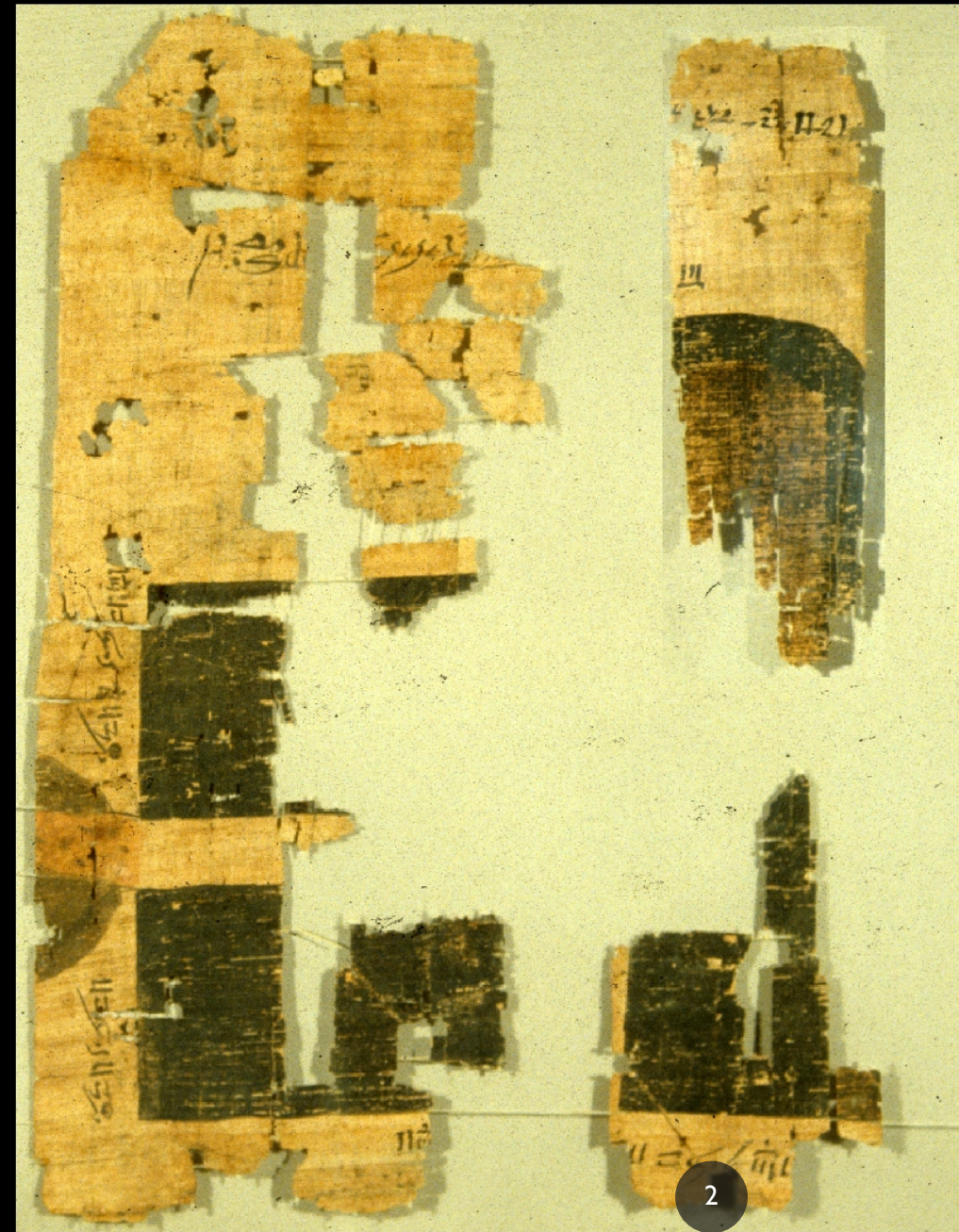


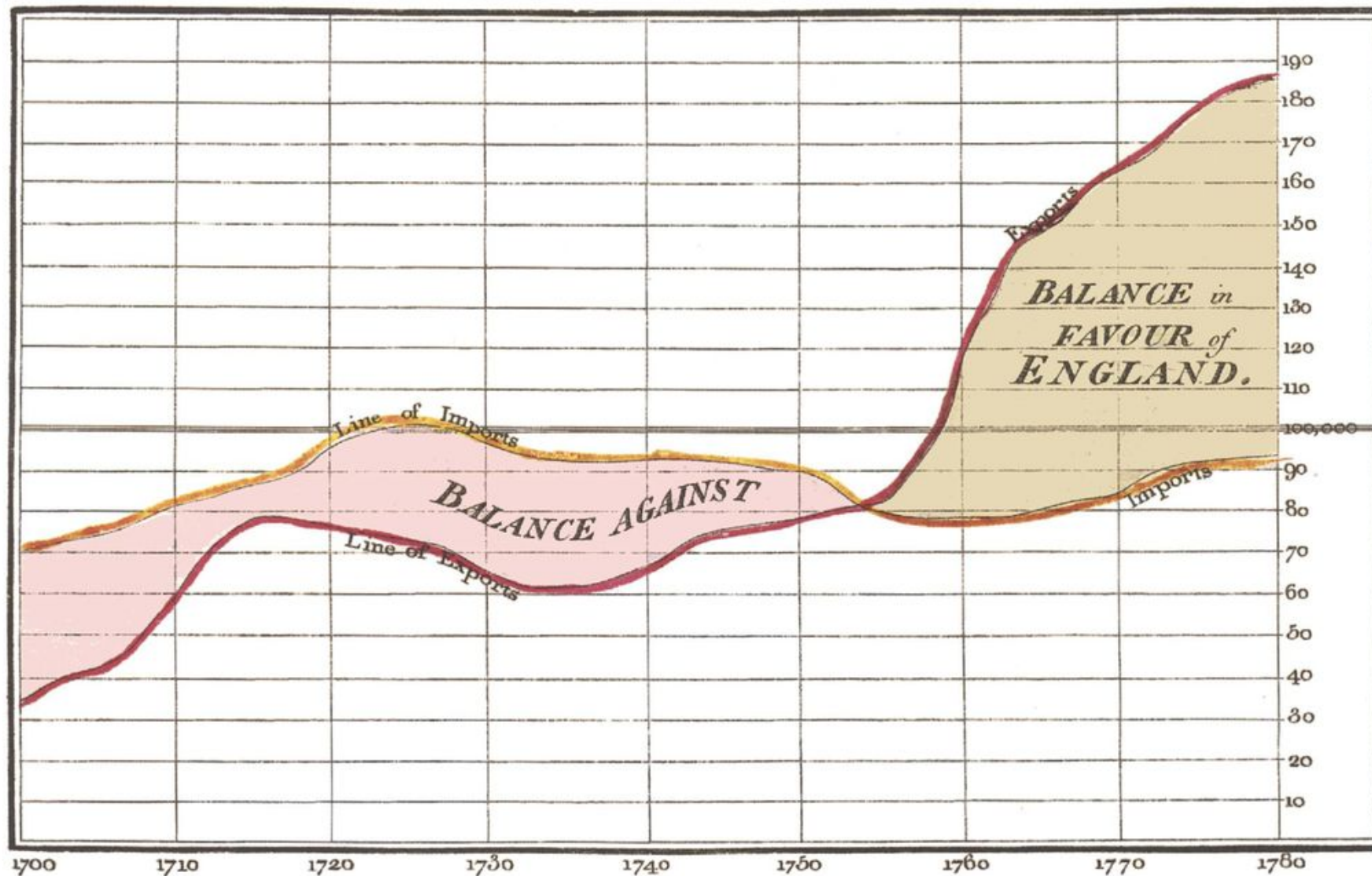
INTRO TO DATA VISUALIZATION

Katie Ireland Kuiper
28 October 2020
katherine.kuiper25@uga.edu





Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.



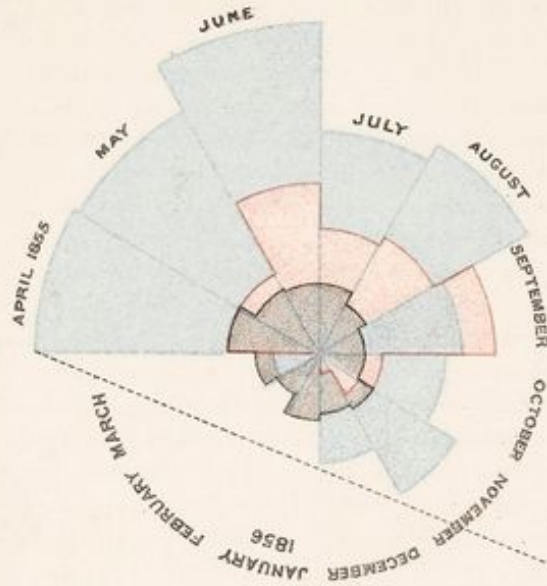
The Bottom line is divided into Years, the Right hand line into £10,000 each.

