

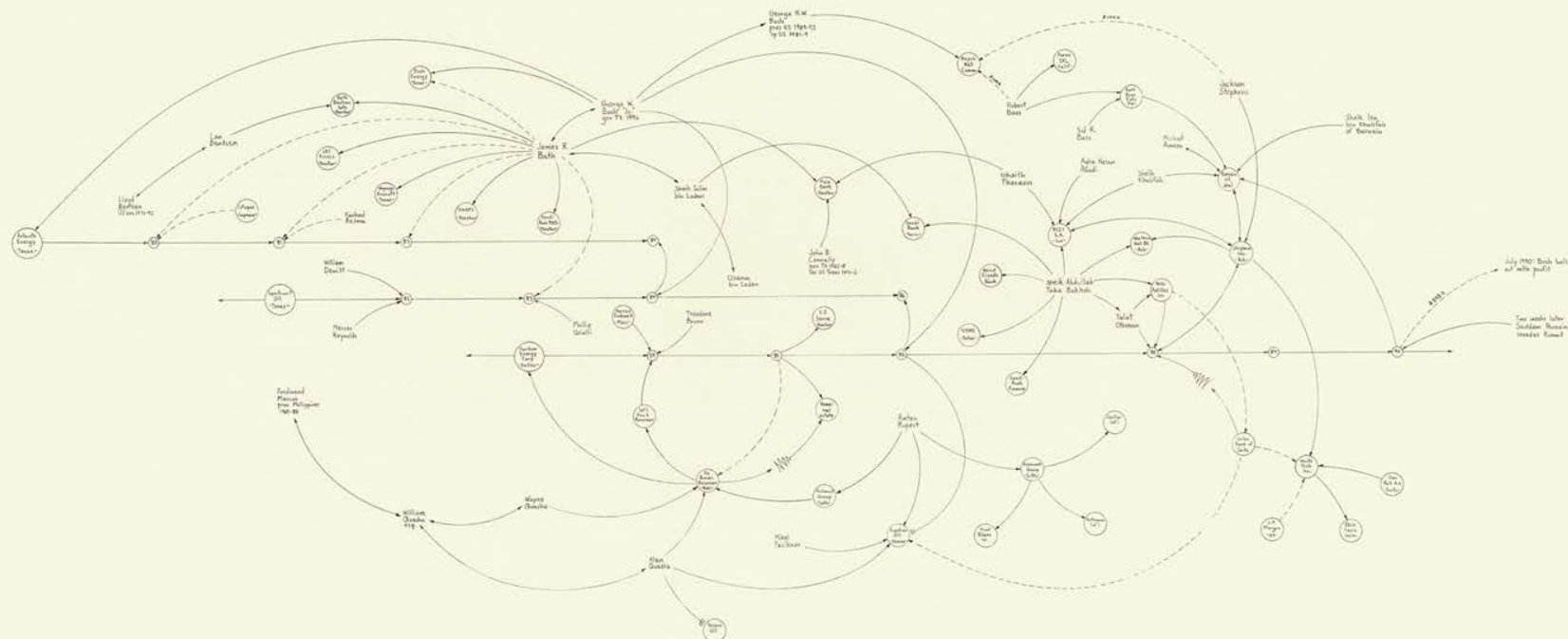
# What I Think About When I Think About Data Visualization

