

Evaluation Exercise

Lie Factor, Data-Ink Ratio, Data Density

Resources

- **Envisioning Information**

by Edward R. Tufte, Graphics Press, 1990

- **Visual Explanations**

by Edward R. Tufte, Graphics Press, 1997

- **The Visual Display of Quantitative Information** ←

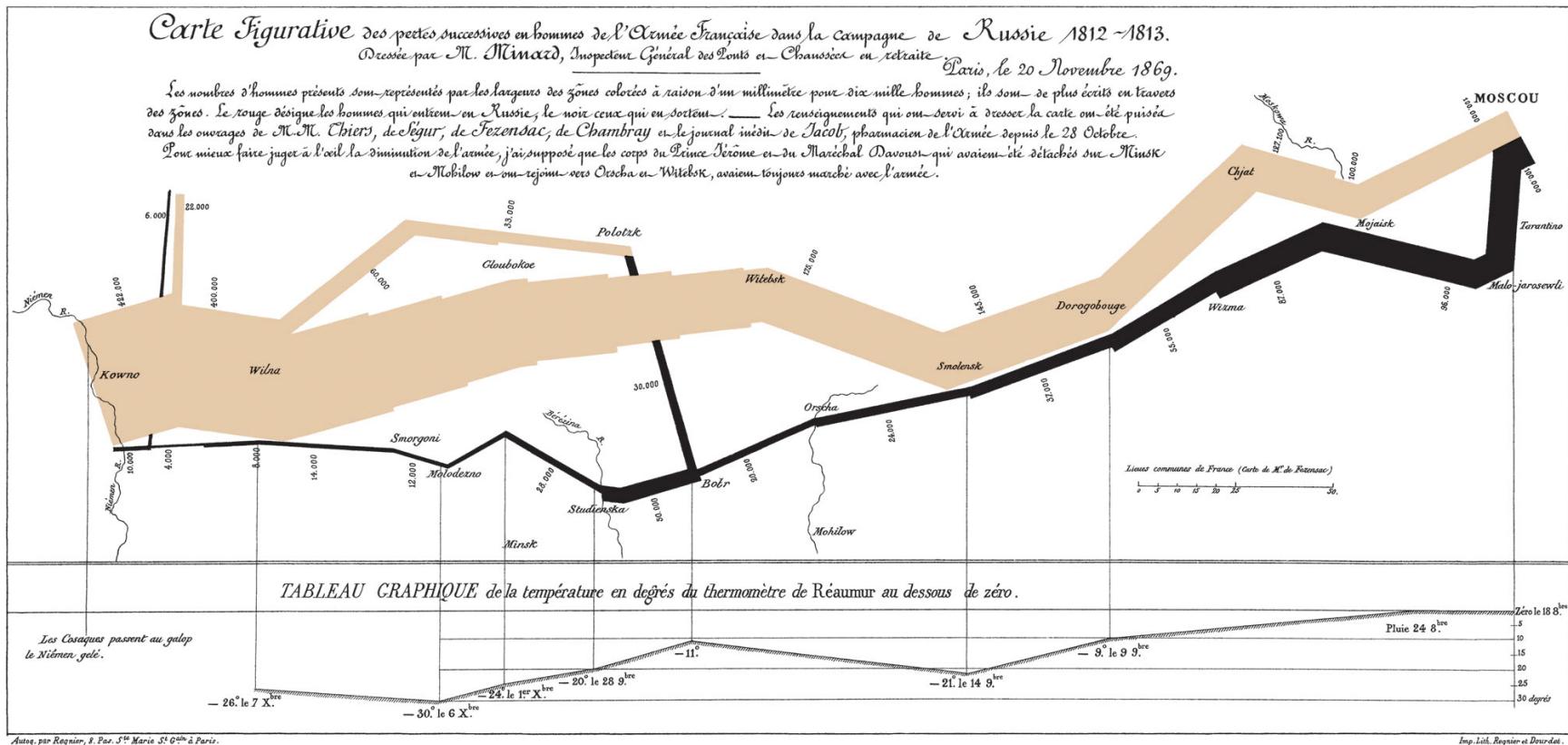
by Edward R. Tufte, Graphics Press, 2001

Evaluation Recap

- **Lie Factor**
 - Size of effect in graphic versus size of effect in data
- **Data-Ink Ratio**
 - Ratio of ink for non-redundant display of data
- **Data Density**
 - Amount of data entries versus graphic area

LOSSES IN FRENCH ARMY

By Charles Joseph Minard, 1869



<http://en.wikipedia.org/wiki/File:Minard.png>

Interpretation

- Illustrates losses suffered by Napoleon's army during the Russia campaign of 1812
- Important geographical markers, like rivers, are provided
- Width of tan band is size of army at location
- Black band shows retreat of army
- Temperature during retreat shown at bottom

“The Visual Display of Quantitative Information” by Edward R. Tufte

Carte Figurative des pertes successives en hommes de l'Armée Française dans la Campagne de Russie 1812-1813.

Dessiné par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite à Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de Léger, de Fezensac, de Chambray et le journal médical de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Napoléon et du Maréchal Davout qui avaient été détachés sur Minsk et Malibow et qui rejoignirent Ossaka en Witelkof, avaient toujours marché avec l'armée.

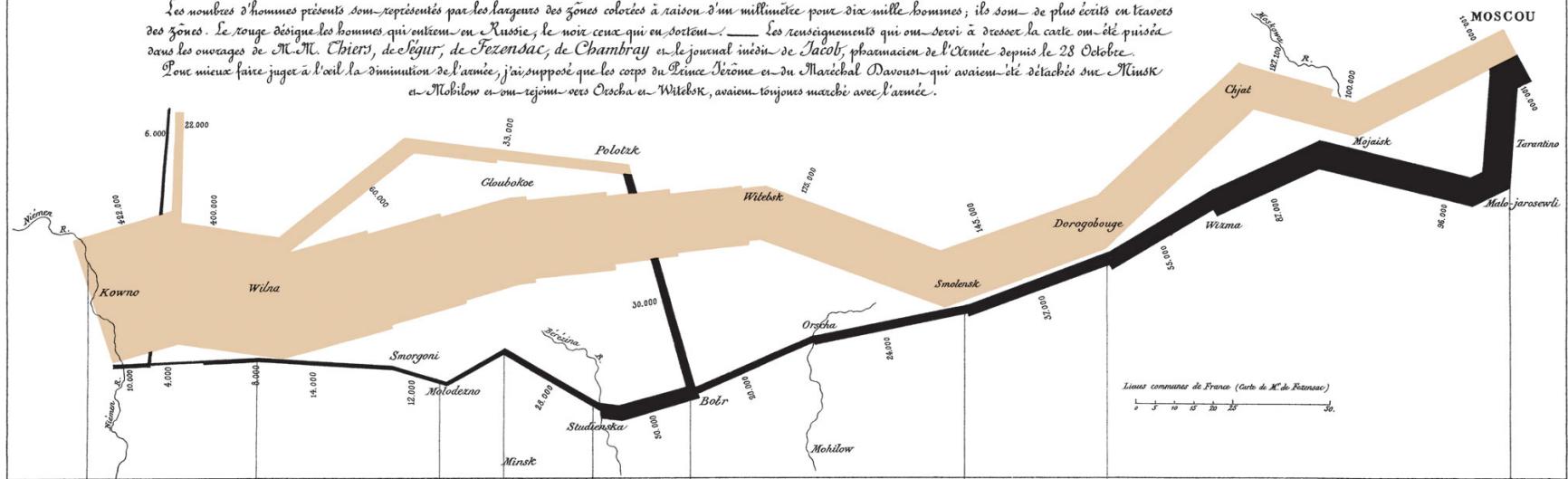
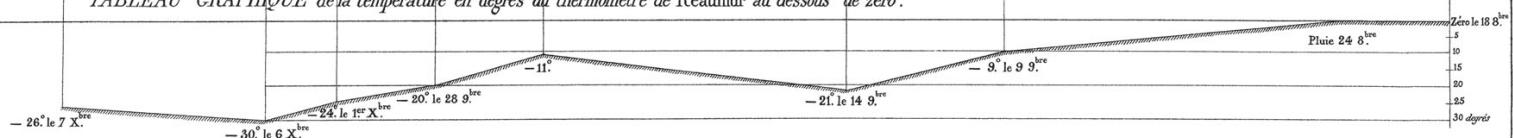


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les cosaques passent au galop
le Niemen gelé.



Autog. par Regnier, 8. Pas. S^e Marie 3^e G^e à Paris.

Imp. Loh. Regnier et Durand.