Published as the Act directs, 1st May 1786, by W^m Playfair

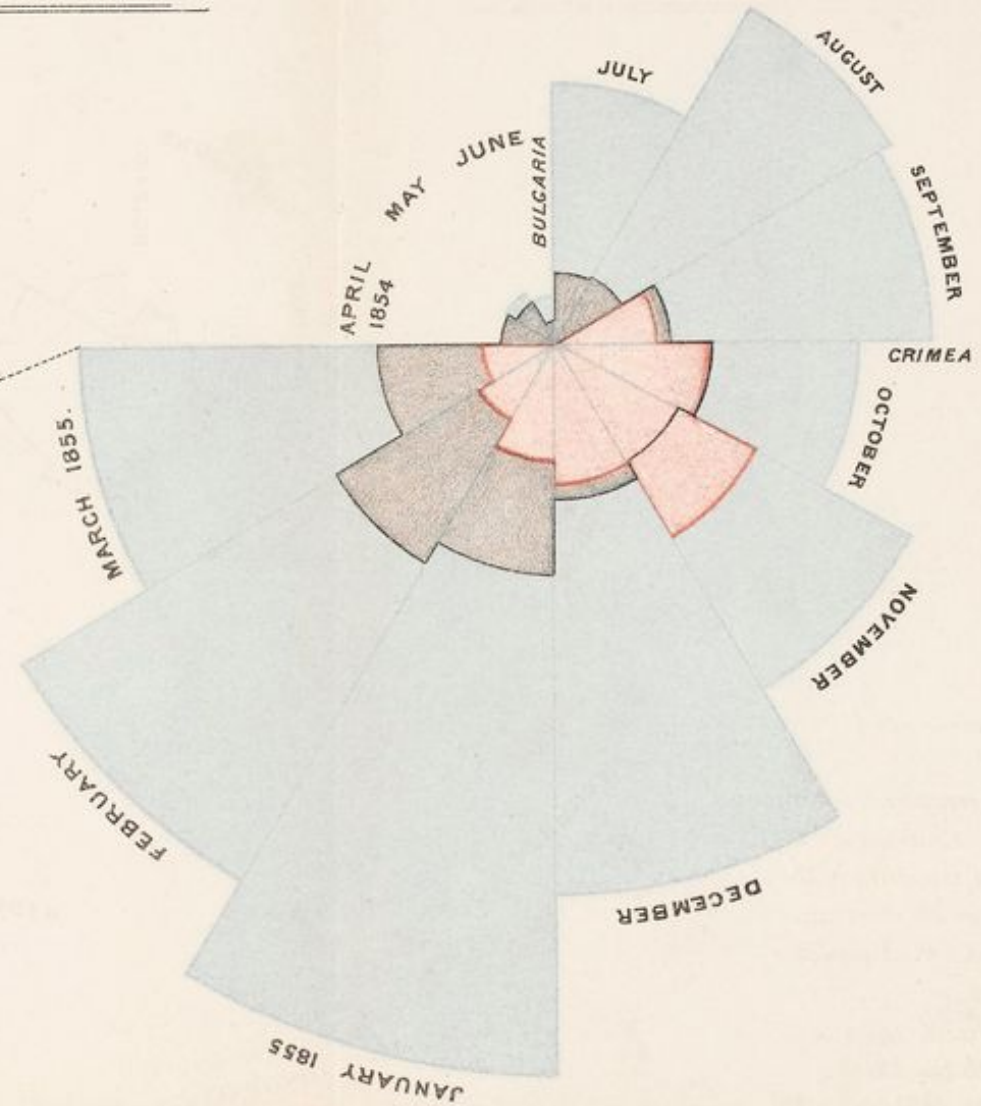
Needle sculpt 352, Strand, London.

DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

2.
APRIL 1855 TO MARCH 1856.

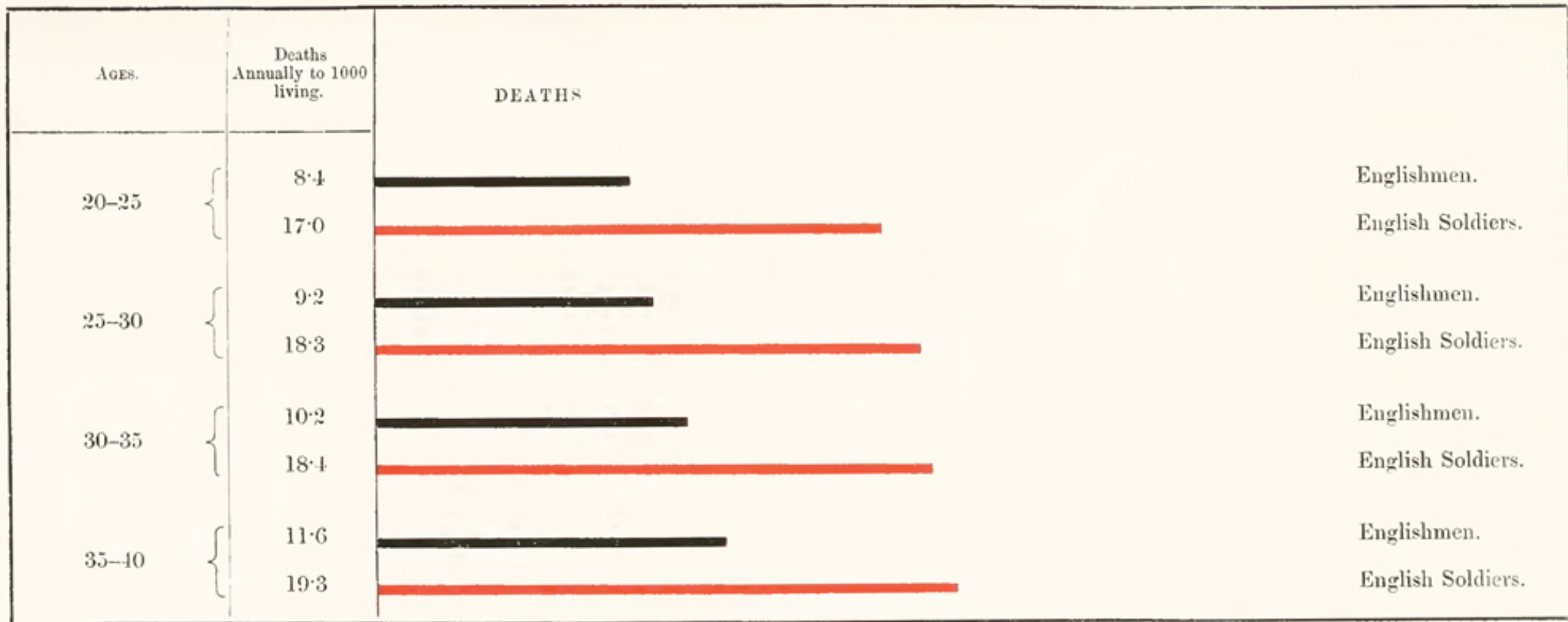


1.
APRIL 1854 TO MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.
The black line across the red triangle in Nov^r 1854 marks the boundary of the deaths from all other causes during the month.
In October 1854, & April 1855, the black area coincides with the red, in January & February 1855, the blue coincides with the black.
The entire areas may be compared by following the blue, the red & the black lines enclosing them.

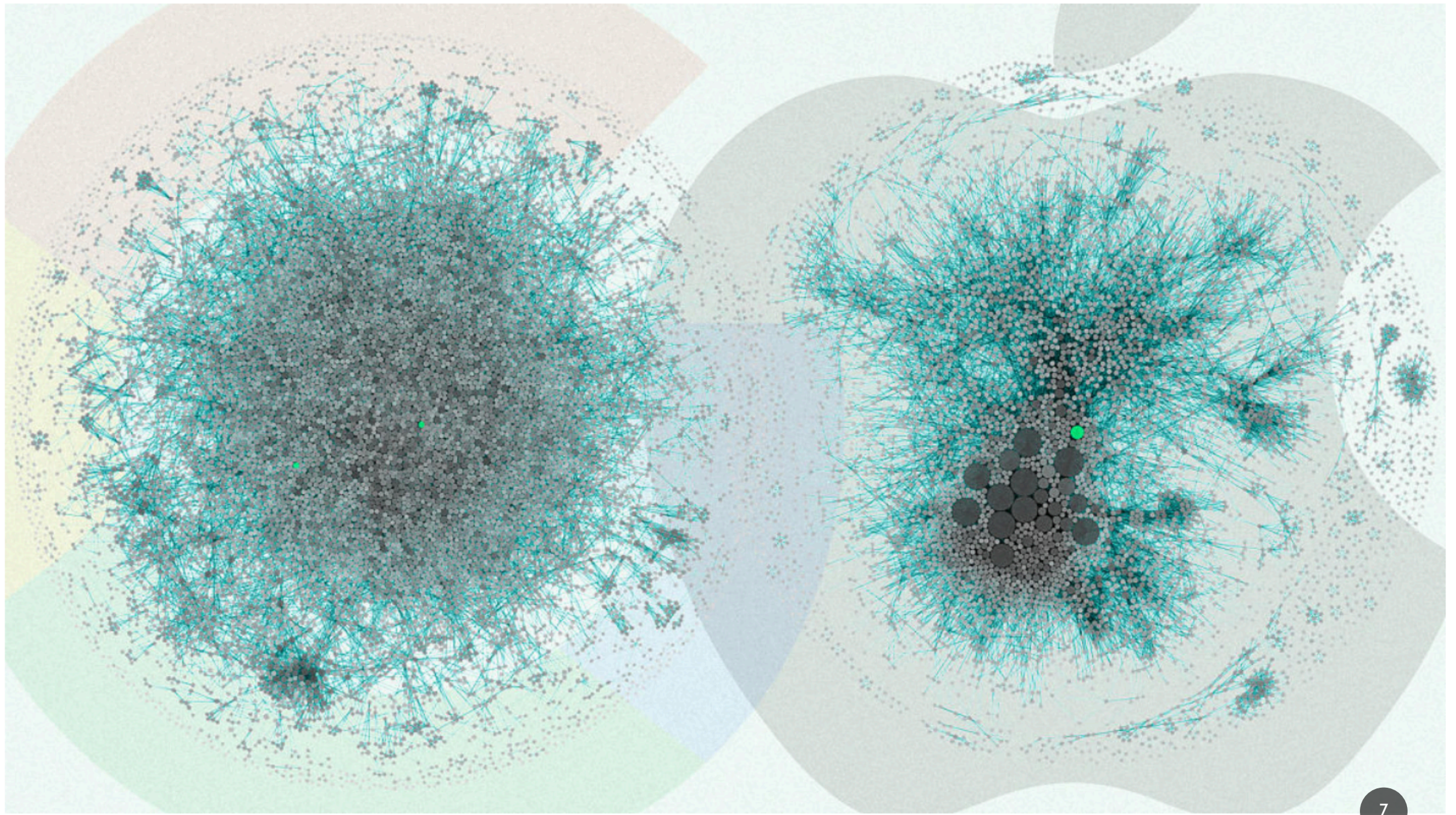
Representing the Relative Mortality of the Army at Home and of the English Male Population at corresponding Ages.



JAMES LEWIS, del.

VISUALIZATION
TRANSFORMS DATA
INTO IMAGES THAT
EFFECTIVELY AND
ACCURATELY
REPRESENT
INFORMATION
ABOUT THE DATA.