Justin Joque

U-M Library

Data Visualization Librarian

September 25, 2018



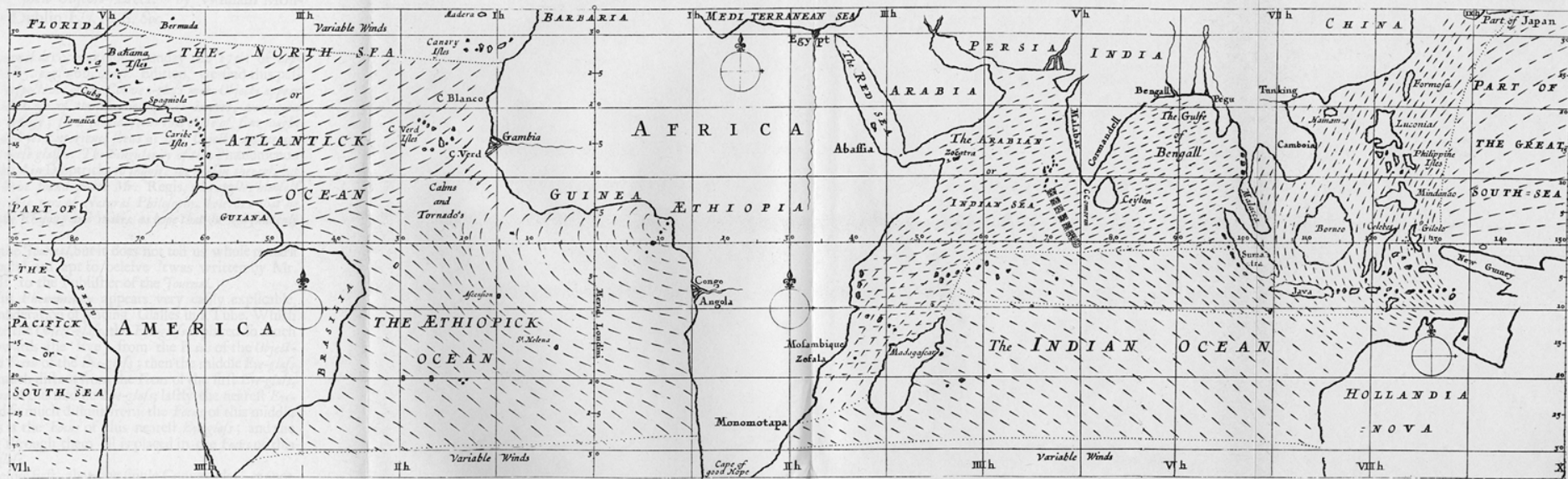
George W. Bush, Nuclear Energy and  
 Jackson, September 1, 1979-80  
 5th version  
 PL © 1999