<http://en.wikipedia.org/wiki/File:Minard.png>

Lie Factor

- Size is given by width which is perceived fairly accurately
- Some issues likely due to hand-drawn nature of the figure
- Time is related to position (horizontal movement does not take equal amounts of time)

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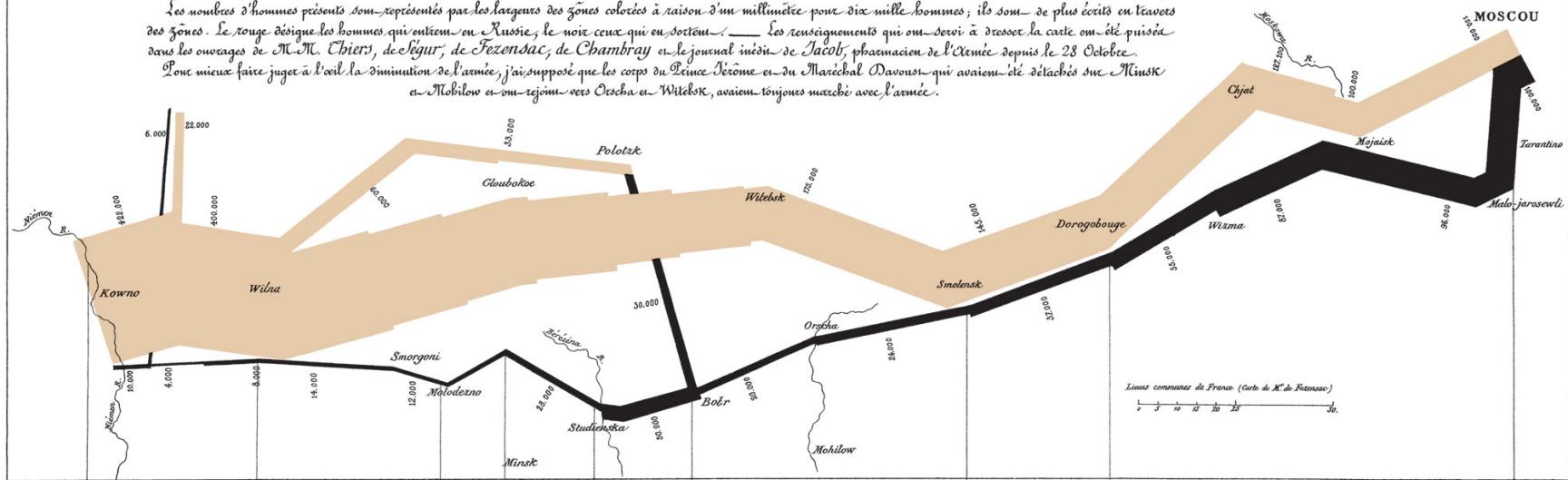
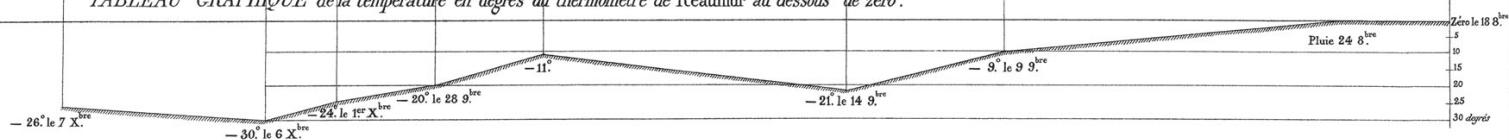


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

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Imp. Lib. Regnier et Durand.

<http://en.wikipedia.org/wiki/File:Minard.png>

Data-Ink Ratio

- Can maybe remove some lines
 - *But often provide context and easy reference*
- Can maybe remove some text
 - *But often provides context and easy reference*
- Can remove shading of temperature line
 - *But provides distinction between foreground and background*

“The Visual Display of Quantitative Information” by Edward R. Tufte

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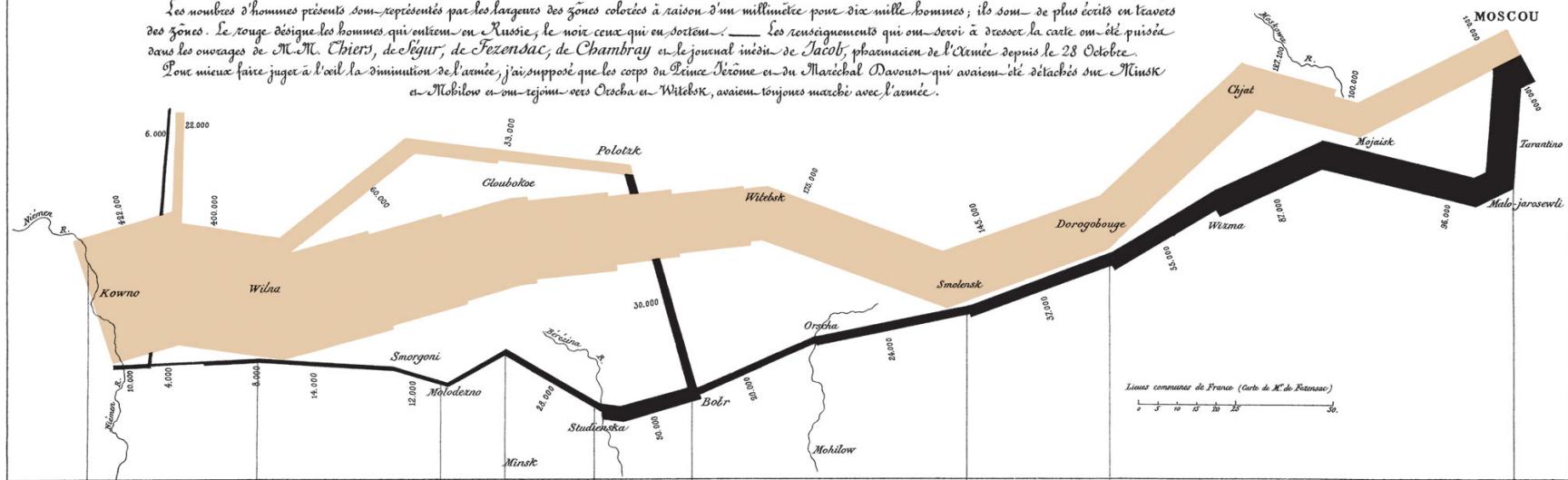
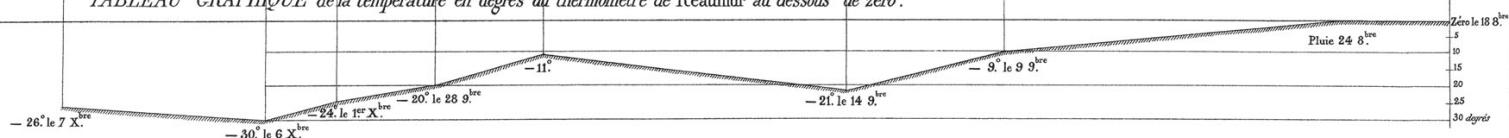


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Data Density

- Size of army (width of bands)
- Location of army (underlying map)
 - Latitude and longitude values
- Direction of army (tan versus black bands)
- Temperature change over time
 - Temperature value
 - Time (given by annotation and position)

“The Visual Display of Quantitative Information” by Edward R. Tufte

Summary

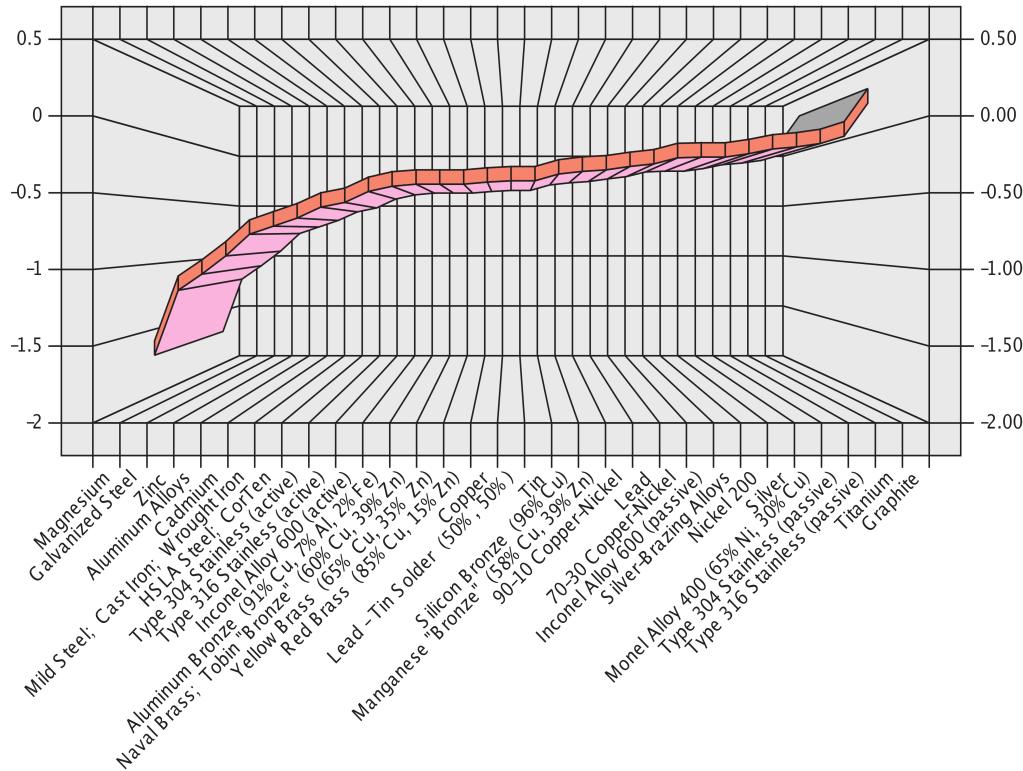
- Excellent visualization
 - Lie factor reasonable
 - Data-ink ratio very high
 - Data density very high
- Tufte: “It may well be the best statistical graphic ever drawn.”

