Text Analysis

Introduction to Data Visualization

The Graduate Center at CUNY | Summer 2018

June 12, 2018

Five Minute Reflection

Moretti presents us with a problem: “a canon of two hundred novels sounds very large for nineteenth-century Britain, but is still less than one per cent of the novels that were actually published: twenty thousand, thirty, more, no one really knows—and close reading won’t help here, a novel a day every day of the year would take a century” – Moretti, 2003, pg 1.

Computers cannot “read” the way people do. Given this, do you think that reading these texts computationally (distant reading) is possible? Why or why not? Do you think there is anything to be gained in this approach?

Texts as Data

- Corpus/Corpora
- Collection of documents
  - Tweets
  - Books
  - Zines
  - Text messages
  - Newspaper Articles
  - Supreme Court proceedings

Working with text

- Given a text, what can you quantify?

Working with Corpora

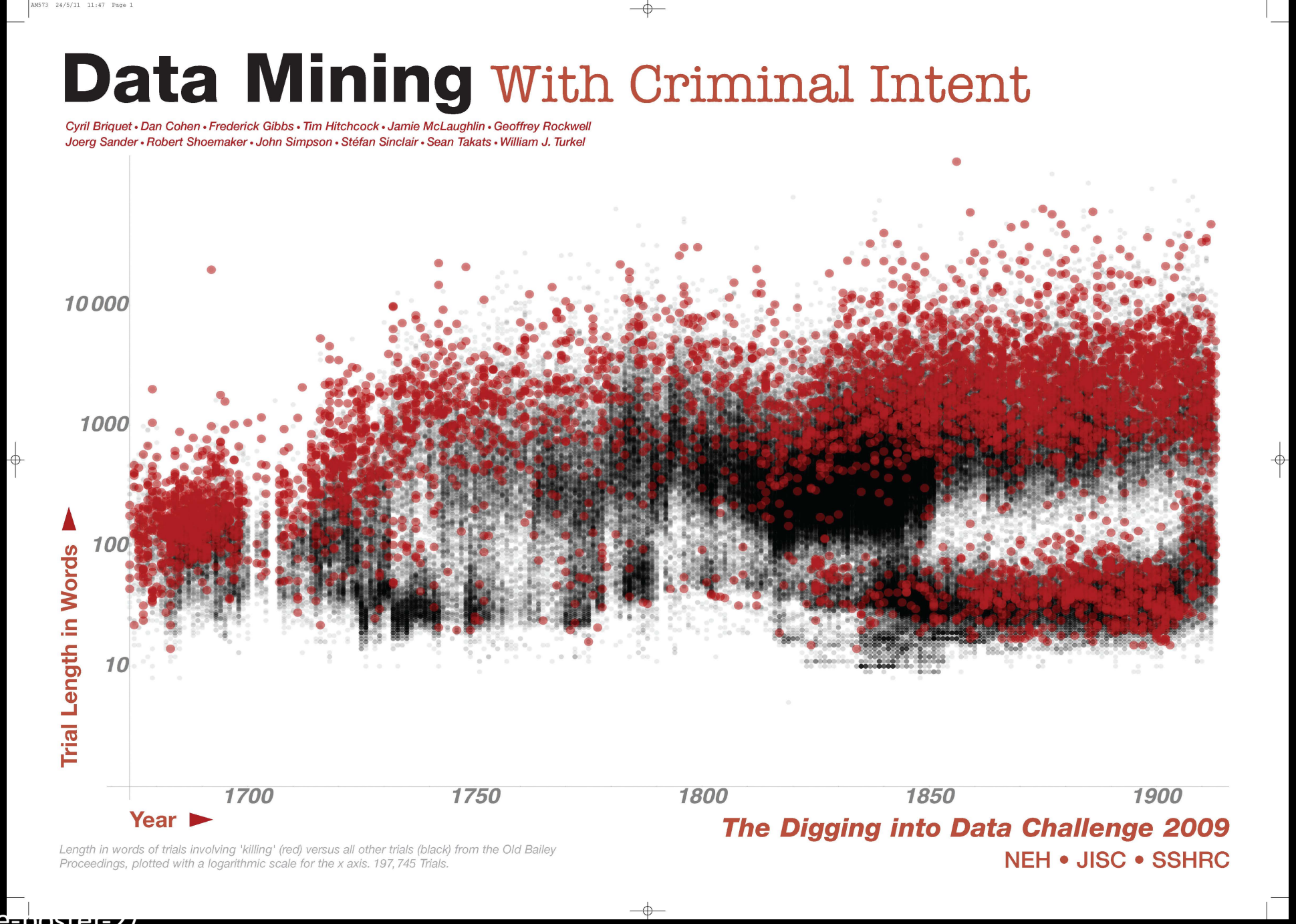
MetaData

- Date (Time)
- Location
- Creators (author, publisher, etc.)
- Platform/Format
- Sales/Retweet/Distribution
- Length
- Keywords
- Title
- Revision History

Content

- Word frequencies
- N-grams
- Word offset
- Topic Modelling
- Sentiment Analysis
- Predictions

Metadata



http://criminalintent.org/2011/06/criminal-intent-the-poster-2/

Visualizing Edits

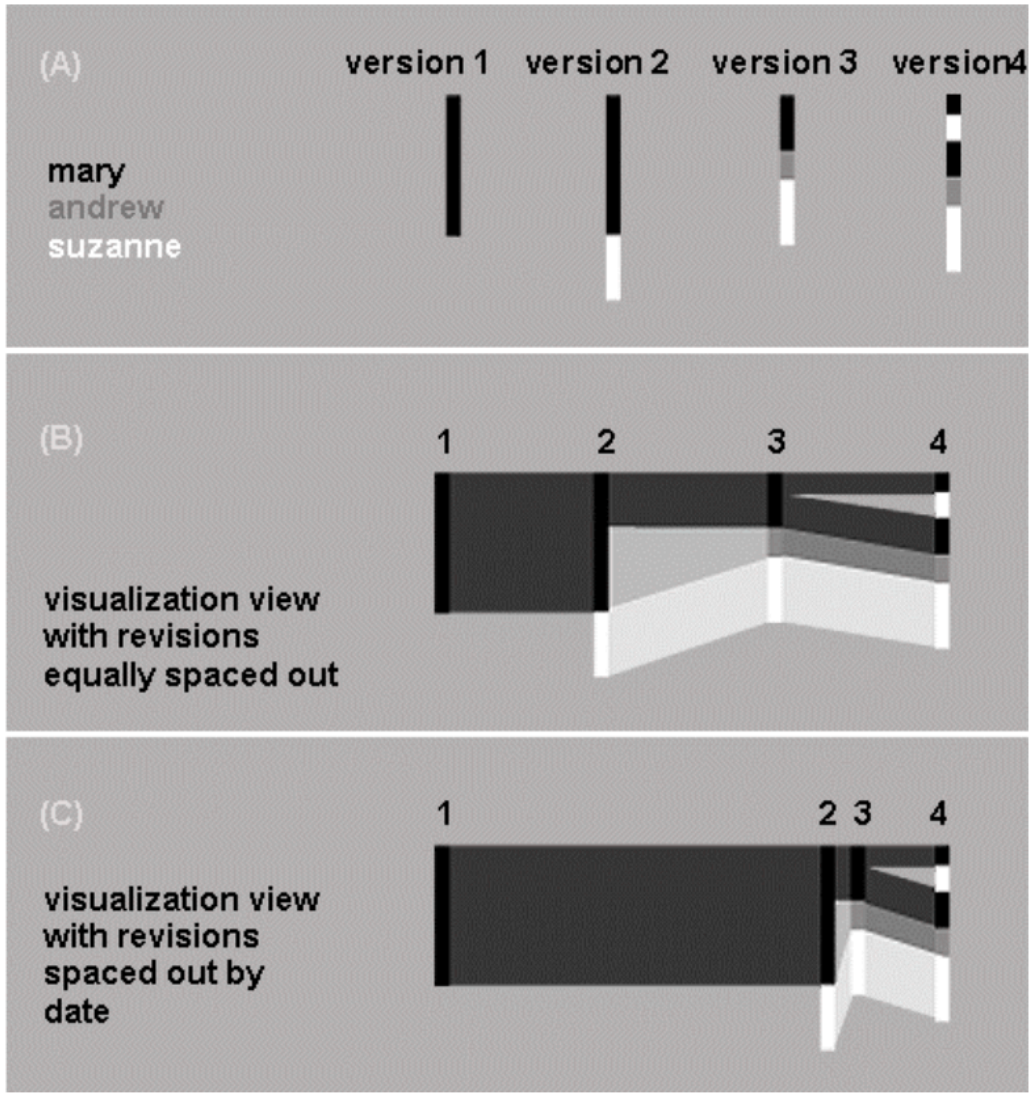


Fig 2: *explanation of history flow's visualization mechanism*

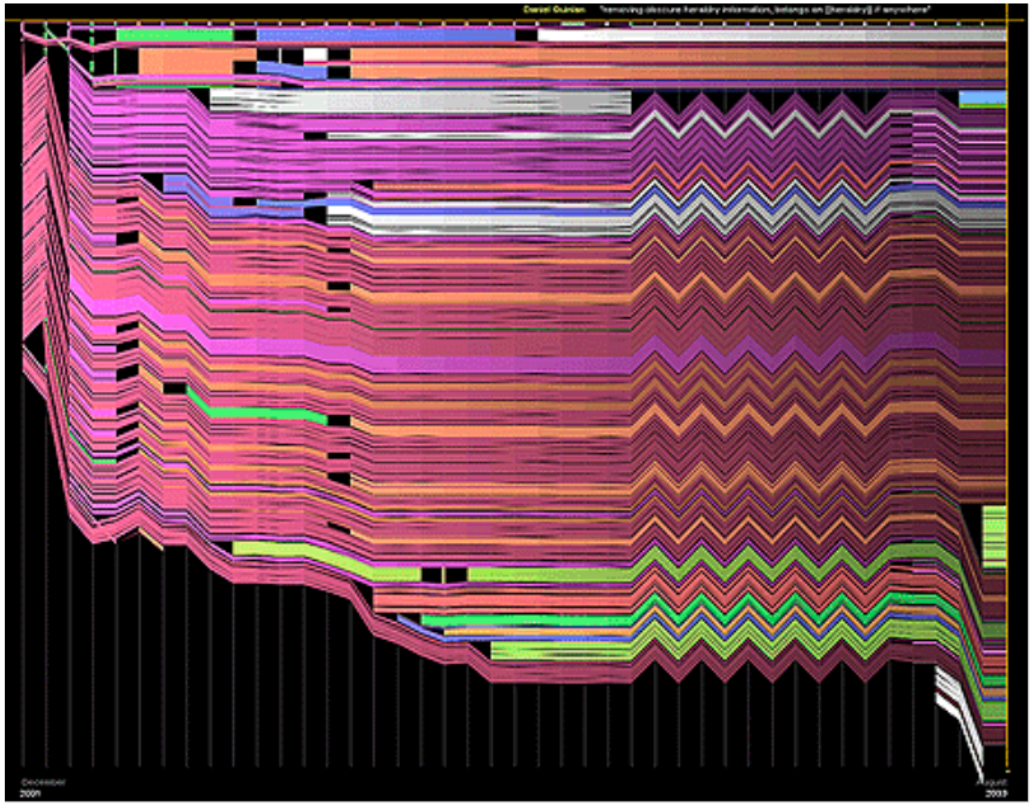


Fig 6: *"Chocolate" page spaced out by number of versions; we can see the zigzag pattern of an edit war.*