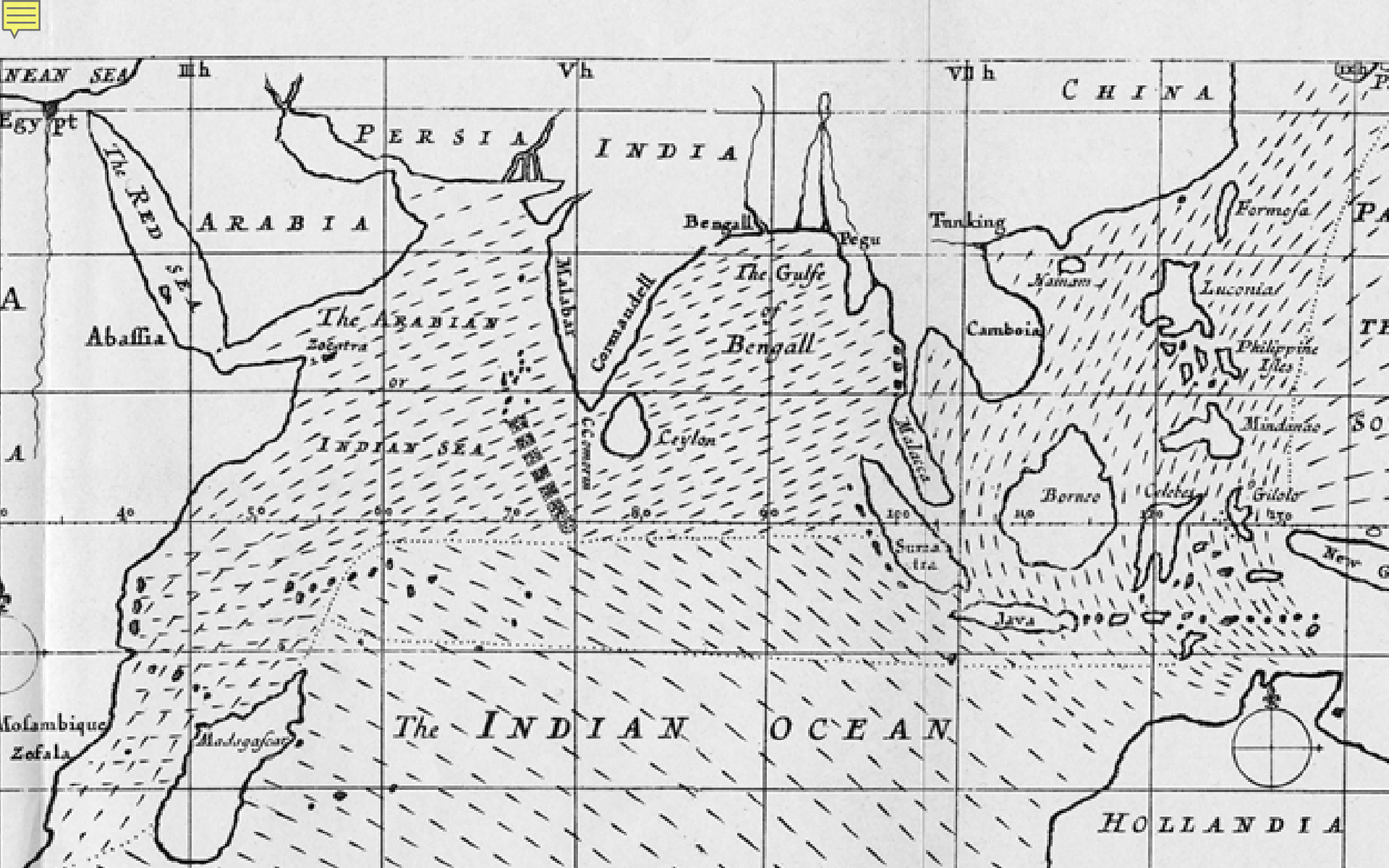


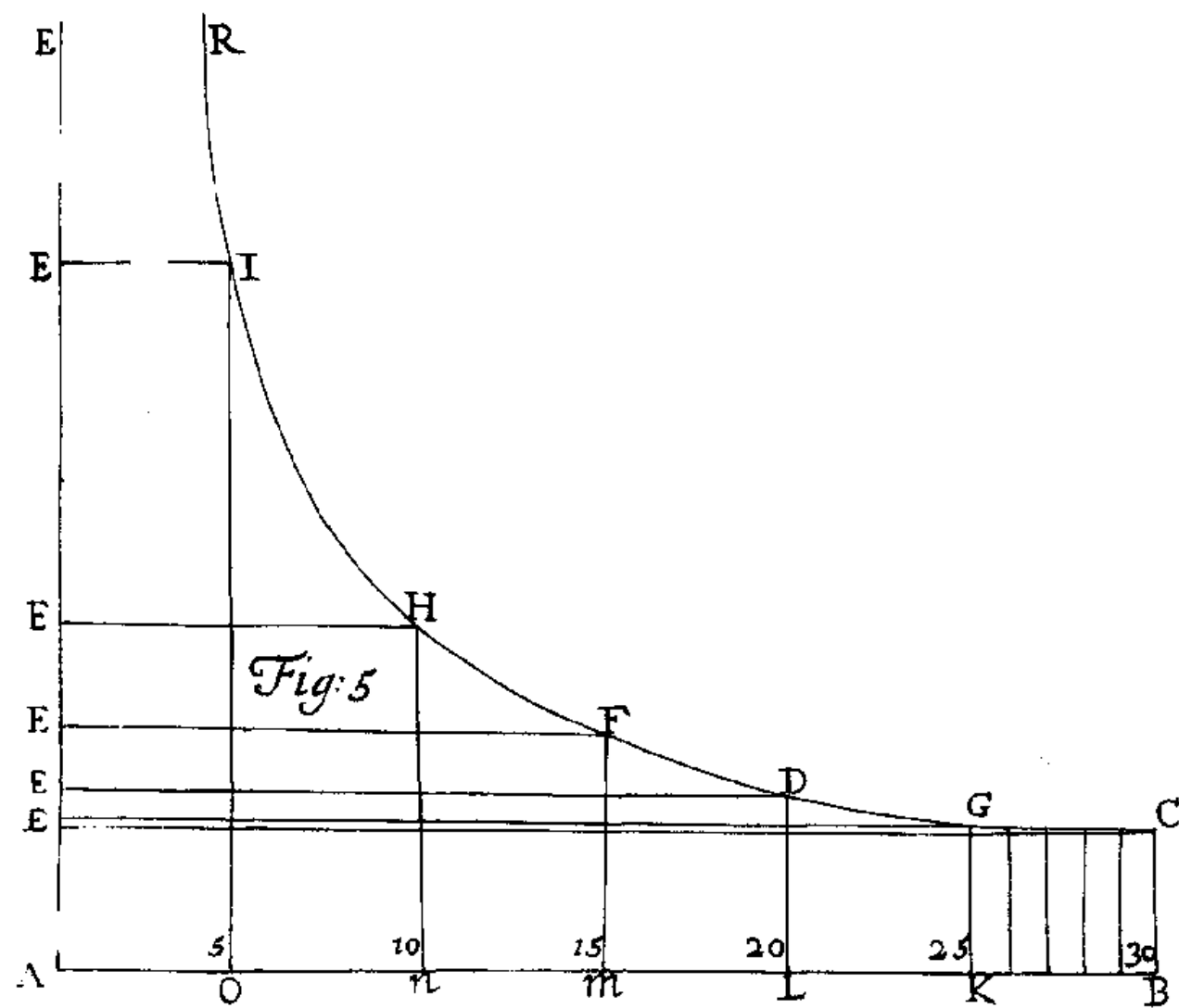


100% Free and No Watermark



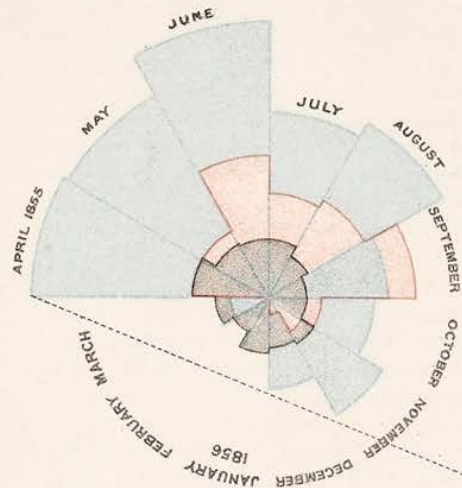




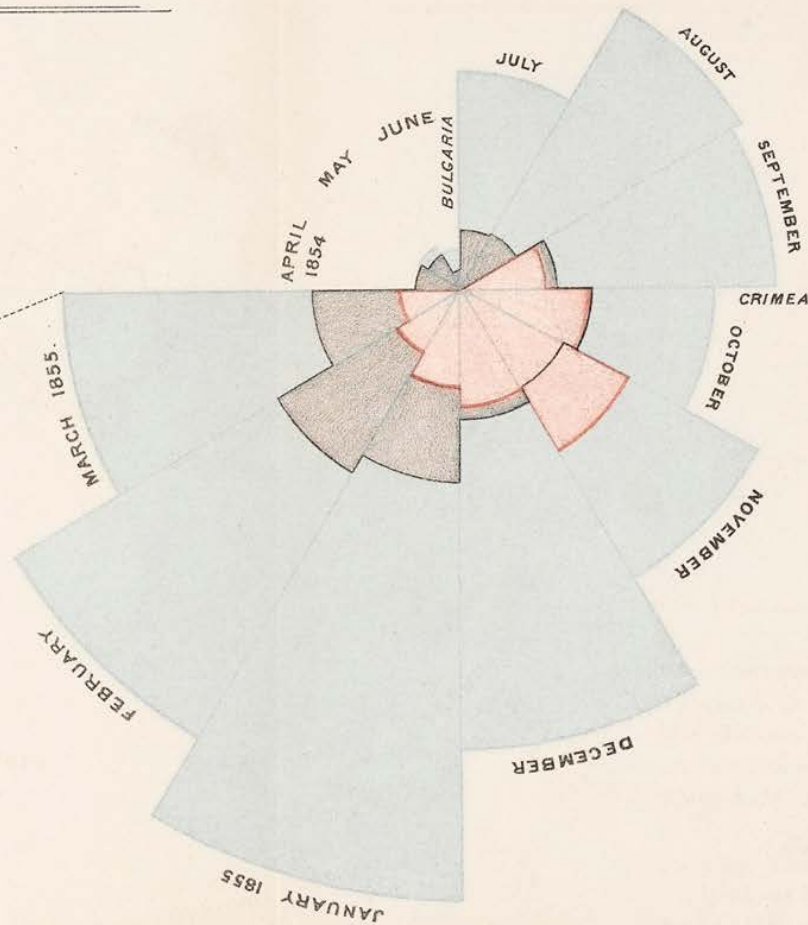


# DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

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 Preventible 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<sup>r</sup> 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.

PURPOSES

| Property                                     | Value                                                         |
|----------------------------------------------|---------------------------------------------------------------|
| Mean of $x$ in each case                     | 9 (exact)                                                     |
| Sample variance of $x$ in each case          | 11 (exact)                                                    |
| Mean of $y$ in each case                     | 7.50 (to 2 decimal places)                                    |
| Sample variance of $y$ in each case          | 4.122 or 4.127 (to 3 decimal places)                          |
| Correlation between $x$ and $y$ in each case | 0.816 (to 3 decimal places)                                   |
| Linear regression line in each case          | $y = 3.00 + 0.500x$ (to 2 and 3 decimal places, respectively) |