“The Visual Display of Quantitative Information” by Edward R. Tufte

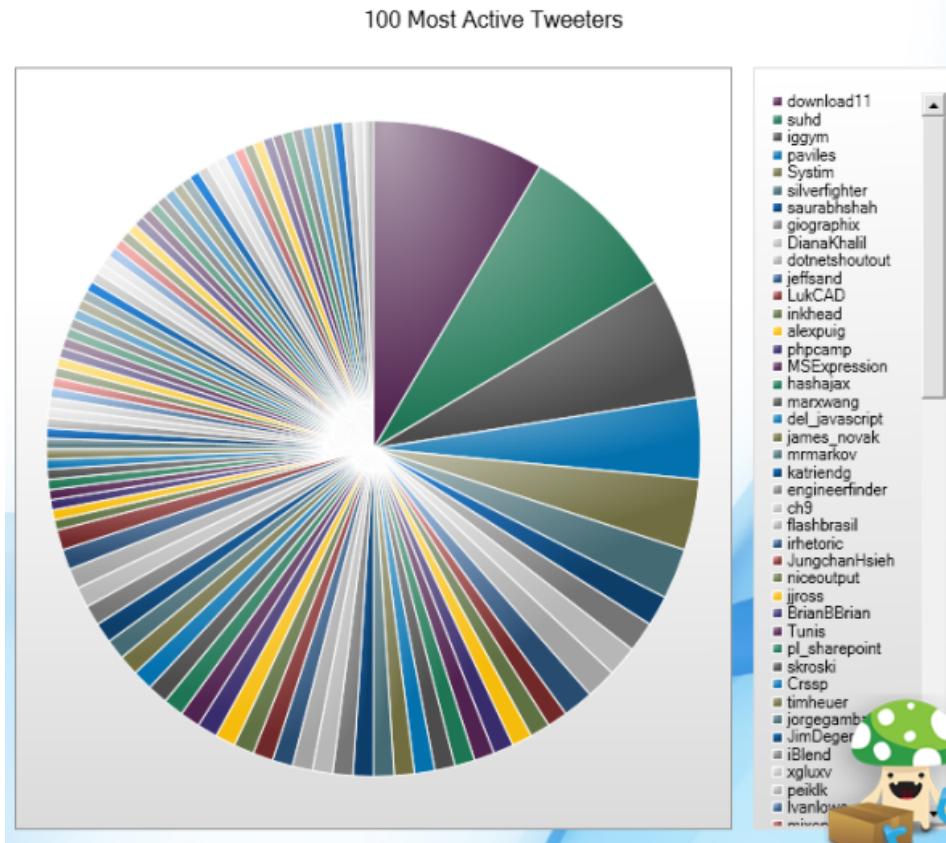
OTHER EXAMPLES

From <http://www.datavis.ca/gallery/>

Average Voltage in Seawater



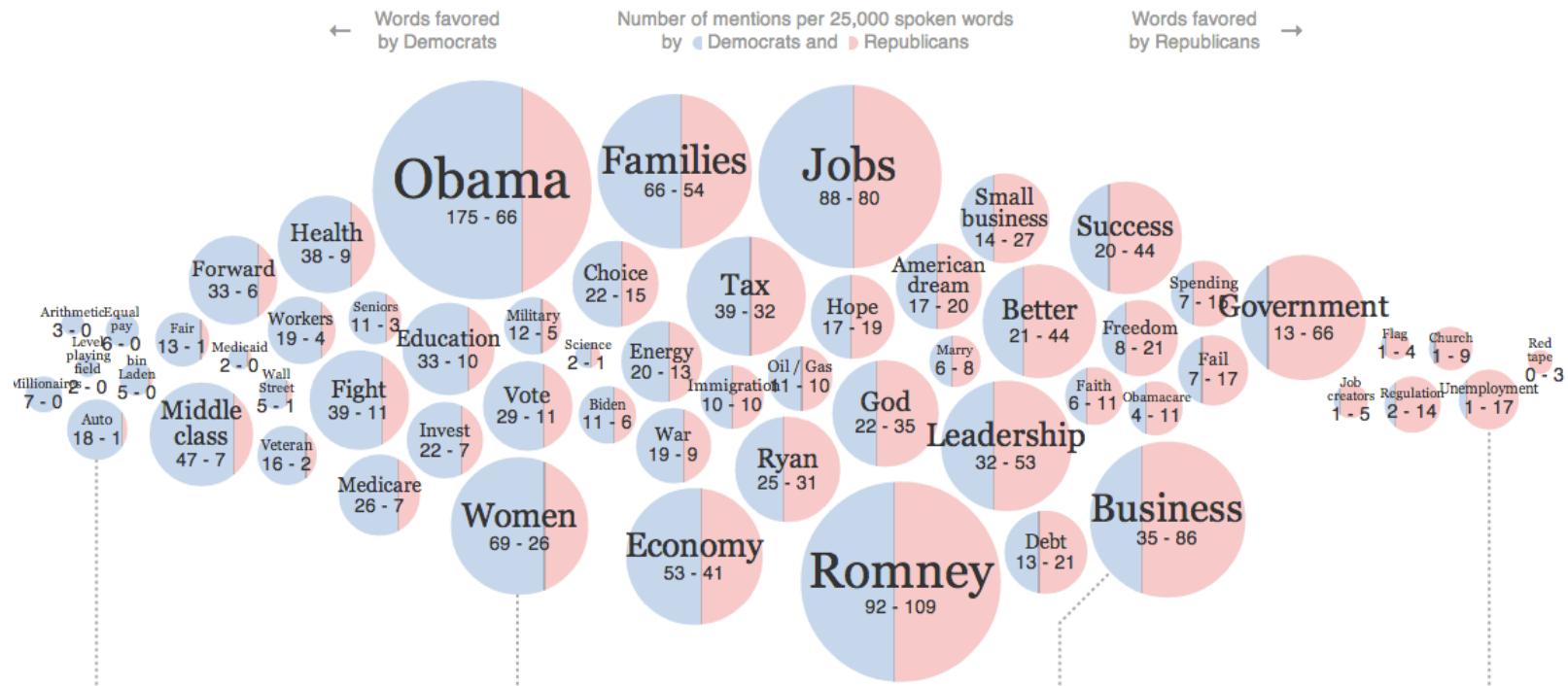
http://www.kastenmarine.com/_pdf/mbqMetRef.pdf



http://readwrite.com/2009/08/10/10_ways_to_archive_your_tweets

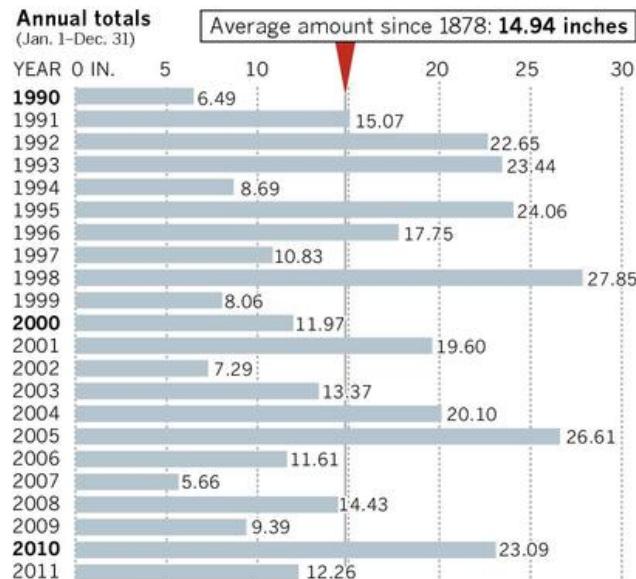
OTHER EXAMPLES

<http://junkcharts.typepad.com/>



L.A. annual rainfall, 1990-2011

A total of 12.26 inches of rain was recorded in 2011 at the National Weather Service's downtown Los Angeles weather station, located at USC.