Viégas, Wattenberg, Dave, 2004. Studying Cooperation and Conflict between Authors with history flow Visualizations

Visualizing Text

Metadata

- Darwin's Origin of the Species Edits https://fathom.info/traces/

Content

- Presidential Debates (n-grams) https://public.tableau.com/views/Election2016-SpeechAnalysis/Newspaper?:embed=y&:display_count=yes&:toolbar=no&:showVizHome=no

Metadata

- Can usually be formatted for visualization with minimal cleaning
- Categorical or Numerical
- Tells a story about the text

Working with Text

Some Cleaning

- Word Counts/Frequencies
- Offsets
- N-grams

A Lot of Cleaning

- Comparing two or more texts
- Lexical Density/Diversity
- N-grams
- Topic Modelling
- Sentiment Analysis
- Predictions

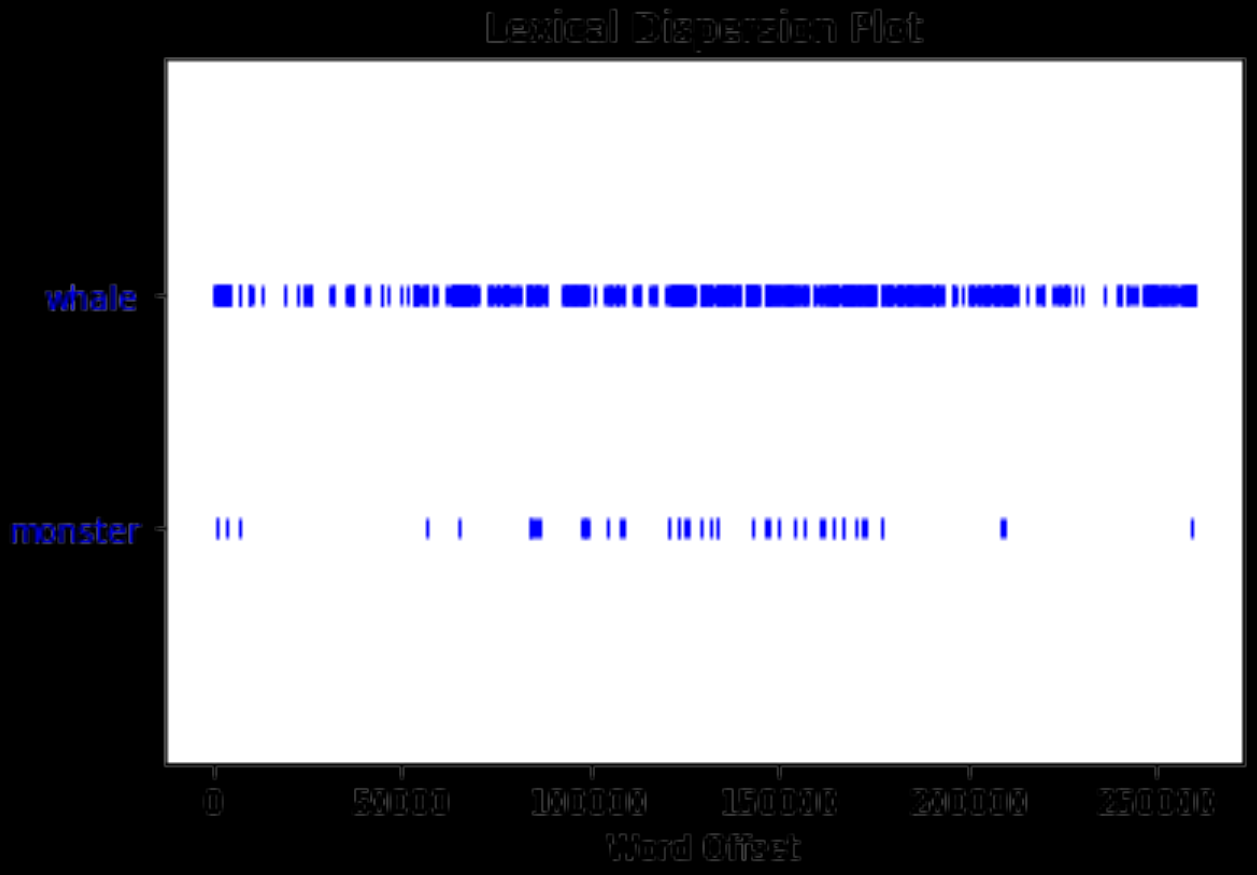
Cleaning Text

DON’T DO THIS WITH TABLEAU

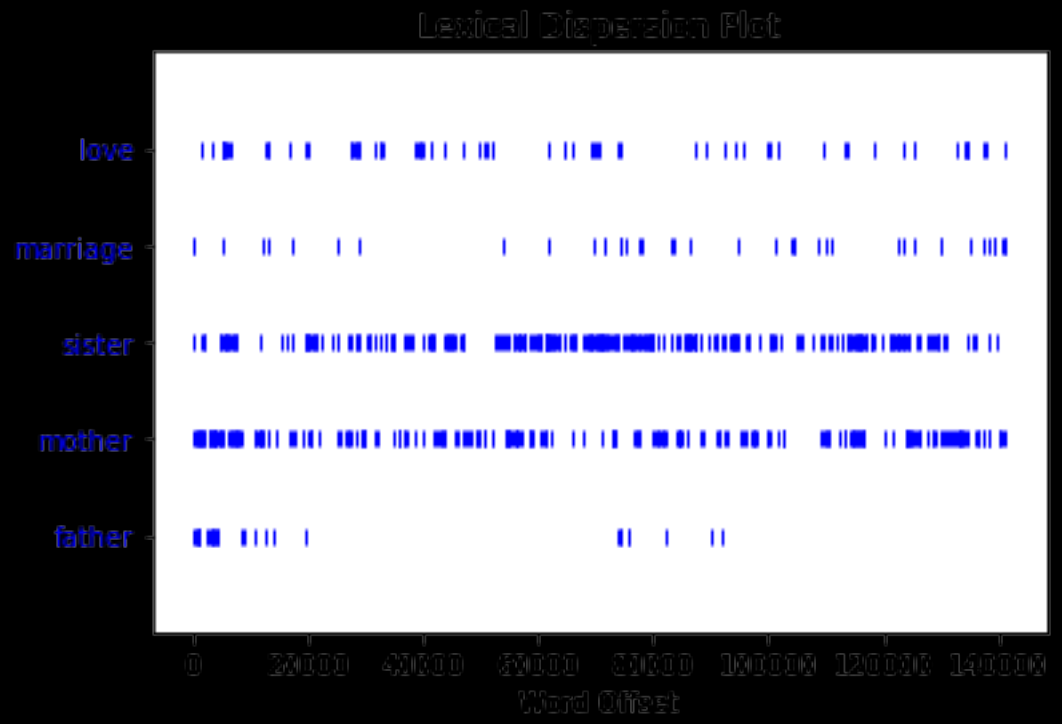
- Tokenize (split into words)
- Normalize (remove punctuation and capitalization)
- Remove Stopwords (determiners, prepositions, auxiliaries, etc.)
- Stem or Lemmatize (transform “run”, “runs”, and ”running” into “run”)

Frequency Distributions

Moby Dick (Herman Melville)



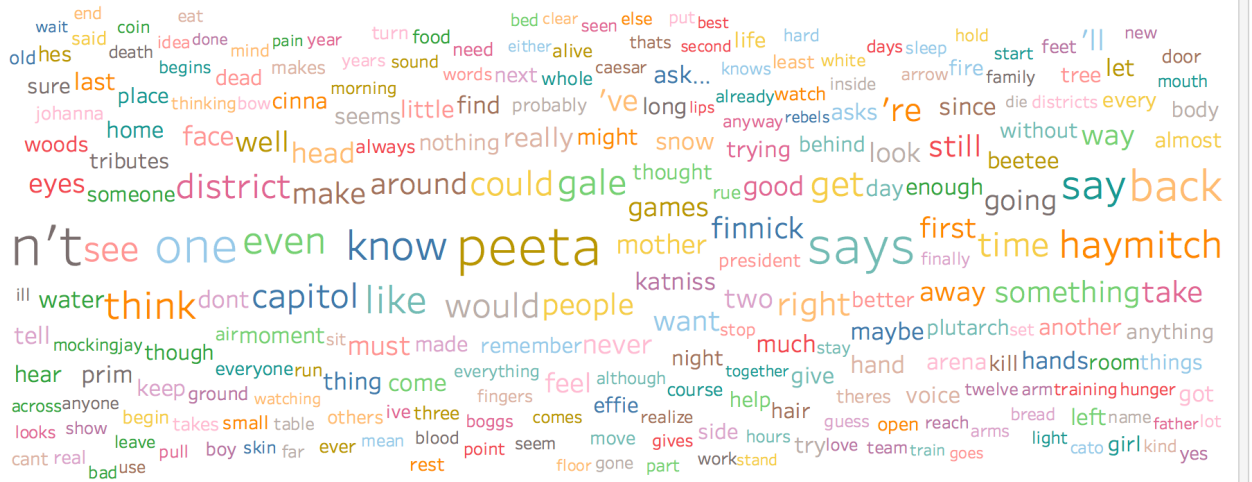
Sense and Sensibility (Jane Austen)