Schroeder et al. 1998: The Visualization
Toolkit



MAIN GOALS OF DATA VISUALIZATION



1. EXPLORE AND
UNDERSTAND



2. TO ANALYZE



3. PRESENT AND
COMMUNICATE
RESULTS



4. PROMOTE
ENGAGEMENT

COMMON TERMS

- Statistical graphics
- Infographics
- Information visualization
- Data visualization

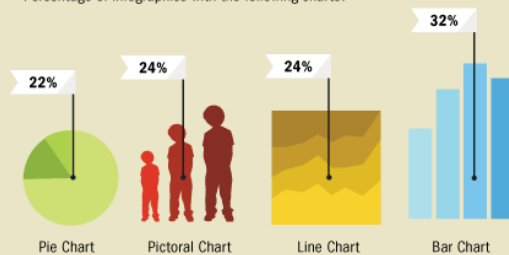
INFOGRAPHIC OF INFOGRAPHICS

Data visualization is a popular new way of sharing research. Here is a look at some of the visual devices, informational elements, and general trends found in the modern day infographic.

DESIGN

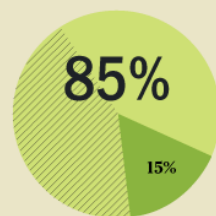
CHART STYLE

Percentage of infographics with the following charts:



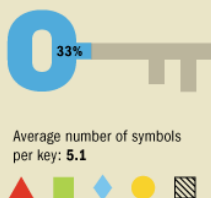
FONT

■ Sans Serif
 ▨ Condensed Sans Serif
 ■ Serif

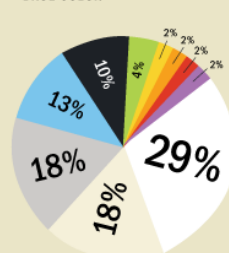


KEY INFO

Percentage of infographics with key:

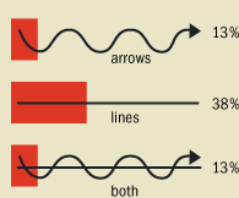


BASE COLOR



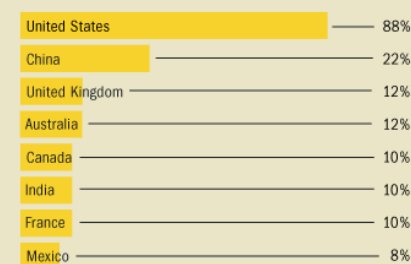
NAVIGATIONAL ICONOGRAPHY

Frequency of arrows & connecting lines in infographics:



CONTENT

COUNTRIES FEATURED

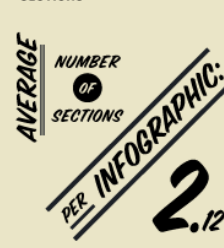


THEME

Relative popularity of different infographic themes:



SECTIONS



CREDITED SOURCES

Average number of sources per infographic: **2.29**



TITLE

Average number of words per infographic title: **4.36**

“RICHEST AND POOREST AMERICAN NEIGH

CONCEPT & DESIGN Ivan Cash

SOURCE 49 infographics collected at random from www.good.is/infographics

BEFORE GETTING STARTED

- In order to select the best visualization for your data, ask yourself:
- Who is my audience?
- What am I trying to convey and accomplish?
- What kind of data am I using?

AUDIENCE AND GOALS

- Who is the visualization for?
- Is the goal exploration, explanation, or persuasion?
- Depending on these, decisions on your visualizations might differ.
- You might want to make your visualizations static,
- or dynamic !

The background of the slide is a blurred image of computer code, likely JavaScript, with various colors like blue, green, and red for different syntax elements. The code is not legible due to the blur effect.

DATA TYPES

- **Quantitative:** numerical values or data that is measured or counted
 - **Discrete-** finite possible values. Ex: game scores, zip codes
 - **Continuous** – data that can take any value. Ex: temperature, height, vowel duration



DATA TYPES

- **Qualitative or Categorical:** no logical order and can't be translated into a numerical value
- Ex: dog breeds, countries, text genres, dialects