Annual records since 1878

Wettest 40.29 (1884) **Driest** 4.08 (1953)

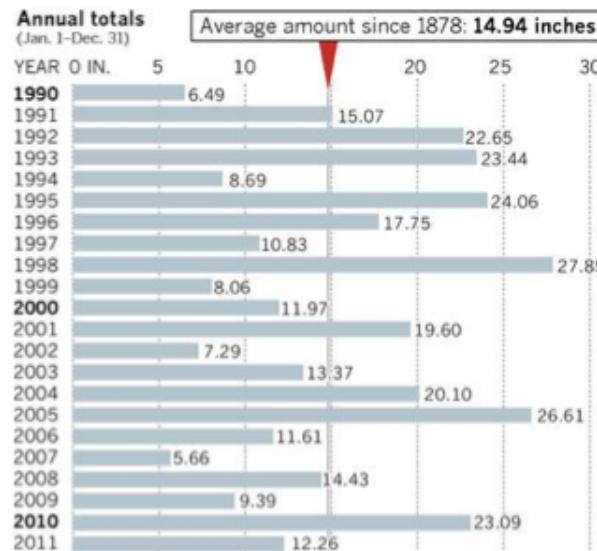
Source: National Weather Service

Los Angeles Times

<http://www.latimes.com/news/local/la-me-annual-rainfall.eps-20120105,0,5664933.graphic>

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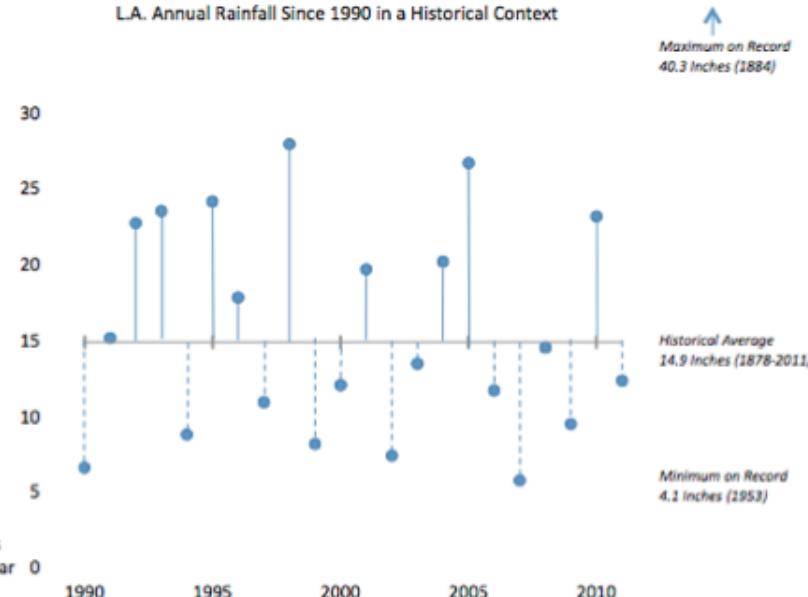
Annual records since 1878

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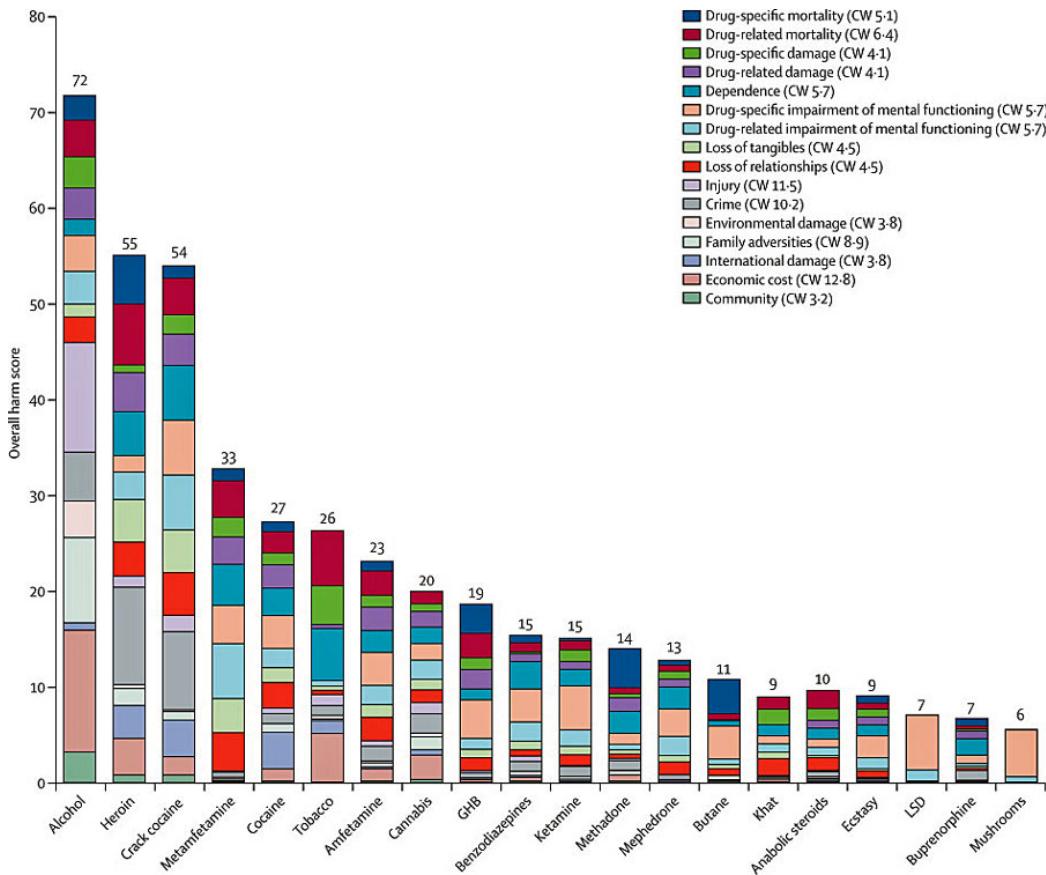
Source: National Weather Service

Los Angeles Times

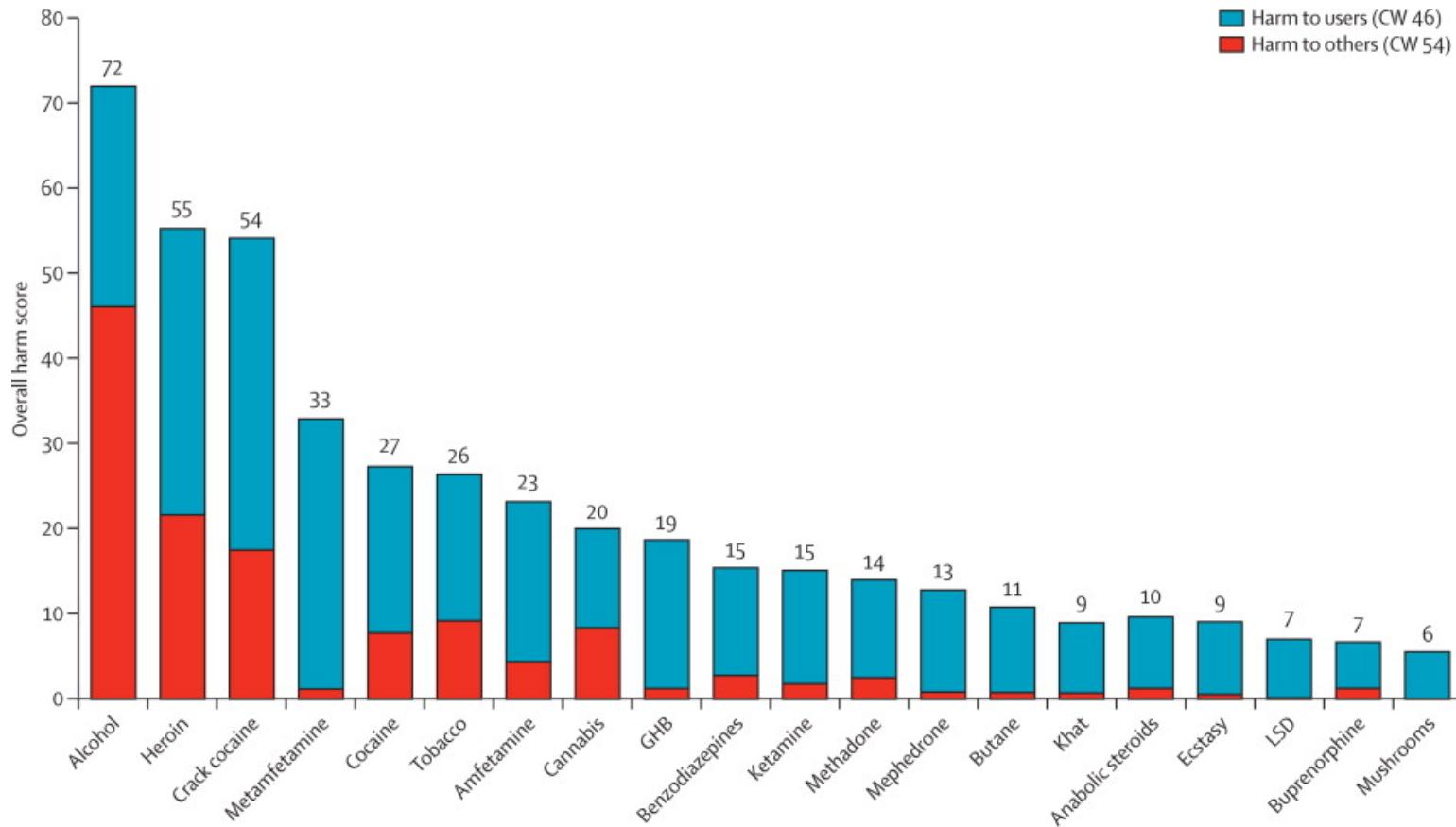
L.A. Annual Rainfall Since 1990 in a Historical Context