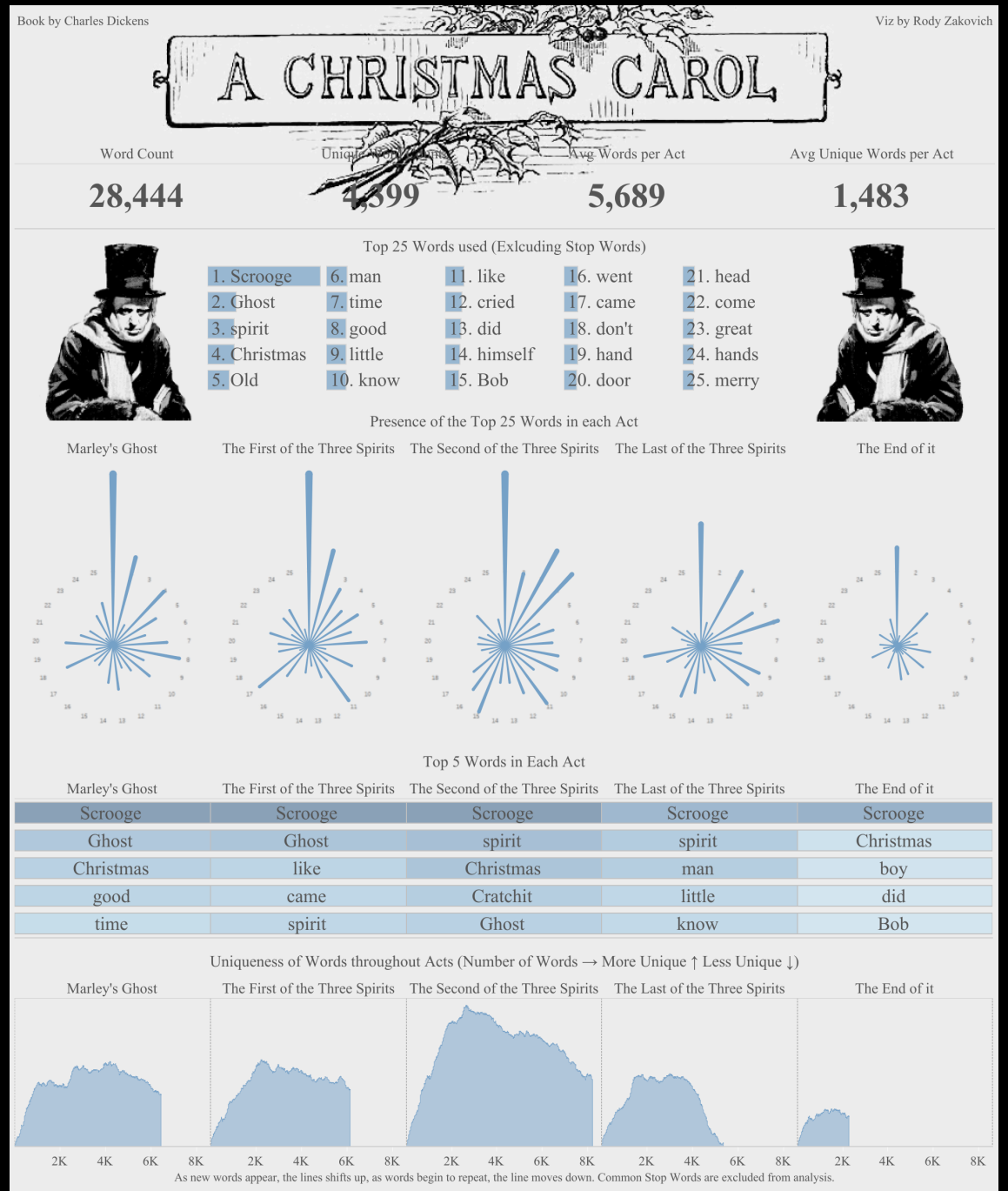
Cleaning Text

Hunger Games (Dirty Text)

The Hunger Games (Clean Text)



Cleaned Text Analysis

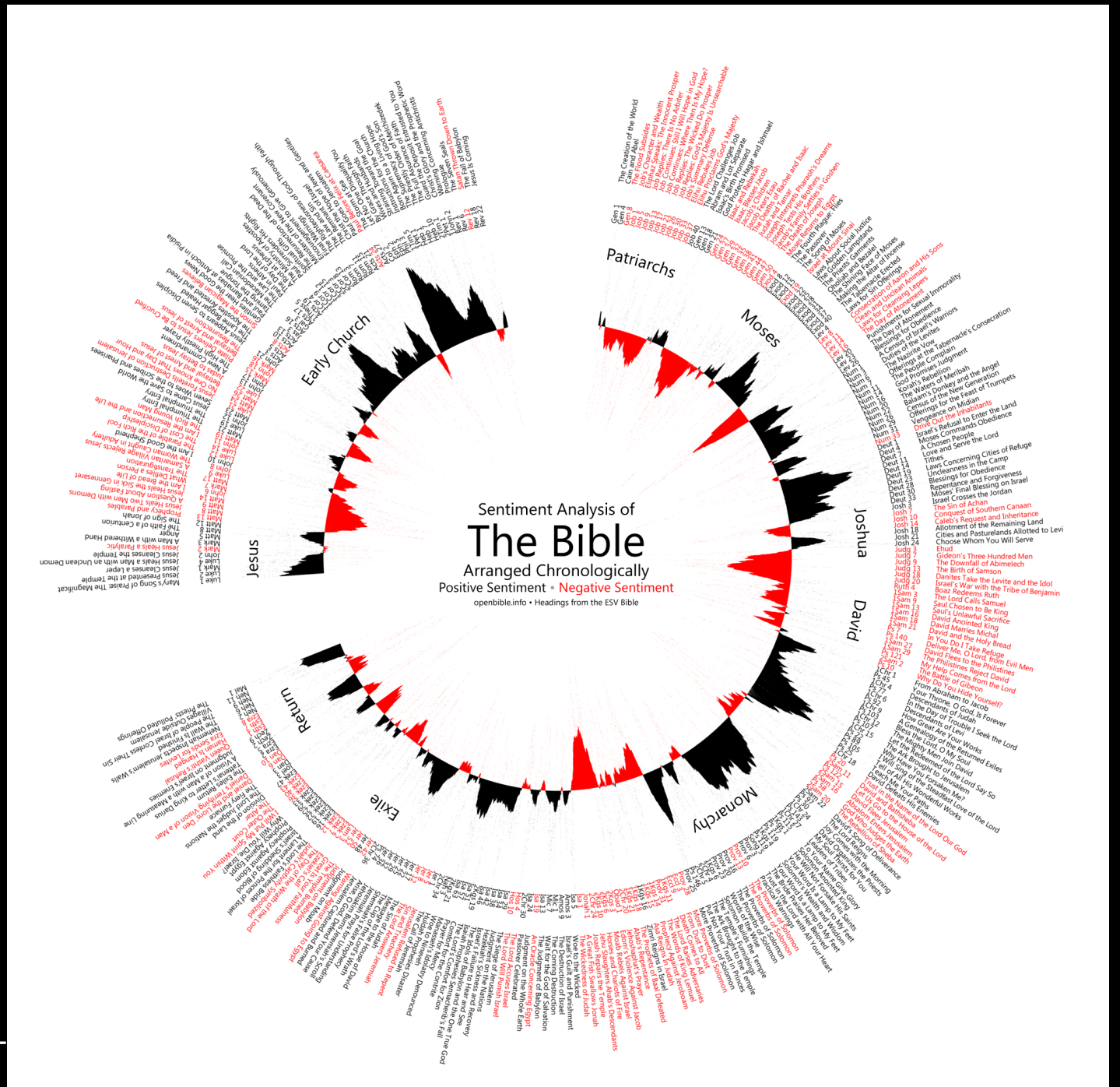


https://public.tableau.com/profile/rody.zakovich#!/vizhome/AChristmasCarolTextAnalysis/AChistmasCarolTextAnalysis

Texts as visualizations: Sentiment Analysis

Sentiment analysis is a Natural Language Processing technique using Machine Learning

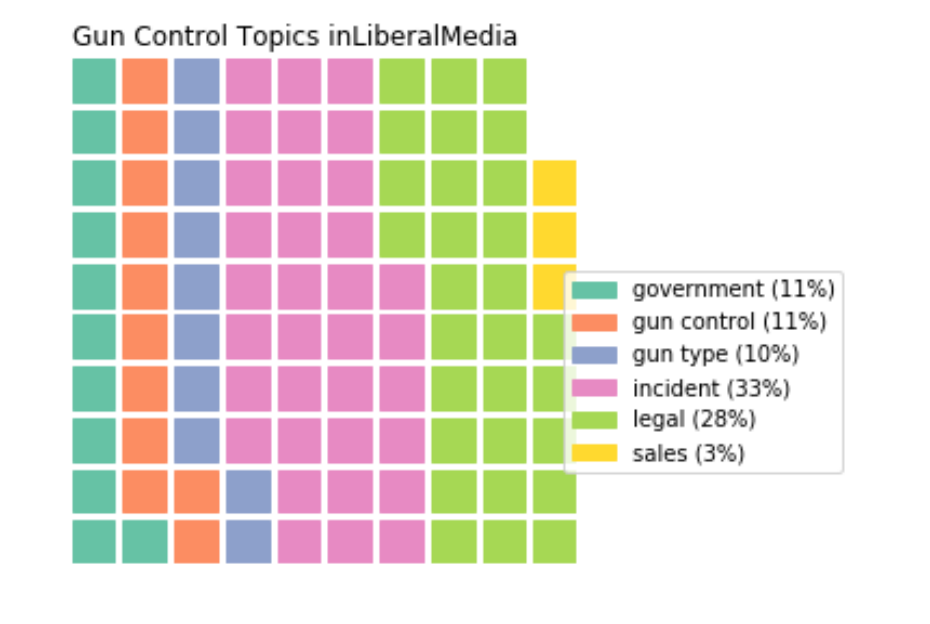
It is a Classification Task (labels each instance) to tag positive or negative usually based on a previously tagged corpus (but not always)



https://www.biblegateway.com/blog/2011/10/the-ups-and-downs-of-the-bible-a-sentiment-analysis-

Texts as visualizations: Topic Modelling

Topic Modelling is a Natural Language Processing technique using Machine Learning



topicID	description
0	gun control violence shooting owner law mass america crime policy
1	police officer department incident city county video killed say man
2	ar 15 rifle automatic semi used round style shooter store
3	school student high shooting florida parkland medium dead control left
4	trump president white house wednesday policy ha support lawmaker also
5	one ha say like people think know would could use
6	state law carry enforcement public texas federal owner official local
7	get news whether often let say already told want life
8	video street 000 country want people show ha world shooting
9	firearm act gun federal home number according crime death handgun
10	shot killed shooting two man time fired one fire year
11	company store sale rifle ha year make group say end
12	check background sale system purchase gun record federal buy criminal
13	com second amendment twitter news follow bullet armed american host
14	nra national association member rifle group right republican political amendment
15	bill republican house legislation congress lawmaker measure would support president
16	new york city year old ha week part time street
17	said told official county member authority statement two attack home
18	read 2016 report attack weapon news control government member official
19	court right federal case amendment arm second law family handgun
20	wa year old told man report life went family one
21	weapon assault ban magazine rifle used automatic military style mass

Distant Reading

- Understanding literature through data
- Scientific Method
  - Hypothesis
  - Experiment
  - Analysis
- Topic Modelling / Sentiment Analysis
- Named Entity Recognition/ Relation Detection