DATA PATTERNS

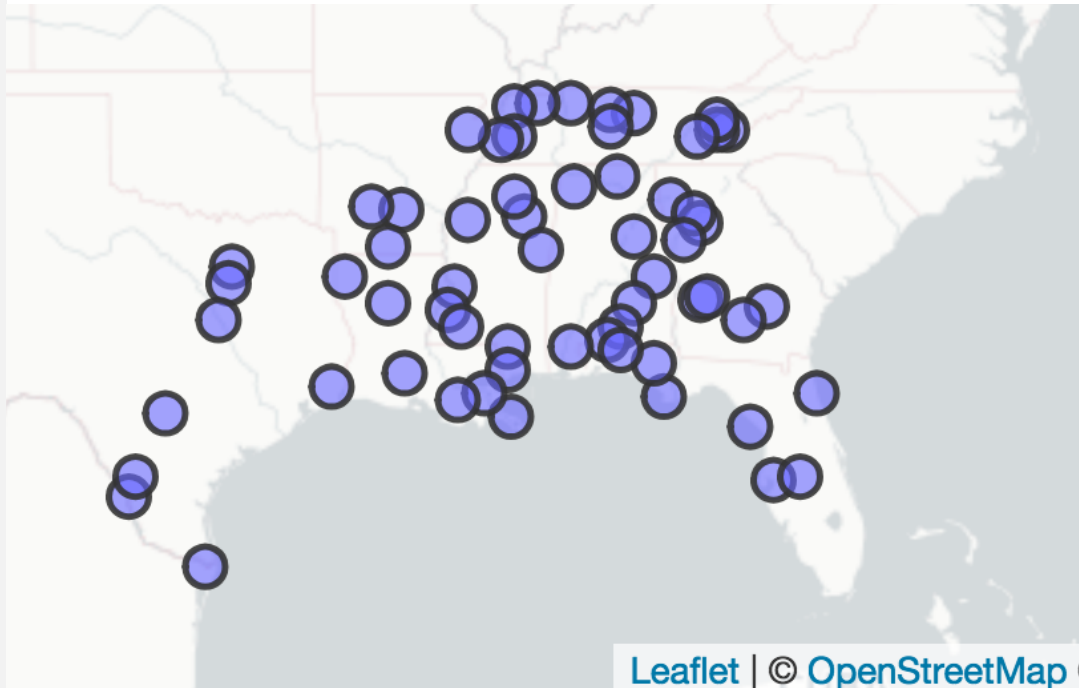
- How does your data relate to each other?
- Common data relationships include:
 - **Nominal:** grouping of data that has no order, ie colors, product sales by product code
 - **Part-to-whole:** ratio in comparison to the whole; pie or bar charts used most often for this.
 - **Ranking-** an ordering often in descending or ascending order, can be used with measures, categories, etc.

DATA PATTERNS

- **Correlation-** a comparison of how two or more variables may have a positive or negative relationship or no relation at all
 - ex: the relationship between square feet and use of electricity.
- **Deviation-** an indication of how data points relate to each other, with an emphasis on how far the data points differ from the mean.
- **Distribution-** an illustration of how the data are spread/located, along with where they tend to center, outliers, etc.



DATA PATTERNS



- **Time series-** showing at least one variable over a period of time, usually displaying changes over time.
- **Geospatial:** comparison of a variable across a map or specific layout.
 - Ex: This map, showing the speakers in the Digital Archive of Southern Speech (Kretzschmar et al. 2012)