http://junkcharts.typepad.com/junk_charts/2012/01/two-tales-of-one-dataset.html

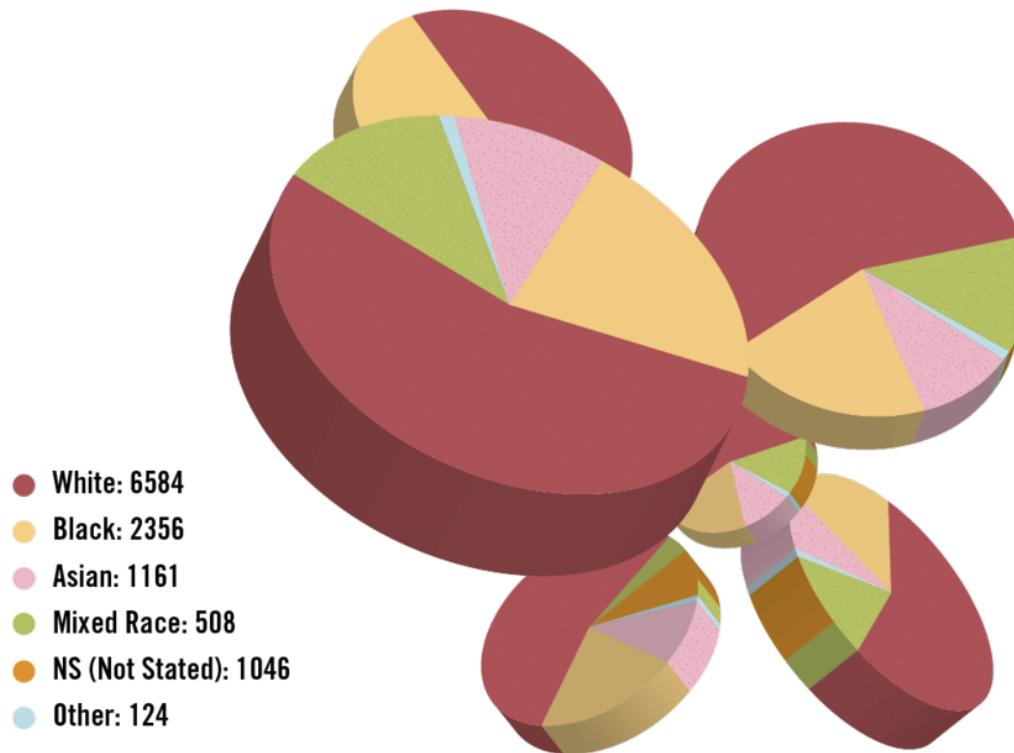


http://junkcharts.typepad.com/junk_charts/2012/07/staggering-excess.html



http://junkcharts.typepad.com/junk_charts/2012/07/staggering-excess.html

Convictions in England and Wales for class A drug supply.



http://www.vice.com/en_uk/read/foi-uk-drug-conviction-ethnicity-282

OTHER EXAMPLES

<http://andrewgelman.com/>

Sort states by:

POLITICS

REGIO

ALPHABETICAL

Laws on file

If no colour appears, there is no such law on file

- 2012 election results
 - Background check law
 - Permit required to purchase
 - Licence required to sell
 - Records kept on file
 - Firearms banned from workplace

New York

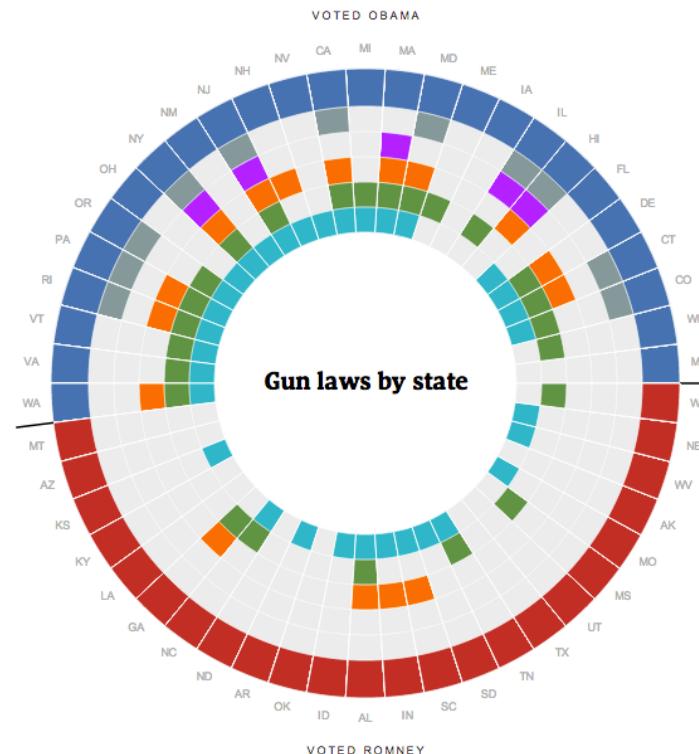
- Voted for Obama in the 2012 election
 - Background check:** required for handguns
 - Permit:** required to buy firearms
 - Licence:** required for dealers
 - Records:** kept on file for handgun owners
 - Workplace:** firearms not allowed in parking lots

Overall gun control score: 9

New York has a **Brady Campaign score** of 62, which is higher than the national average of 16. The score comes from measuring these and other gun laws according to a weighted points system.

Murder rate: 4.12

There were 4.12 firearm murders per 100,000 people in New York during 2011, which is higher than the national average of 2.77. Overall, it is ranked #8 in murder rates out of 48 states with this data.