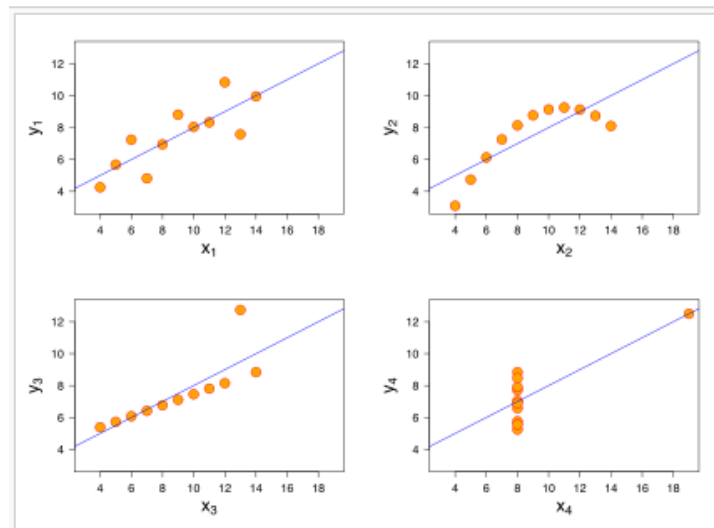
**Anscombe's quartet**

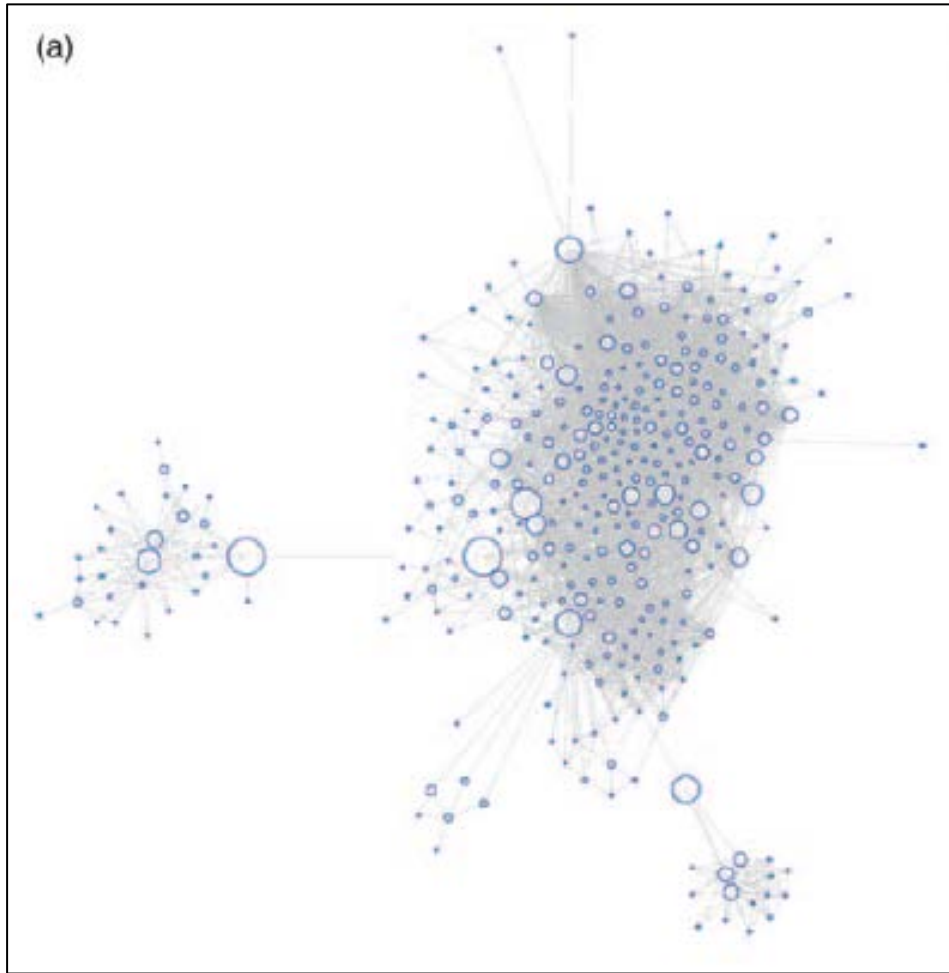
| I    |       | II   |      | III  |       | IV   |       |
|------|-------|------|------|------|-------|------|-------|
| x    | y     | x    | y    | x    | y     | x    | y     |
| 10.0 | 8.04  | 10.0 | 9.14 | 10.0 | 7.46  | 8.0  | 6.58  |
| 8.0  | 6.95  | 8.0  | 8.14 | 8.0  | 6.77  | 8.0  | 5.76  |
| 13.0 | 7.58  | 13.0 | 8.74 | 13.0 | 12.74 | 8.0  | 7.71  |
| 9.0  | 8.81  | 9.0  | 8.77 | 9.0  | 7.11  | 8.0  | 8.84  |
| 11.0 | 8.33  | 11.0 | 9.26 | 11.0 | 7.81  | 8.0  | 8.47  |
| 14.0 | 9.96  | 14.0 | 8.10 | 14.0 | 8.84  | 8.0  | 7.04  |
| 6.0  | 7.24  | 6.0  | 6.13 | 6.0  | 6.08  | 8.0  | 5.25  |
| 4.0  | 4.26  | 4.0  | 3.10 | 4.0  | 5.39  | 19.0 | 12.50 |
| 12.0 | 10.84 | 12.0 | 9.13 | 12.0 | 8.15  | 8.0  | 5.56  |
| 7.0  | 4.82  | 7.0  | 7.26 | 7.0  | 6.42  | 8.0  | 7.91  |
| 5.0  | 5.68  | 5.0  | 4.74 | 5.0  | 5.73  | 8.0  | 6.89  |

| Property                                     | Value                                                         |
|----------------------------------------------|---------------------------------------------------------------|
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**Anscombe's quartet**