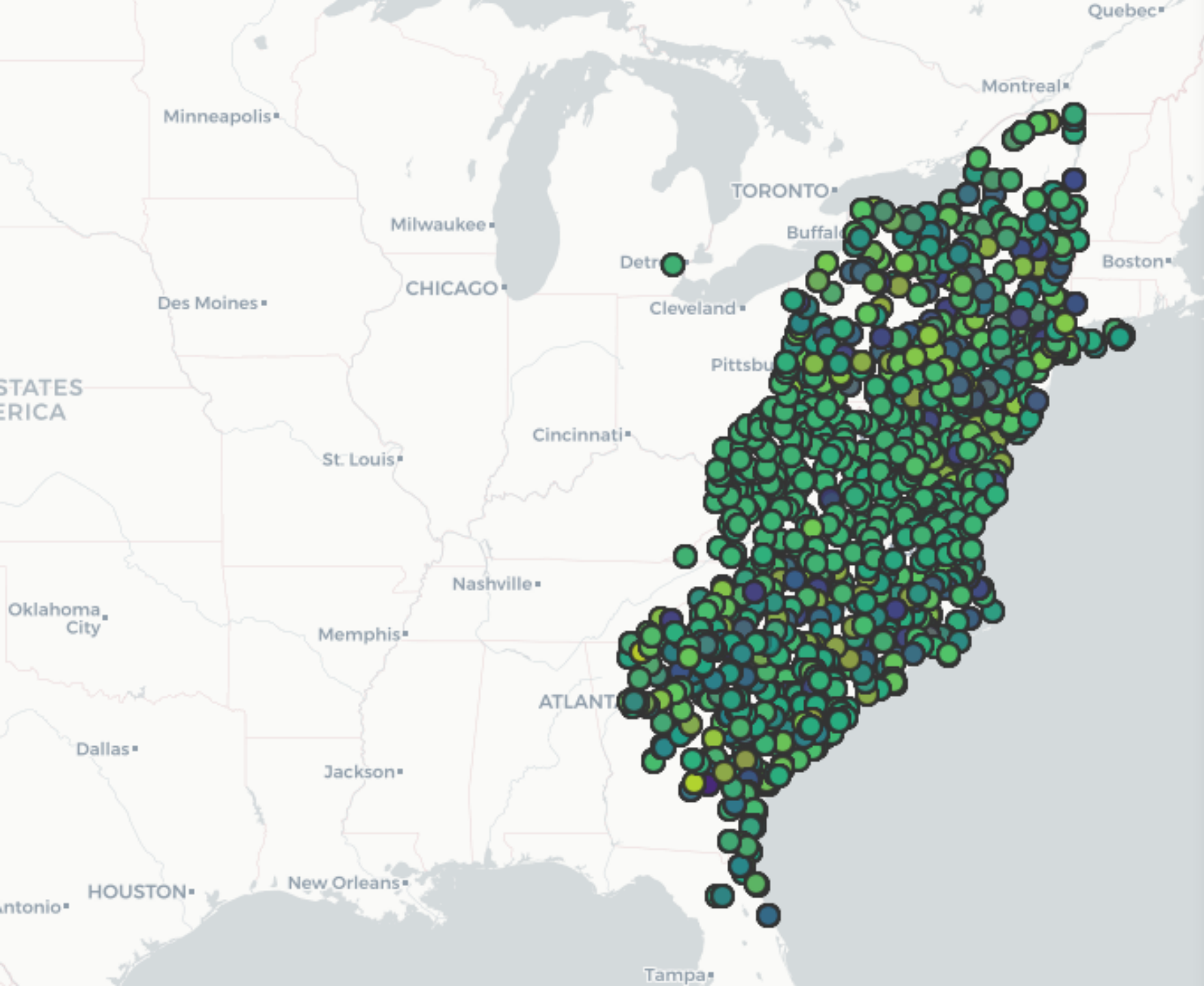
COMMON TYPES OF VISUALS

- Charts
- Tables
- Graphs
- Maps
- Infographics
- Dashboards



CAREFULLY CONSIDER

Color, contrast, clutter, and scale



a curse
a outhouse
a stairs
a stairsteps
a steps
a stone steps
aback of
achter
ain't that recent
all kinds of stuff
all the way across
an outside stairs
antique
antique stuff
antiques
anything you didn't want
at back of
attic
back closet
back entry
back of
back of in here
back of it
back of my house
back of that
back of the bar
back of the barn
back of the chimney
back of the dish table
back of the door
back of the doors
back of the field

Sargasso
Sea



RECOMMENDED RESOURCES

- Excel, Tableau, R, and Python!

- Provides easy and effective comparisons
- Useful for statistical operations and analysis of data
- Does not require scripting knowledge (but has the option to use that)



- Includes a wide range of different chart options:
 - Column chart
 - Histogram
 - Scatterplot
 - Box and whisker chart
 - Area chart





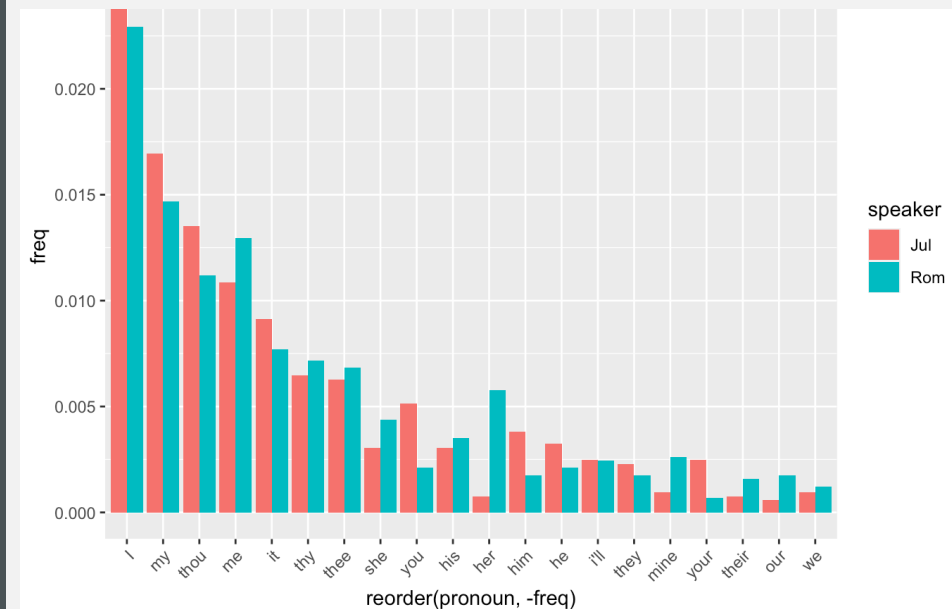
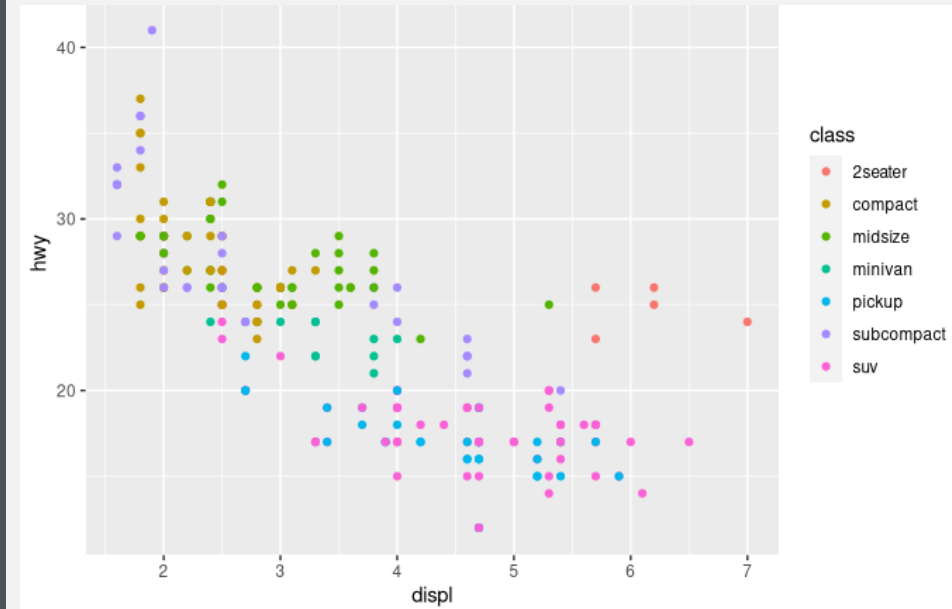
- Extremely popular worldwide and widely used in business and public sectors
- Features powerful business intelligence tools
- A bit steeper learning curve than excel
- Includes different data processing options and analytic tools
- Optional plug-ins to other tools to house data and visualizations
- Tableau public is free!