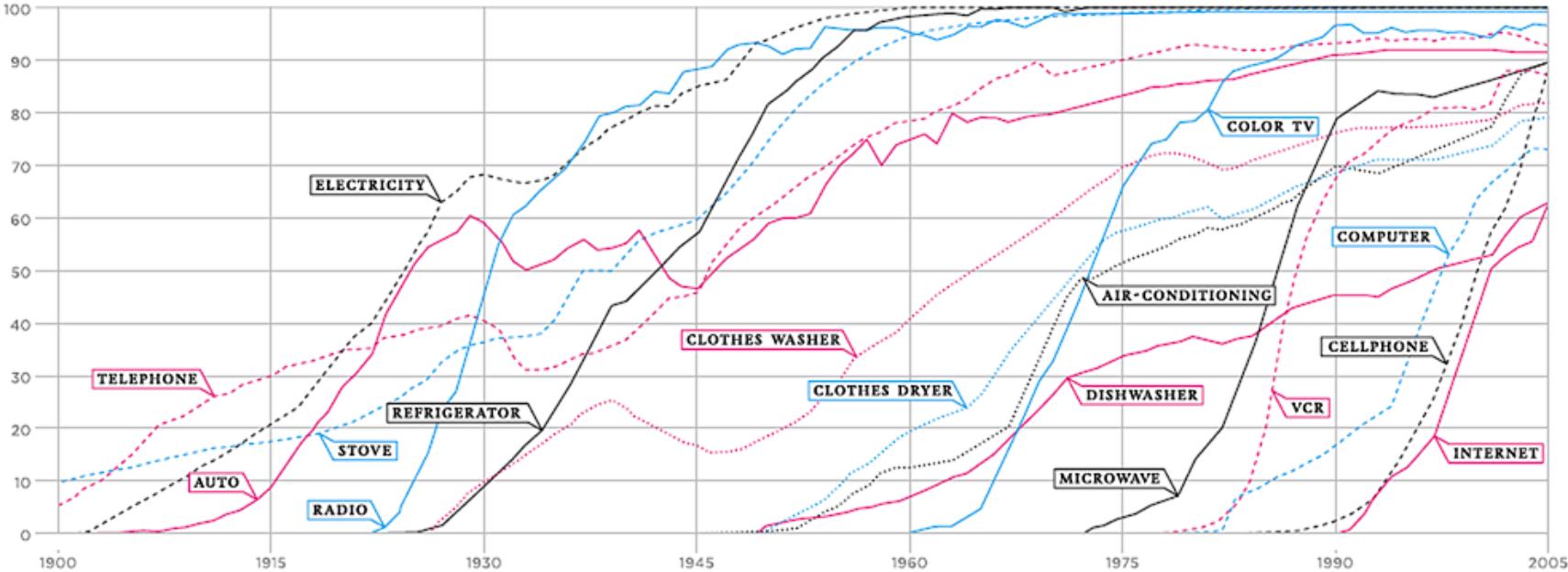


<http://www.theglobeandmail.com/news/world/gun-control-in-america-a-state-by-state-breakdown/article646510/>

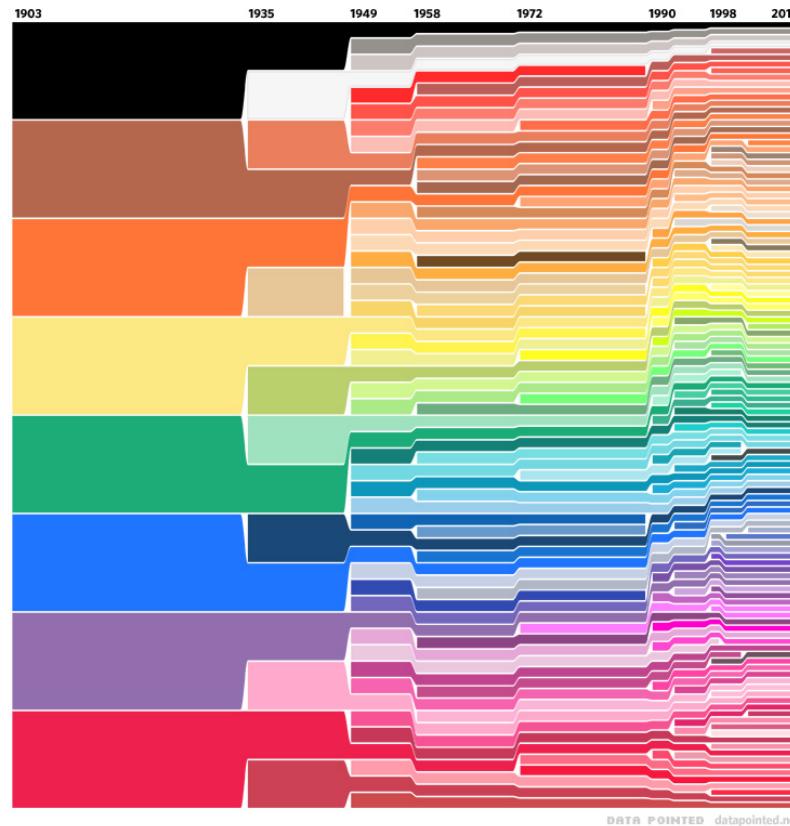
<http://andrewgelman.com/2013/01/20/ugly-ugly-ugly/>

PERCENT OF
U.S. HOUSEHOLDS

CONSUMPTION SPREADS FASTER TODAY



<http://www.theatlantic.com/technology/archive/2012/04/the-100-year-march-of-technology-in-1-graph/255573/>



<http://www.datapointed.net/visualizations/color/crayola-crayon-chart/>

<http://andrewgelman.com/2011/07/31/even-a-good-data-display-can-sometimes-be-improved/>