Moretti

FIGURE 1. *The* Hamlet *network*

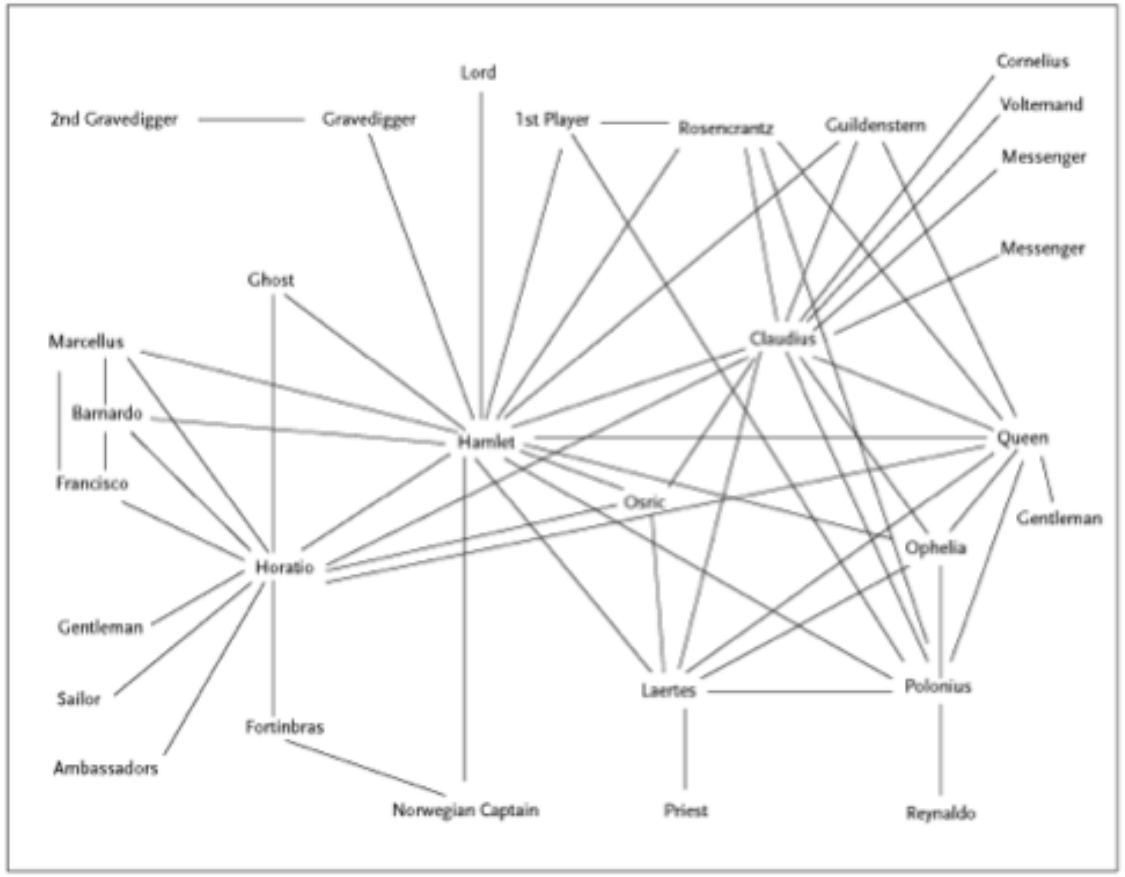
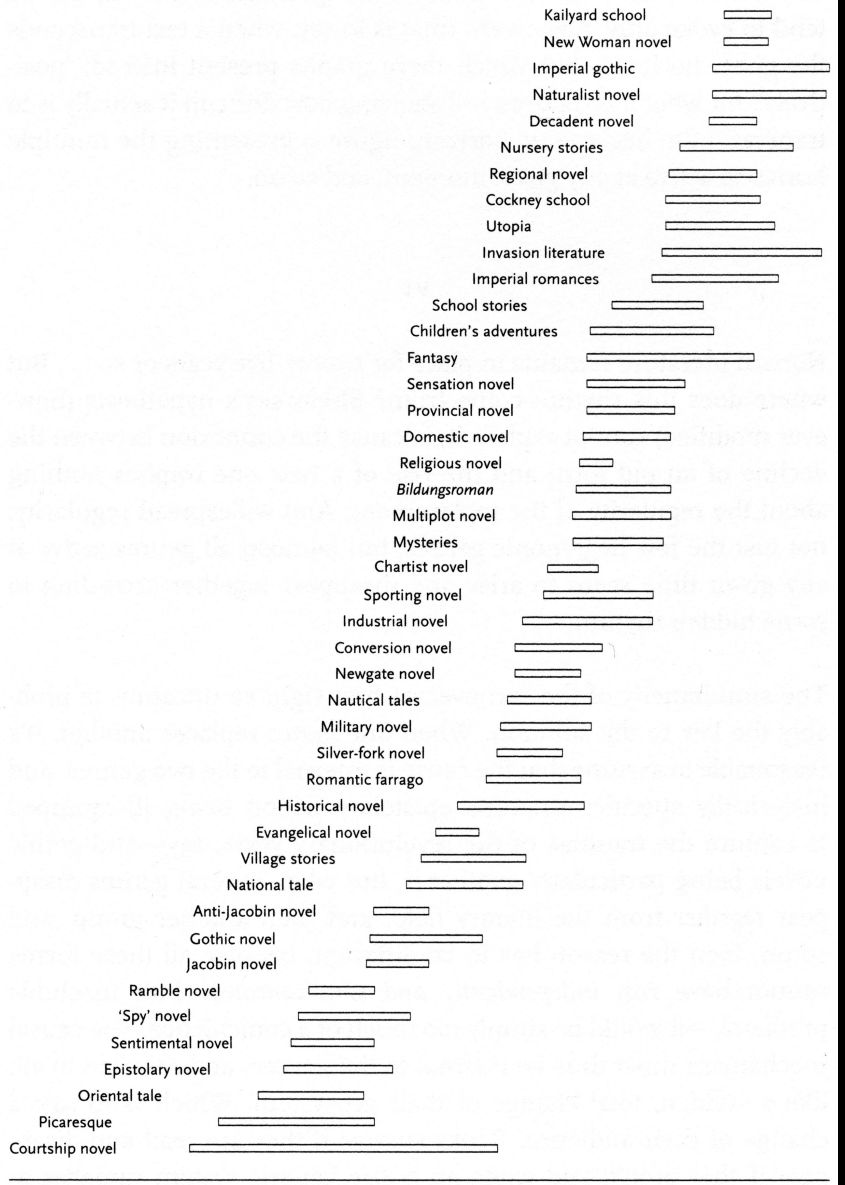


FIGURE 9: *British novelistic genres, 1740–1900*



For sources, see 'A Note on the Taxonomy of the Forms', page 31.

Maps

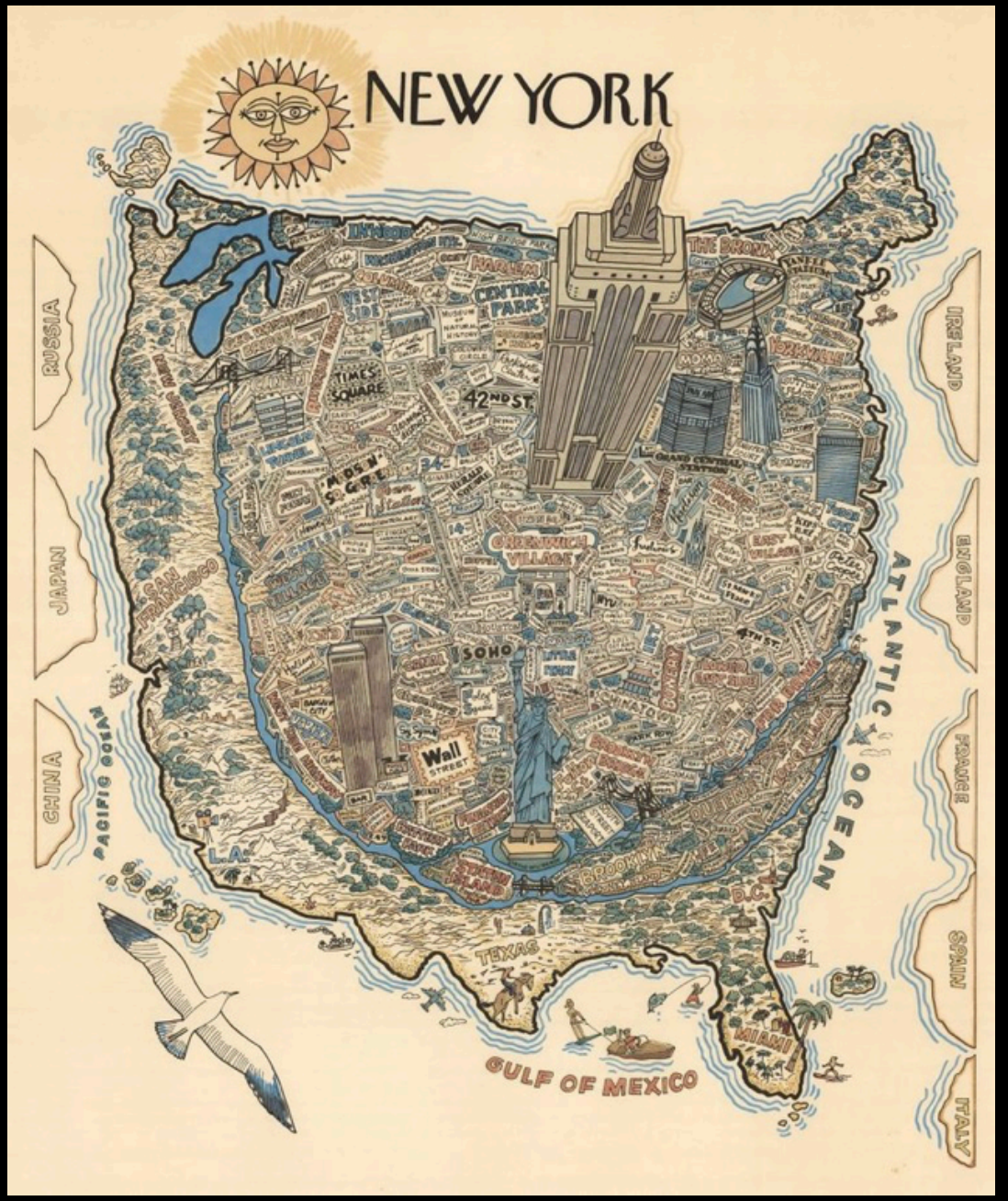
Introduction to Data Visualization

The Graduate Center at CUNY | Summer 2018

June 13, 2018

Five Minute Reflection

- What makes a map different from an image?


NEW YORK
RUSSIA
JAPAN
CHINA
IRELAND
ENGLAND
FRANCE
SPAIN
ITALY
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
TEXAS
MIAMI
L.A.
SAN FRANCISCO
Wall STREET
SOHO
TIMES SQUARE
42ND ST.
CENTRAL PARK
HARLEM
THE BRONX
GREENWICH VILLAGE
BROOKLYN

Maps As…

- Referents
  - Event is happening in this place
  - Proxy for spatial categories
- Containers
  - Map boundaries are essential to the visualization
- Spatial Analysis
  - New findings by combining spatial datasets