- Offers many different beautiful chart options:
 - Scatterplot
 - Heatmap
 - Barplot
 - Box-and-whisker plot
 - Histogram
 - Data dashboard(s)



- General graphics packages:
 - **Base/standard graphics:** provided by the graphics package in base R
 - **Trellis/lattice graphics:** provided by the lattice package
 - **ggplot2** based on Wilkinson's *Grammar of Graphics* and available from CRAN



- Interactive packages:
 - **Leaflet**- interactive maps
 - **Plotly**- useful for interactive plots and other graphics including 3D charts
 - **SunburstR**- sequence charts
 - **Dygraphs**- useful for time series data
 - **Iplots**- a Java-based dynamic graphics system for linked plots
 - **Shiny** - provides the opportunity to create dynamic, interactive visualizations, as shown in this [Gazetteer of Southern Vowels](#), by J. Stanley



PYTHON

- **Matplotlib** – most widely used library for plotting in Python, designed to resemble MATLAB, and works with other libraries like pandas
- **Seaborn**- has more color and default options and builds into matplotlib
- **Ggplot**- integrated with pandas, same method as in R, where you layer components to create a complete plot, ported from R
- **Bokeh**- creates interactive, web-ready plots that are easily output as JSON objects, html, or interactive web apps
- **Plotly**- great for interactive plots, also makes contour plots, dendograms, and 3D charts
- **Geoplotlib**- toolbox for geographical data and mapping, including dot density maps, heatmaps, and choropleths



ADDITIONAL RESOURCES

- Other web-based resources:
 - [DataBasic.io](#)
 - [RAWGraphs](#)
 - [InfoGram](#)
 - [Datacopla](#)
 - [440 Ways to Visualize Text Data](#) the Text Visualization Browser, ISOVIS group
 - [Machine Learning Models and Visualizations](#), ISOVIS group
- ArcGIS and QGIS are useful tools for creating maps.



RECOMMENDED READING

- *Visualizing Data and Elements of Graphing Data* by William Cleveland
- *The Visual Display of Quantitative Information, Visual Explanations, Envisioning Information, Beautiful Evidence* by Edward Tufte
- *Information is Beautiful* by David McCandless
- *The Visualization Toolkit* by Schroeder et al.

RECOMMENDED READING

- *Design Methods by Amy Ko*
- Hadley Wickam's *A Layered Grammar of Graphics*
- *Bad Data Guide* by Quartz Data Team
- Heer et al. *A tour through the visualization zoo*
- *Cartographies of Time: A history of the Timeline* by Rosenberg and Grafton
- *Visual Thinking for Design* by Colin Ware
- For more on GIS resources, check out this article by Emily McGinn and Meagan Duever : *We mapped it so you don't have to: comparing online data mapping platforms*

RECOMMENDED WEBSITES

- Excellent overview of selecting different types of graphs for different types of data!
- Information is beautiful by David McCandless
- Edward Tufte's website
- Excel chart cookbook from Duke Libraries
- <https://datavizcatalogue.com>



RECOMMENDED WEBSITES



[Visualizing text data with ggplot2](#)



[Ggplot2 cheat sheet](#)



[Mastering Shiny by Hadley Wickham](#)



[Tidyverse Blog](#)

OTHER RESOURCES

- Linked-in learning has many tutorials for data visualization in excel and R.
- Tableau also has freely available tutorials.
- Tutorials from the Digilab here at UGA: excel, R, and Tableau!
- R Ladies Athens!!

RELATED COURSES

- Courses at UGA:
 - LING 4400/6400 | Quantitative Methods in Linguistics (Renwick)
 - SPAN (DIGI) 4085 | Studies in Spanish and Latin American Electronic Literature and Cyberculture (Benedict)
 - Ling 4530/6530 | Finite State Linguistics (Hale)

COMING UP NEXT...

4 Nov. Bar Graphs and Histograms

In Excel, Tableau, and R

18 Nov. Area Graphs

in Excel, Tableau, and R

11 Nov. Scatterplots

in Excel, Tableau, and R

IN PREPARATION FOR NEXT WEEK

- Download and install:
- Excel (free to UGA students)
- Tableau public
- R
- R Studio – useful IDE (integrated development environment)

The background is a solid, bright yellow. In the bottom-left corner, two pencils are positioned diagonally. The top pencil is light grey with a sharpened wooden tip. The bottom pencil is dark grey with a sharpened wooden tip. A dark olive-green rectangular box with a thin white border is centered on the right side of the slide, containing the text.

THANKS FOR LISTENING!

KATHERINE.KUIPER25@UGA.EDU

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