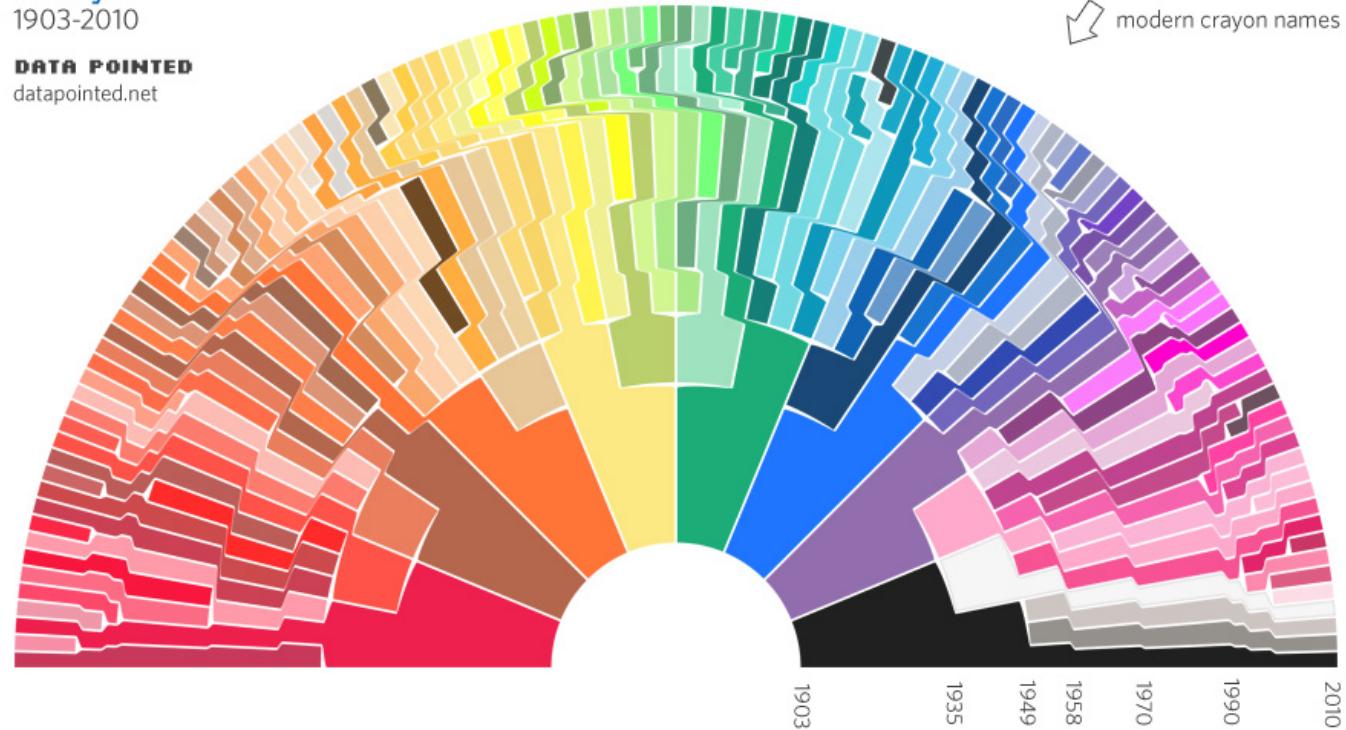
Crayola Color Chart

1903-2010

DATA POINTED

datapointed.net

mouse over to see the
modern crayon names

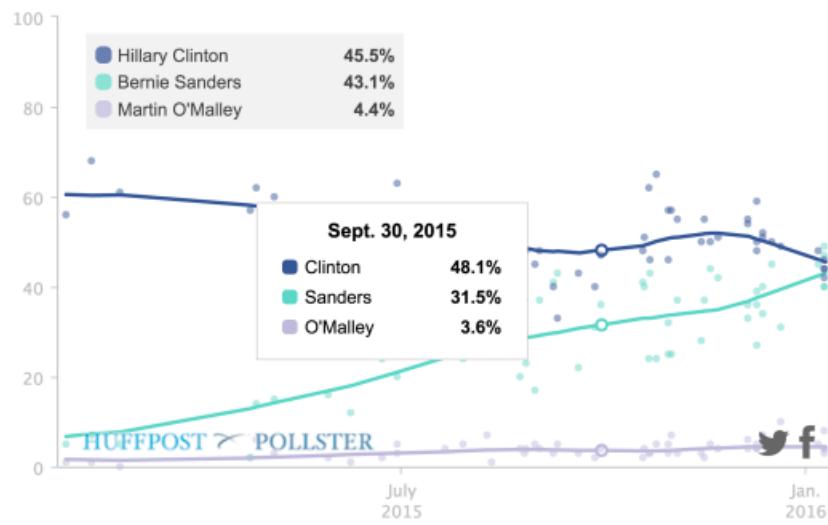


<http://www.datapointed.net/visualizations/color/crayola-crayon-chart-bow/>

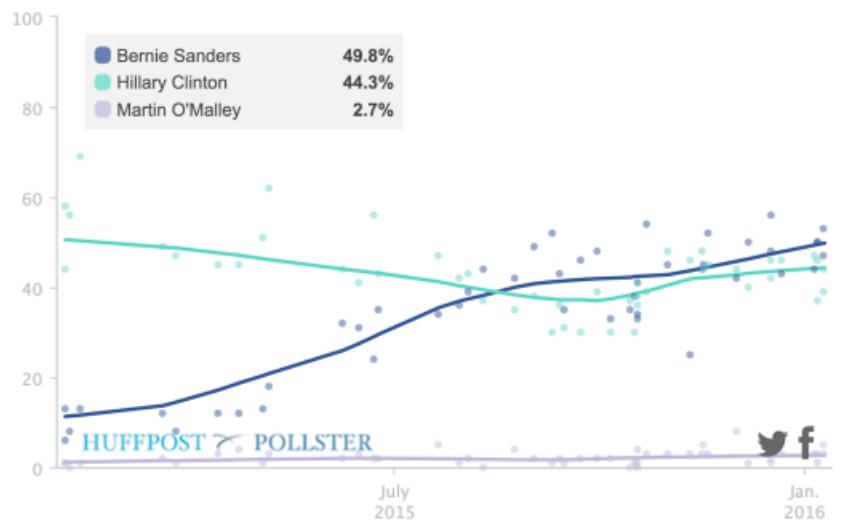
OTHER EXAMPLES

<http://viz.wtf/>

2016 Iowa Democratic Presidential Caucus



2016 New Hampshire Democratic Presidential Primary



<http://viz.wtf/post/137565929466/flip-flop>

UNDER PRESIDENT OBAMA,

MORE STUDENTS ARE EARNING THEIR HIGH SCHOOL DIPLOMAS THAN EVER BEFORE

HIGH SCHOOL GRADUATION RATE

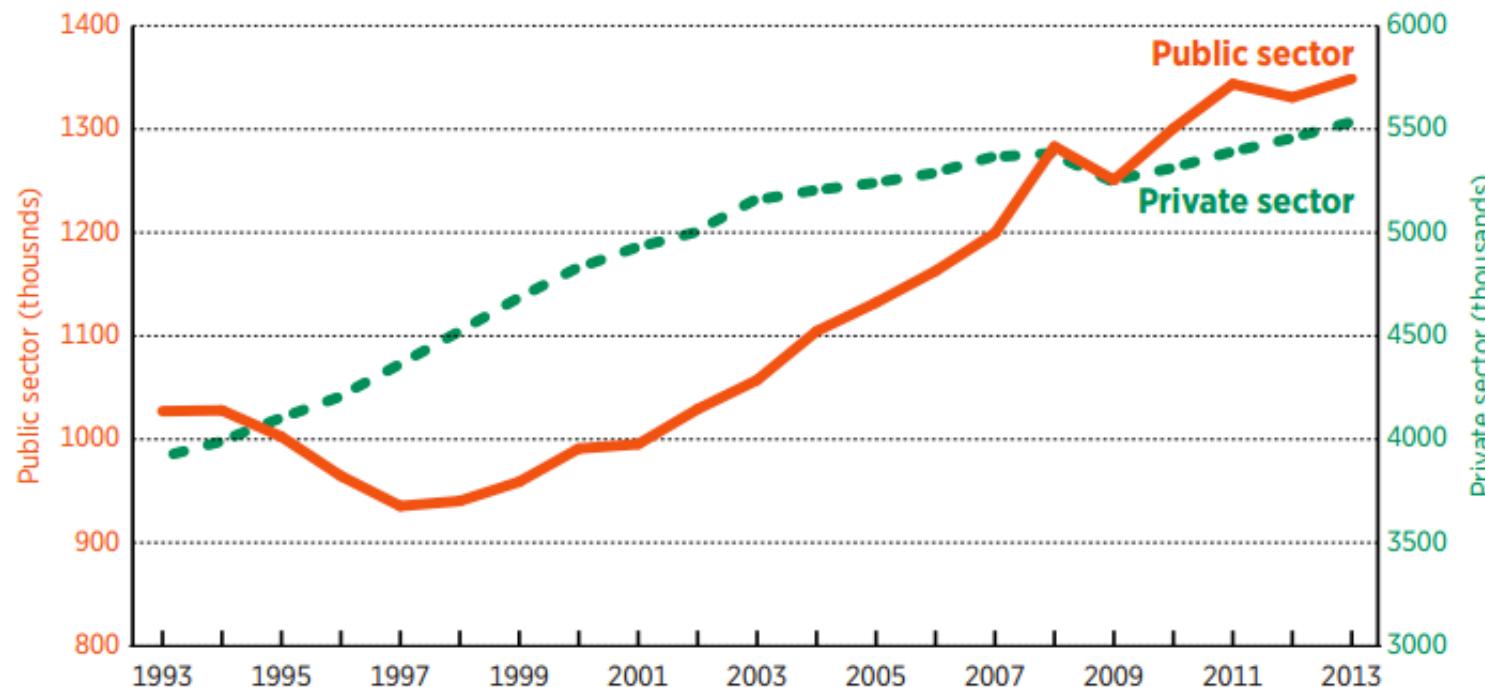


#LeadOnEducation

SOURCE: U.S. DEPARTMENT OF EDUCATION,
NATIONAL CENTER FOR EDUCATION STATISTICS

<http://viz.wtf/post/135456182058/good-news-americas-high-school-graduation-rate>

Figure 10: Public- and private-sector jobs (000s) in Ontario, 1993–2013



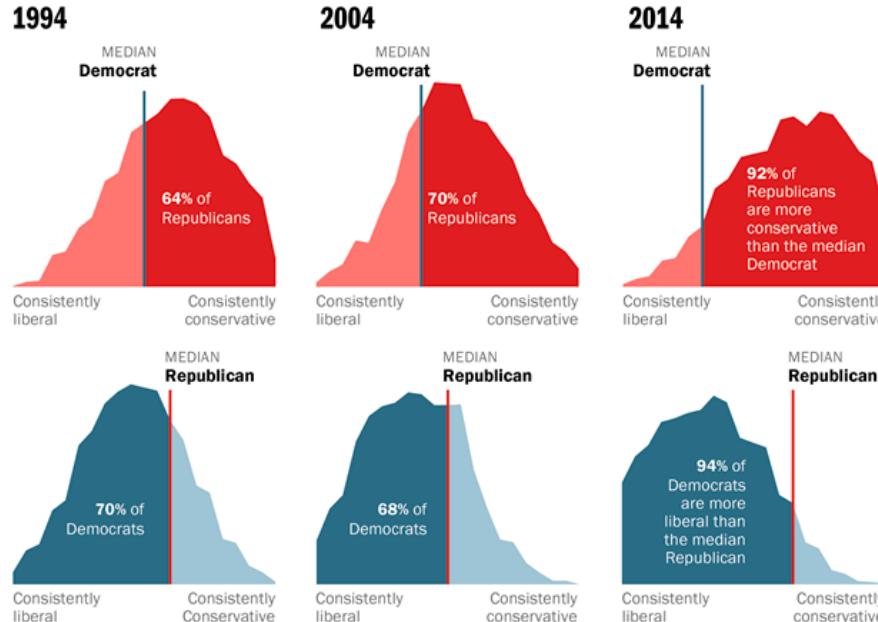
<http://viz.wtf/post/130346650836/flagrant-abuse-of-y-axis>

OTHER EXAMPLES

Random Sources

Republicans Shift to the Right, Democrats to the Left

Distribution of Republicans and Democrats on a 10-item scale of political values



Source: 2014 Political Polarization in the American Public.