Maps to represent…

- People
- Places
- Things
- Events

- … All against a backdrop of space/location

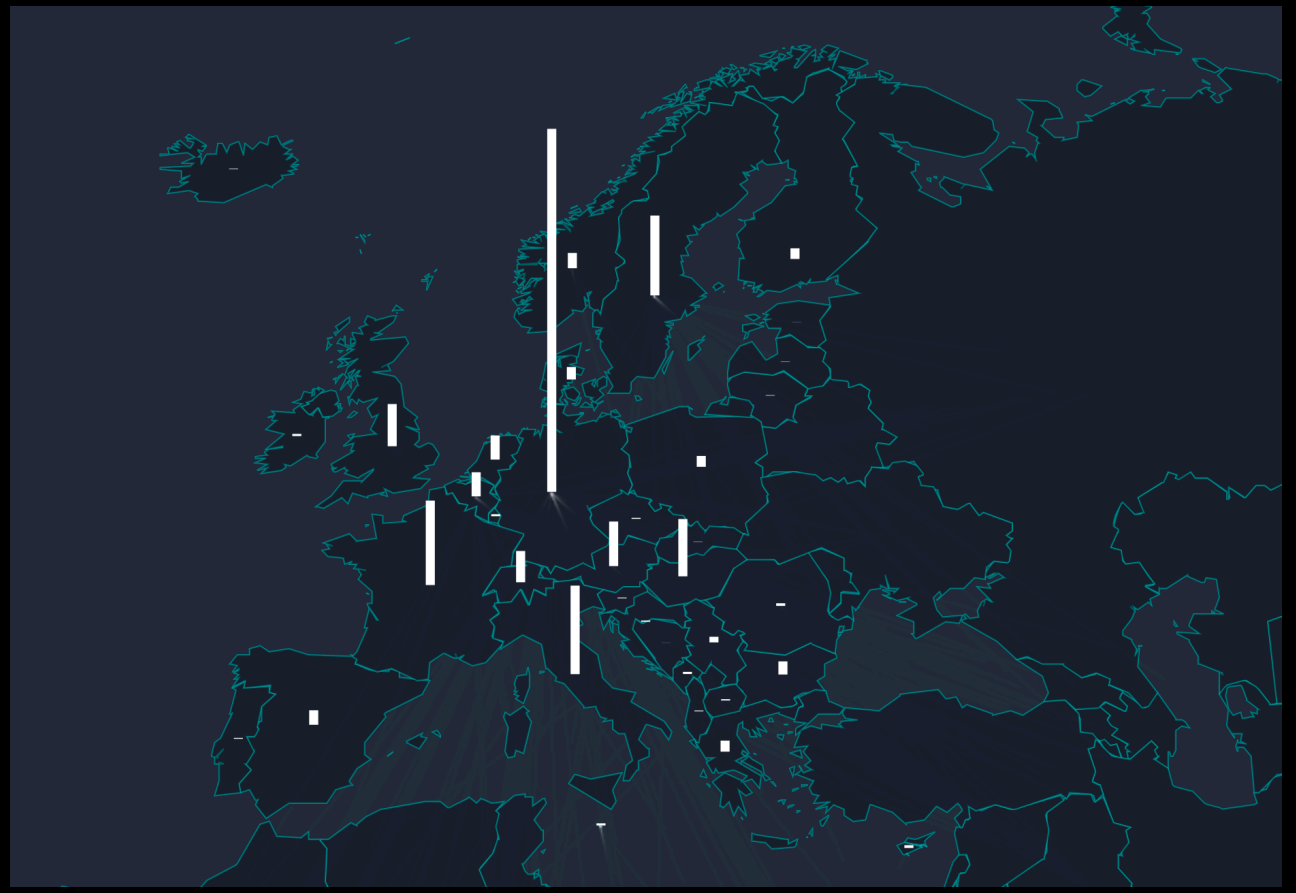
BUT...

Critical Cartography

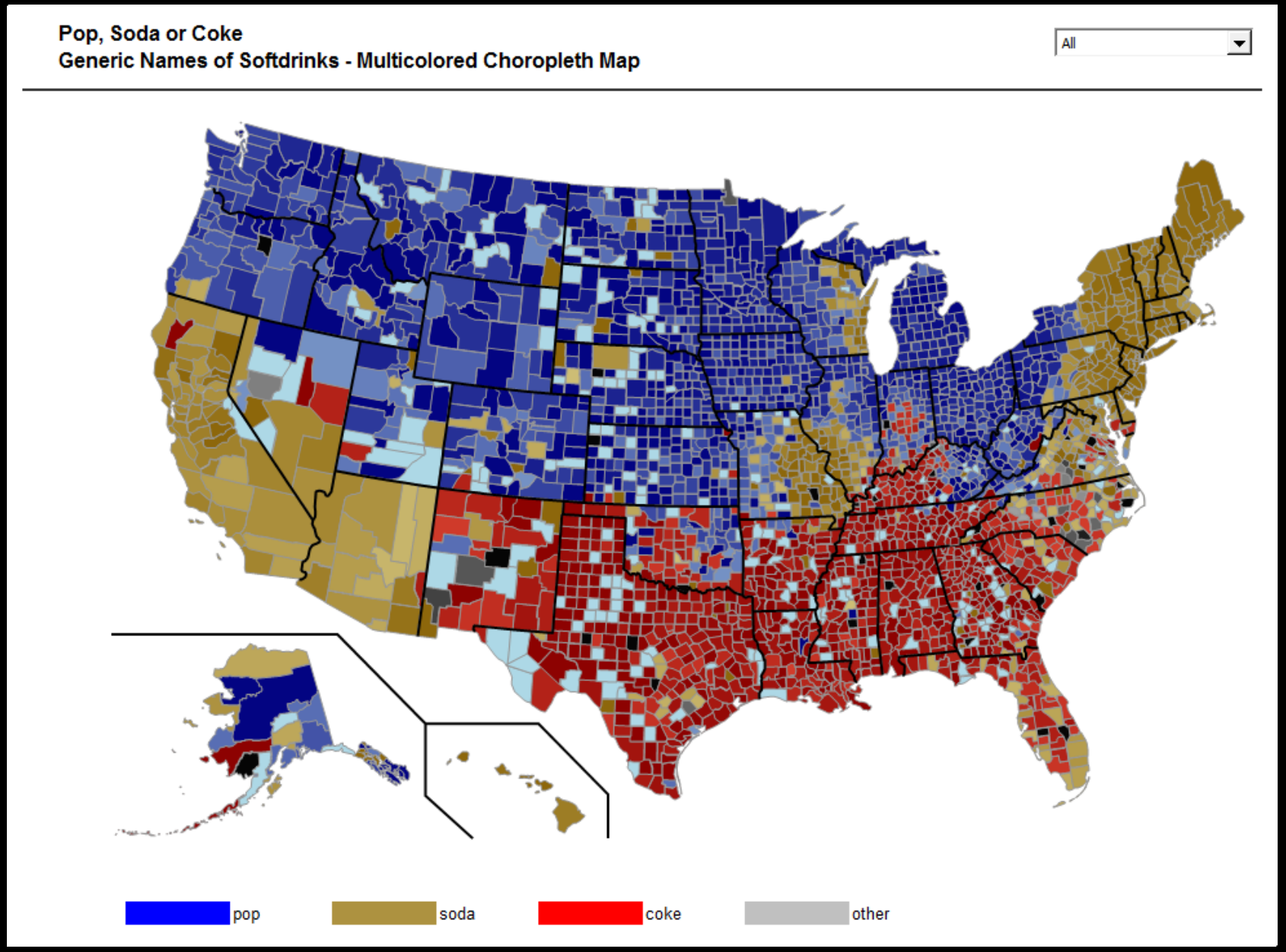
- Gods Eye View
- Supremacy of “science”
- The map (or any visualization) is not always the “truth”…
- Incompatible stories aren’t always wrong

Referents

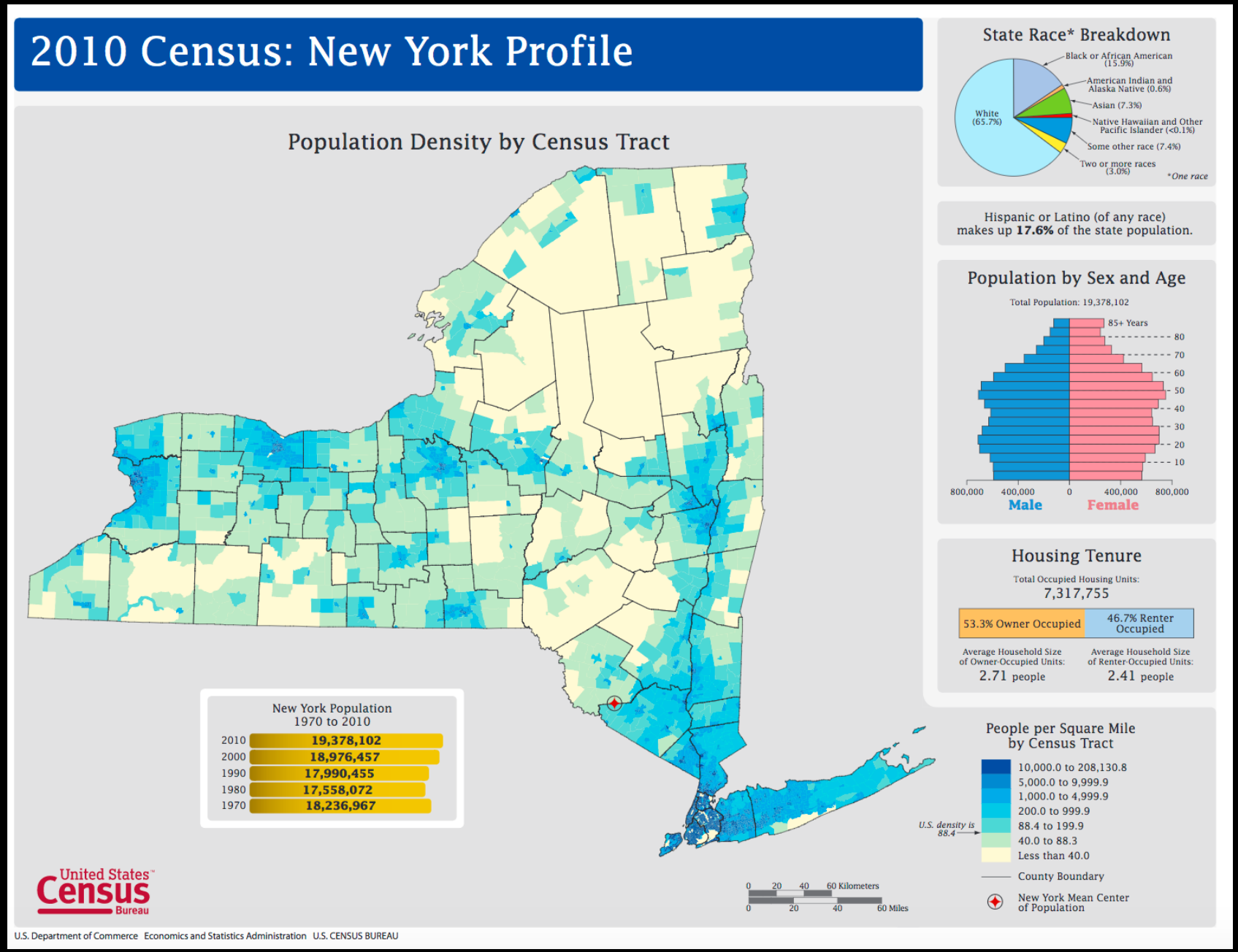
- Stacked Bar Chart
  - www.lucify.com/the-flow-towards-europe/
- Graduated Symbols
  - www.therefugeeproject.org/#/2016
- Wind Map
  - hint.fm/wind