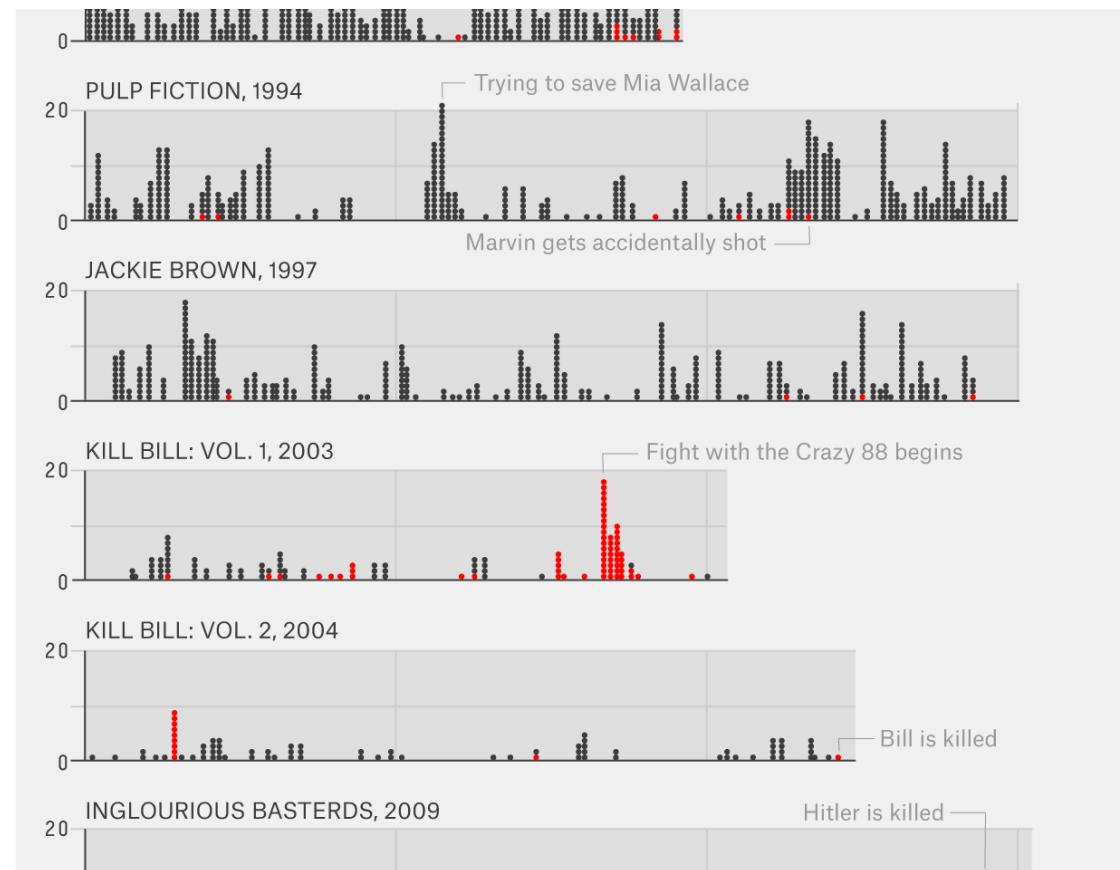
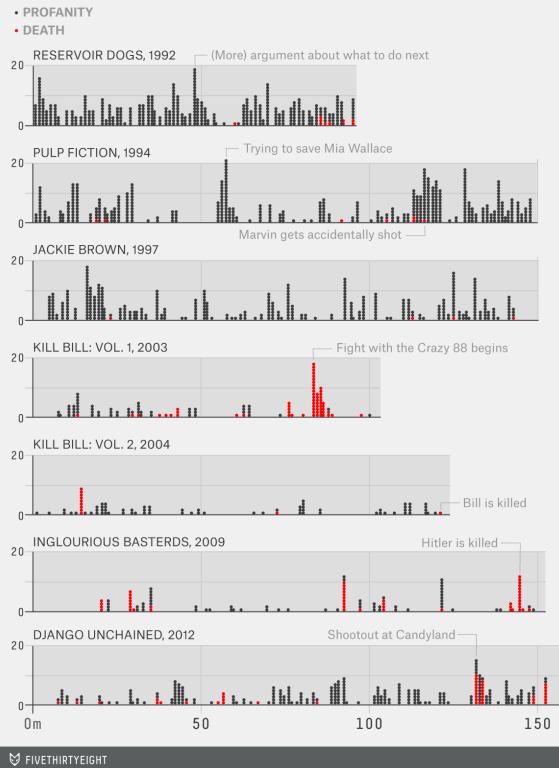
Notes: Ideological consistency based on a scale of 10 political values questions (see Appendix A). Republicans include Republican-leaning independents; Democrats include Democratic-leaning independents (see Appendix B).

PEW RESEARCH CENTER

<http://www.pewresearch.org/fact-tank/2014/12/29/our-favorite-pew-research-center-data-visualizations-from-2014/>
<http://www.people-press.org/2014/06/12/political-polarization-in-the-american-public/pp-2014-06-12-polarization-0-05/>

The complete obscene guide to Tarantino

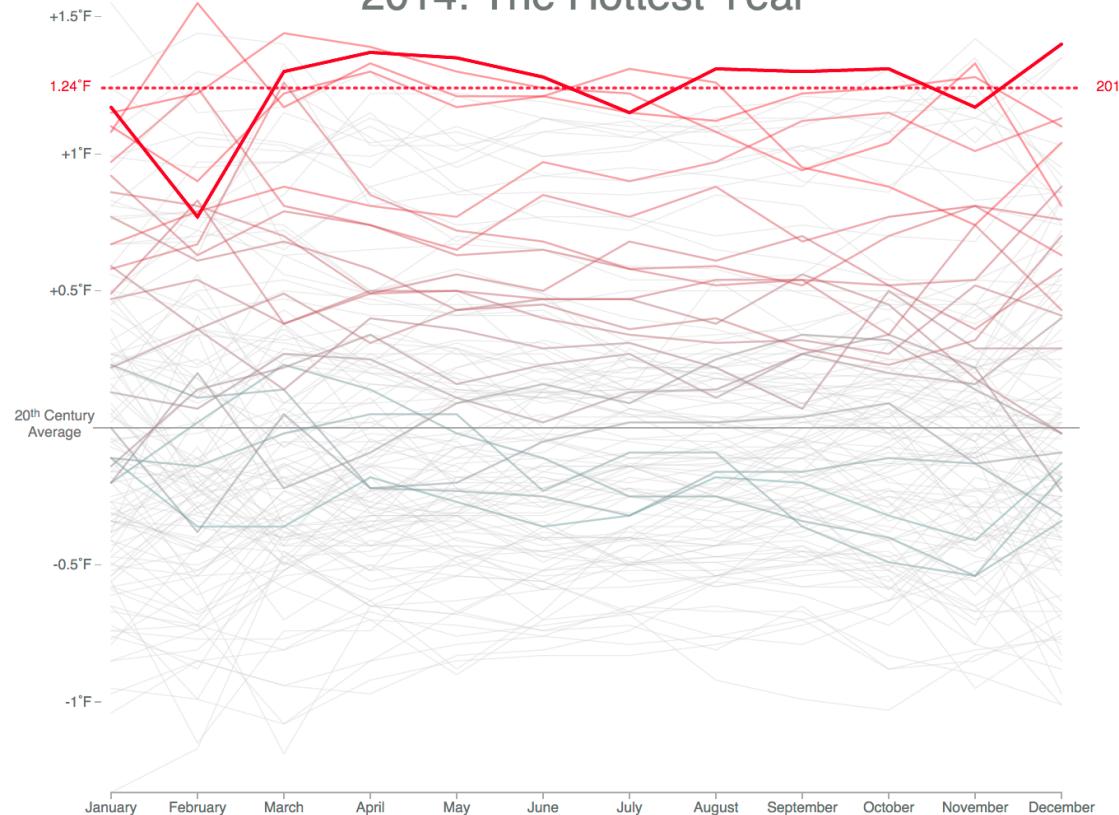
Time stamp of every instance of profanity and each death in feature films directed by Quentin Tarantino



<http://fivethirtyeight.com/features/our-47-weirdest-charts-from-2015/>

<http://fivethirtyeight.com/features/complete-catalog-curses-deaths-quentin-tarantino-films/>

2014: The Hottest Year



<http://flowingdata.com/2015/12/22/10-best-data-visualization-projects-of-2015/>
<http://www.bloomberg.com/graphics/2014-hottest-year-on-record/>

Resources

- Junk Charts <http://junkcharts.typepad.com/>
- WTF Vis <http://viz.wtf/>
- Help Me Vis <http://helpmeviz.com/>
- Andrew Gelman <http://andrewgelman.com/>



CHANGE THE WORLD FROM HERE