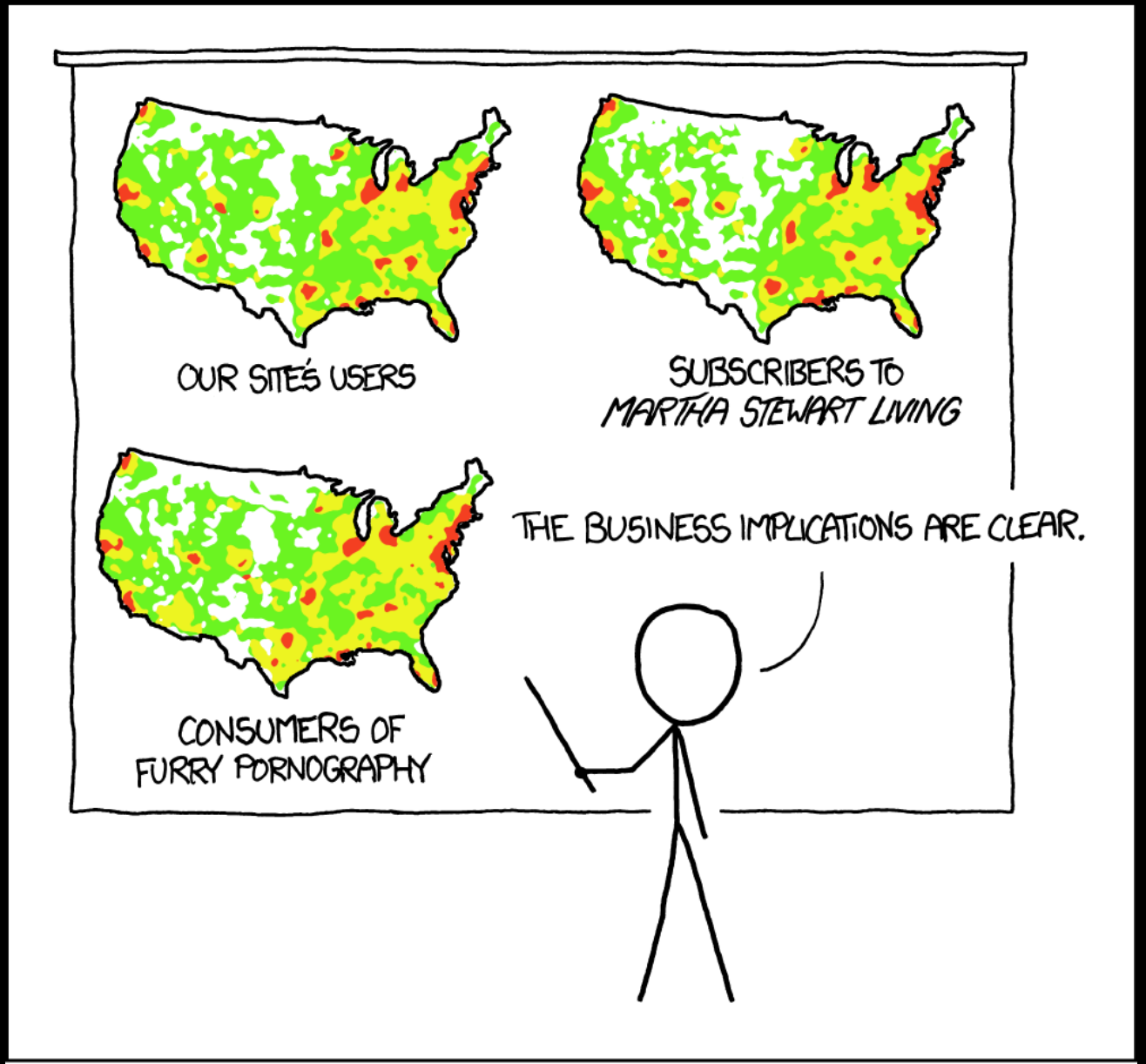
Containers: Categorical Chloropleth



Containers:
Numerical Choropleth



Traps in Normalization & Causation vs. Correlation



PET PEEVE #208:

GEOGRAPHIC PROFILE MAPS WHICH ARE BASICALLY JUST POPULATION MAPS

Chloropleth & Small Multiples

- https://www.nytimes.com/interactive/2017/08/07/upshot/music-fandom-maps.html?mcubz=3

Spatial Analysis

www.subwaylanguages.
michelleajohnson.com

http://tubecreature.com/#metric=
tongues&year=2015&layers=TTTTTF
&zoom=13&lon=-0.1500&lat=51.5200


Sunsquatch
Best spots to see the eclipse
and bigfoot... *at the same time!*
Data: Bigfoot Field Researchers Organization | NASA Scientific Visualization Studio

Advanced Visualization Techniques & Considerations

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June 14, 2018

Five minute reflection

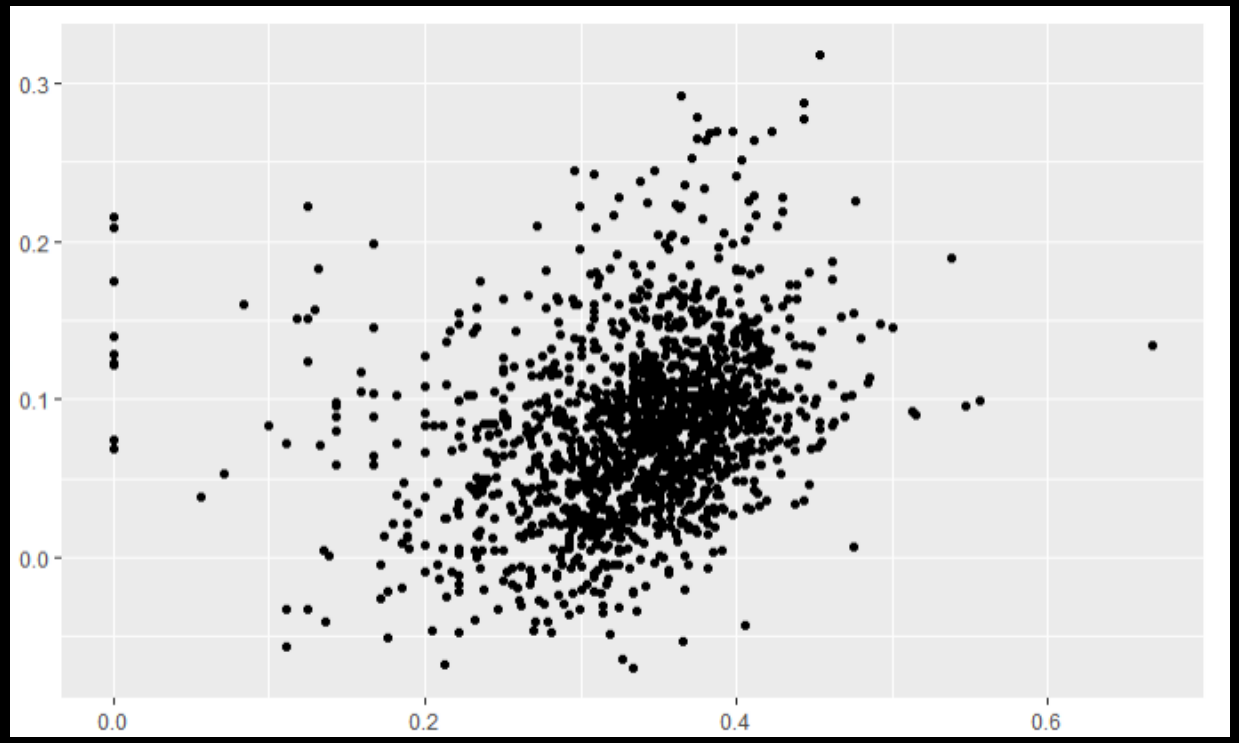
Tufte's Principles

- Labels – if more is needed, write an explanation
- Standardize and normalize units (including money over time)
- Variable dimensions should reflect data dimensions
- Context is essential

Tableau Manages these:

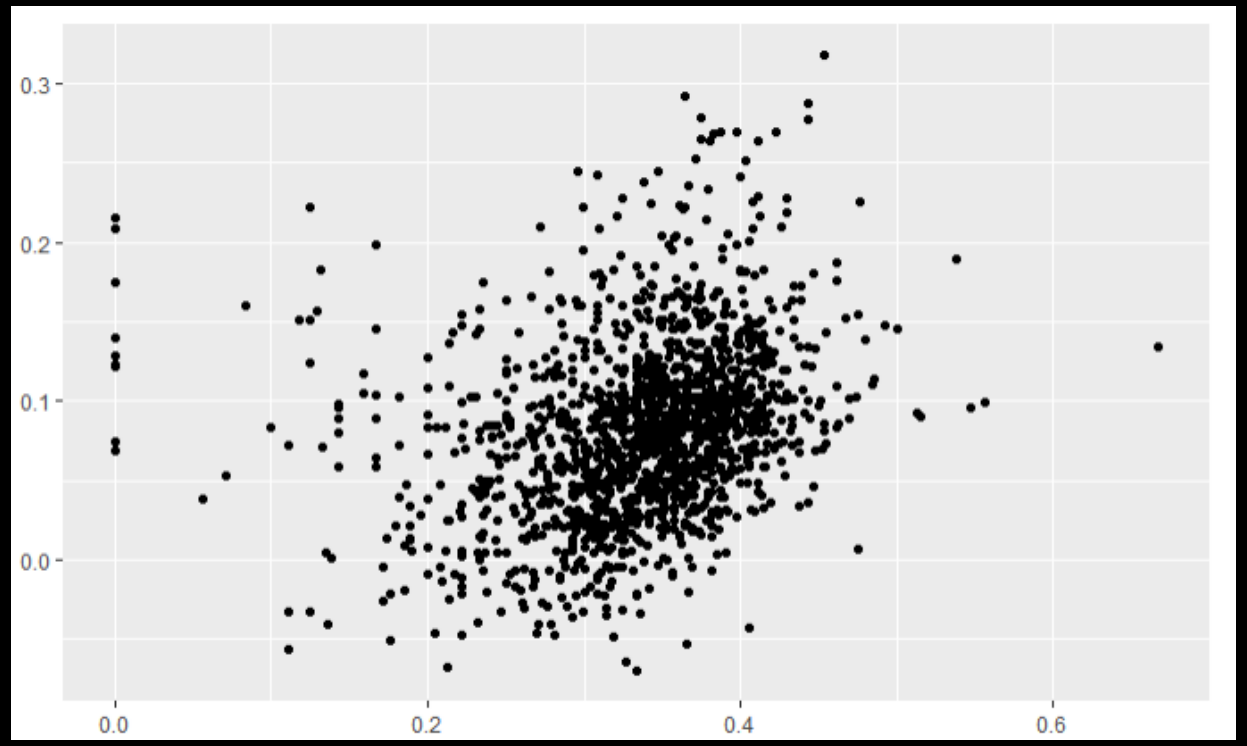
- Keep the design of the plot consistent
- Numerical proportions should be accurately represented by visual

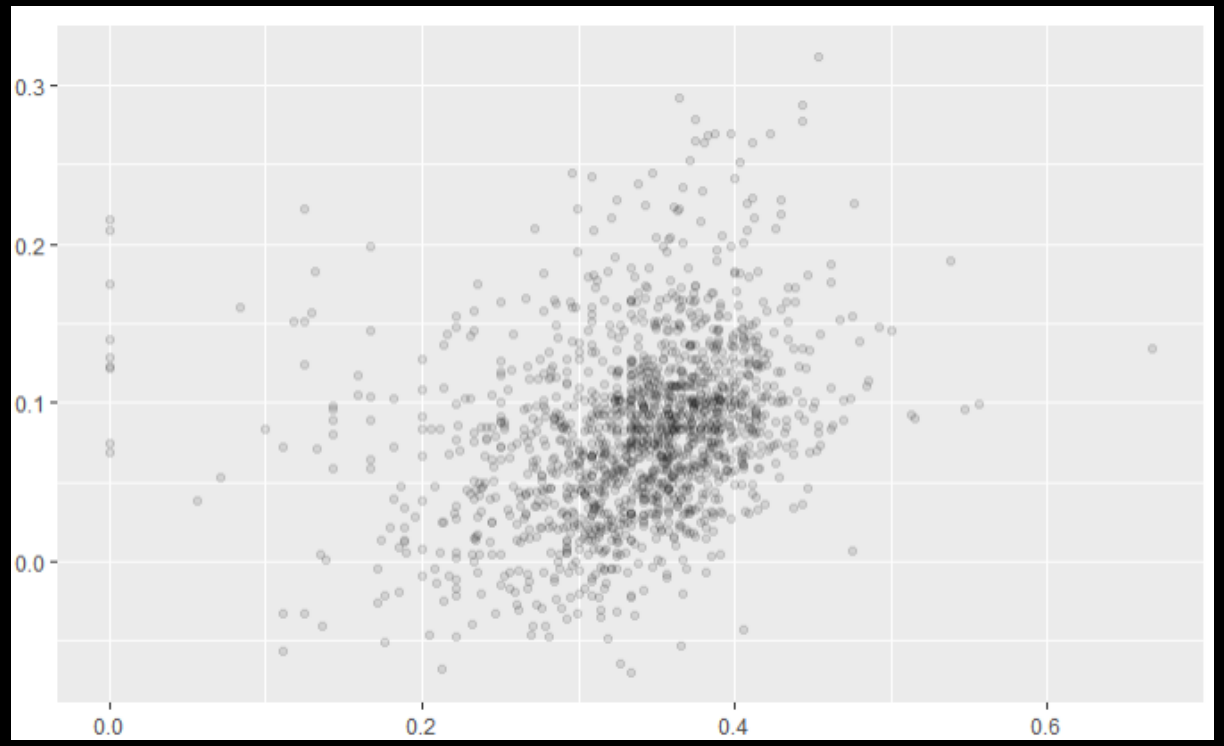
OVERPLOTTING: Point Density



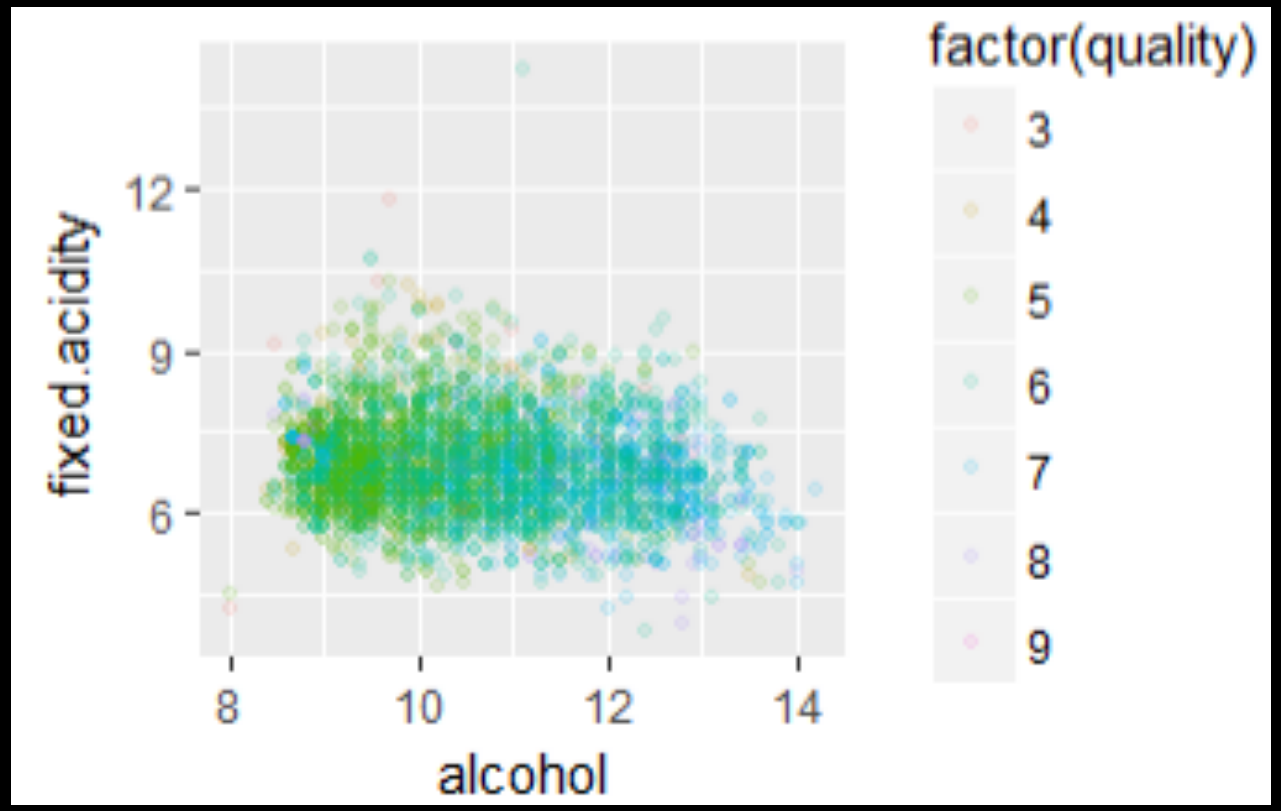
OVERPLOTTING: A SOLUTION

Transparency

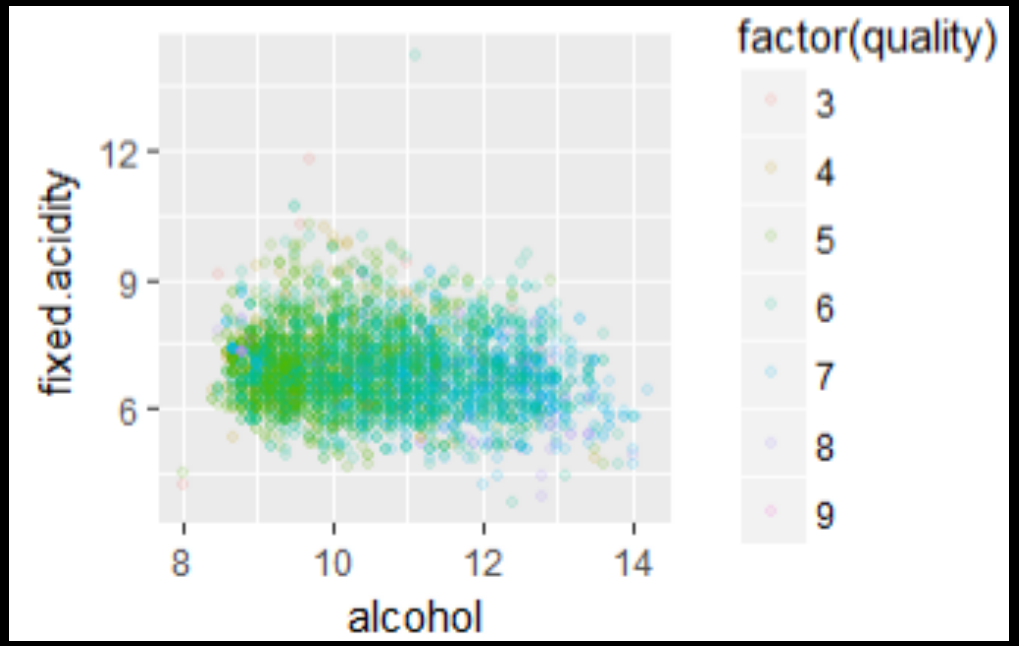




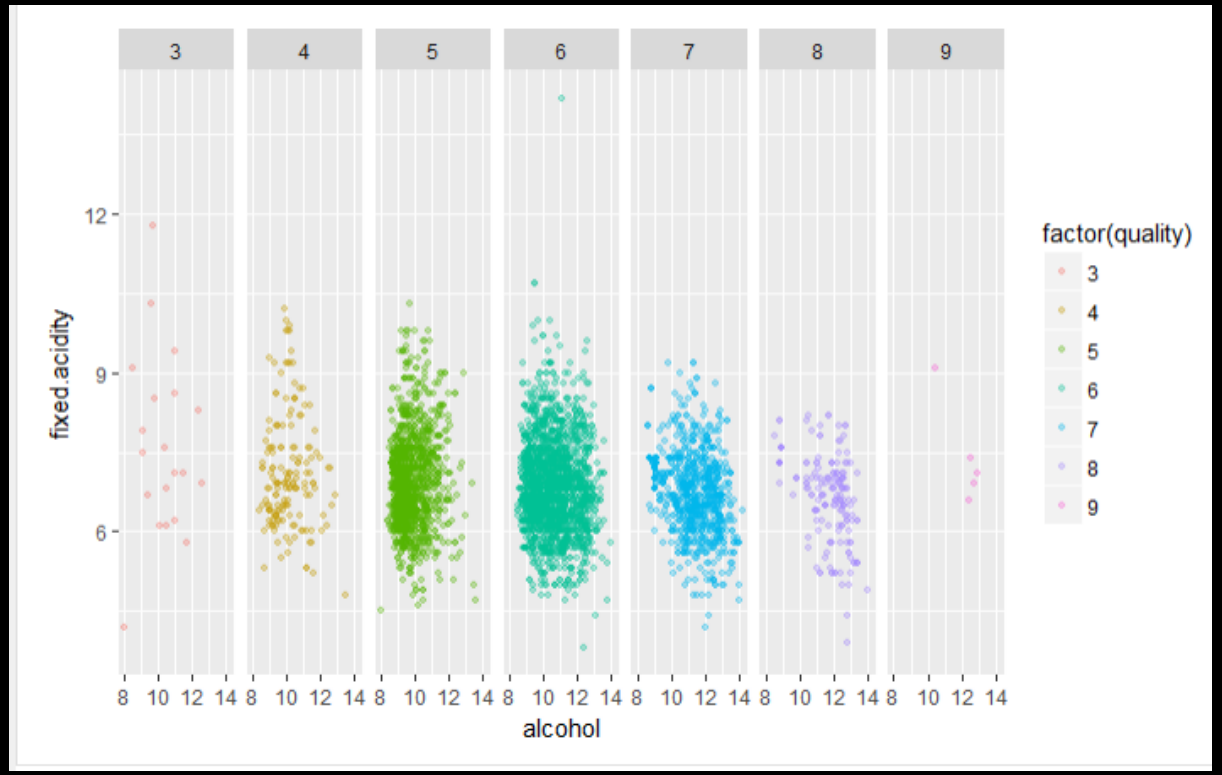
OVERPLOTTING: 3 or more Variables



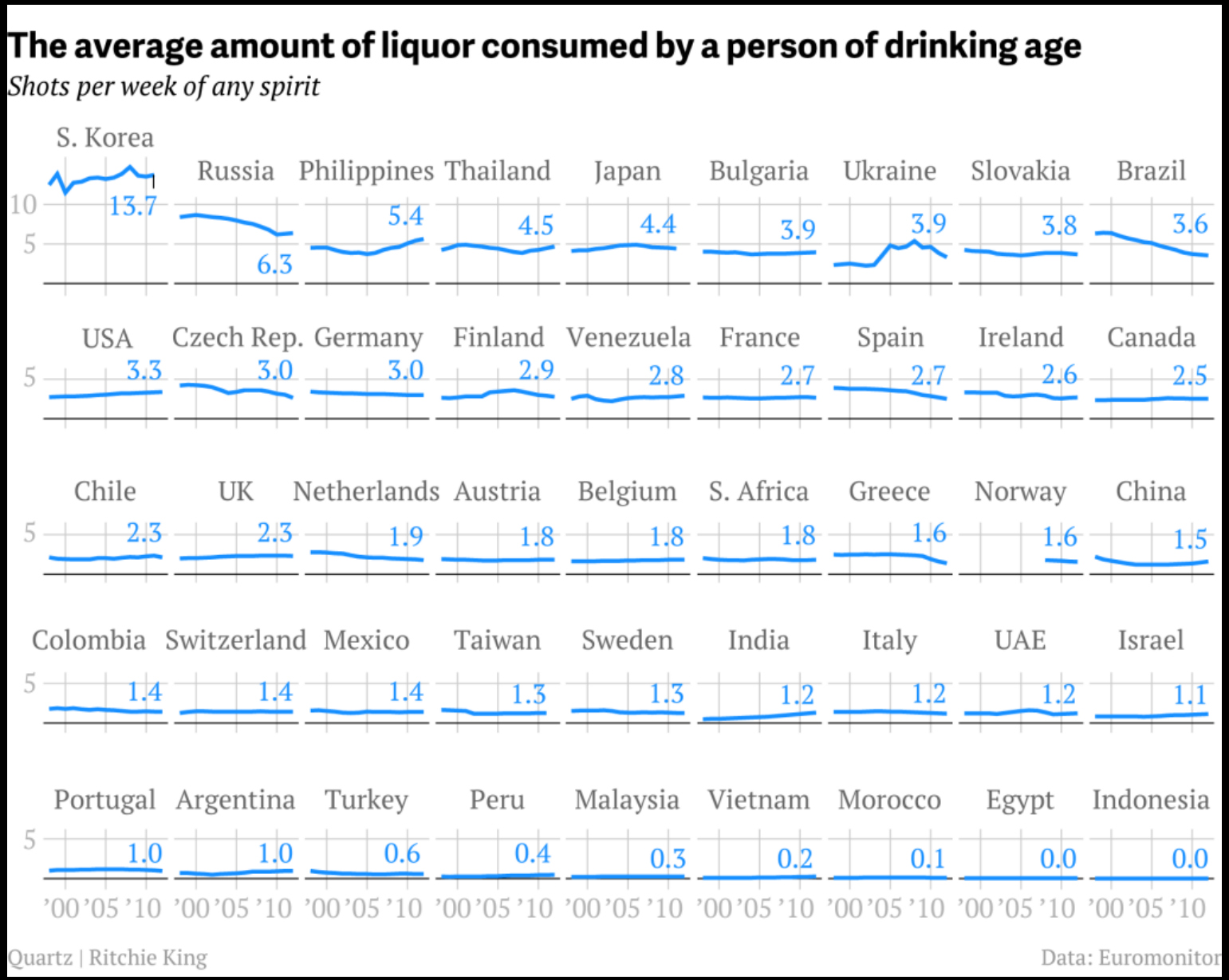
OVERPLOTTING: A SOLUTION



Small Multiples



Small Multiples

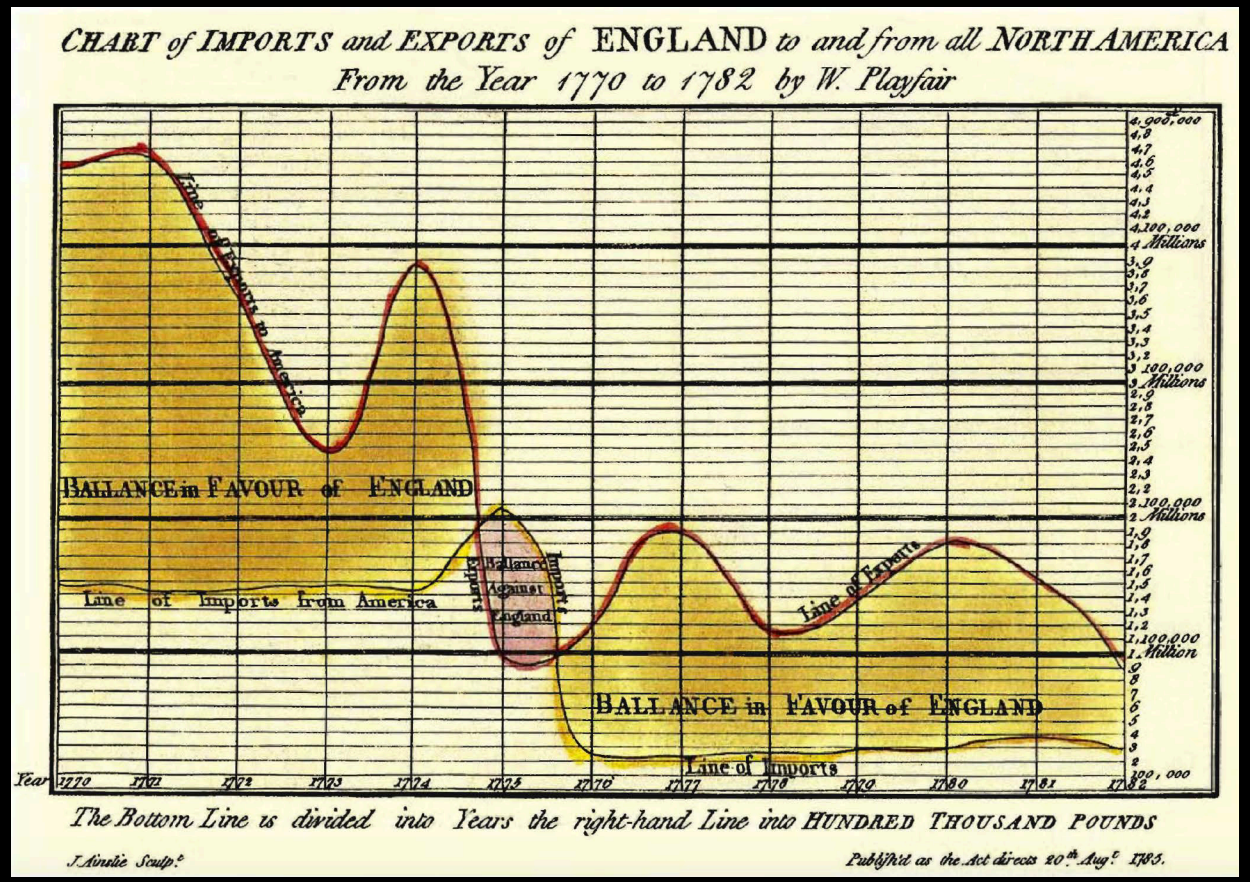


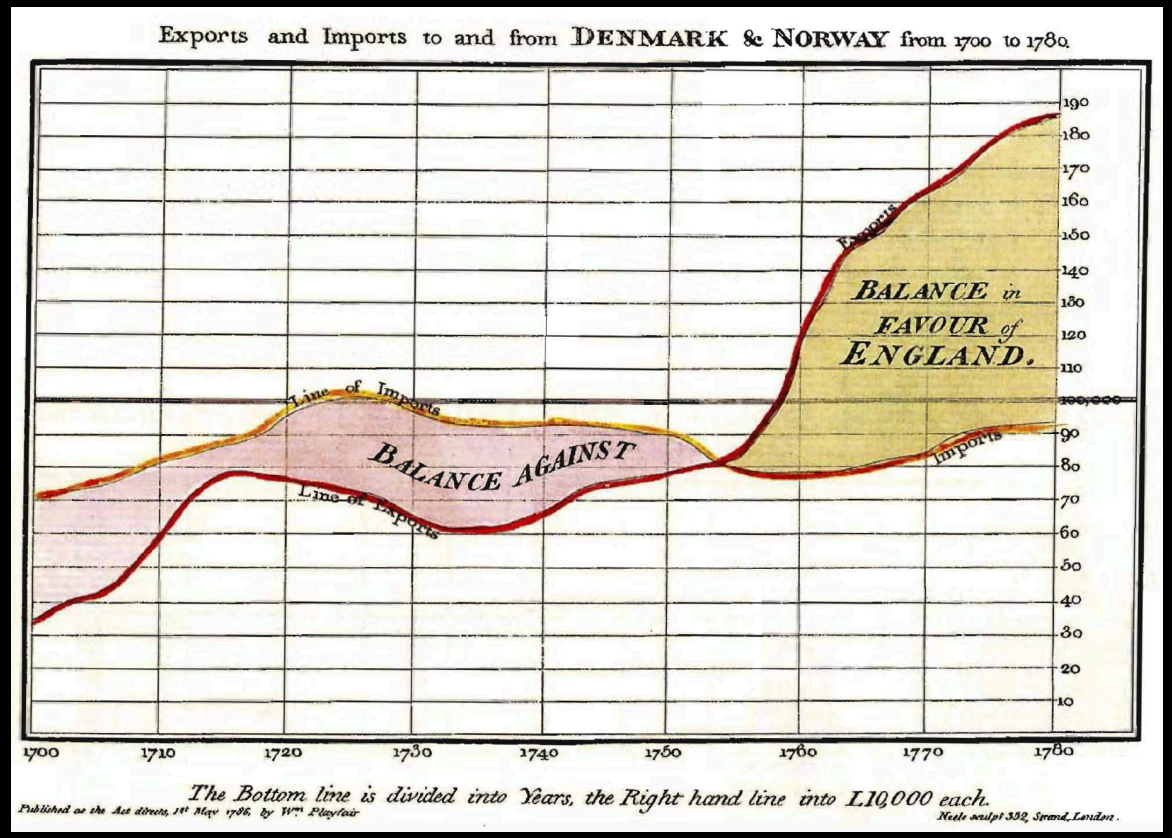
Small Multiples with Tableau

- https://public.tableau.com/profile/beatriz.woods#!/vizhome/PresidentialElectionResults-smallmultiples/Smallmultiples

- https://public.tableau.com/s/blog/2016/07/finding-small-stories-ncaa-football-data

Making Polished Graphics





Playfair 1785 → Playfair 1876

Polish: Simplification

- Maximize the data : ink ratio
  - Minimize grids & tick marks
  - Simplify axes
  - Remove all non-essential lines
  - Minimize redundancy without purpose
  - Labels are data - but use sparingly

Polish: ChartJunk

- No 3D.
- Patterns should be used VERY carefully if at all
- If gridlines are necessary, make them light
- Single boxes or no boxes
- Plots on plots cannot be read

Polish: Redundancy

- If the information can be recovered elsewhere, remove it
  - Titles
  - Legends
  - Labels

But don’t go crazy