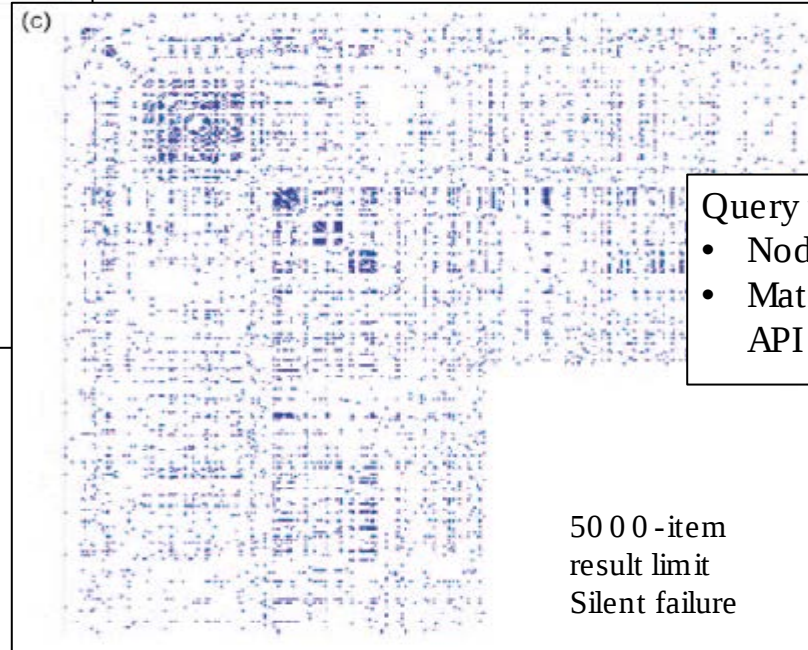
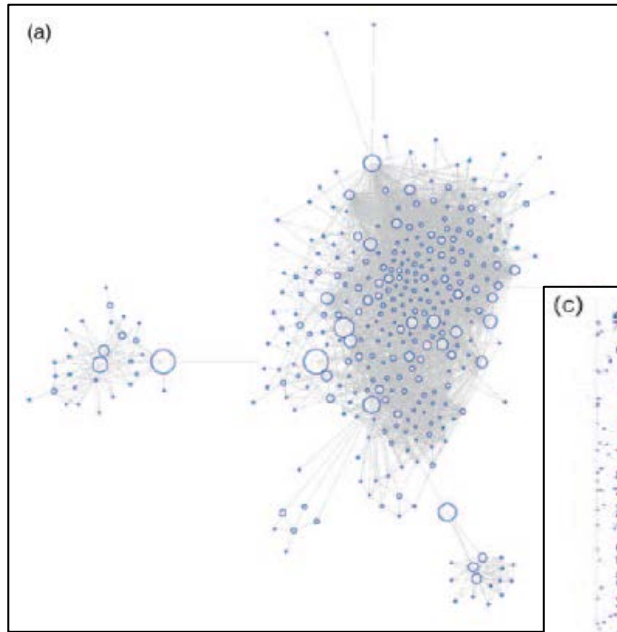
| I    |       | II   |      | III  |       | IV   |       |
|------|-------|------|------|------|-------|------|-------|
| x    | y     | x    | y    | x    | y     | x    | y     |
| 10.0 | 8.04  | 10.0 | 9.14 | 10.0 | 7.46  | 8.0  | 6.58  |
| 8.0  | 6.95  | 8.0  | 8.14 | 8.0  | 6.77  | 8.0  | 5.76  |
| 13.0 | 7.58  | 13.0 | 8.74 | 13.0 | 12.74 | 8.0  | 7.71  |
| 9.0  | 8.81  | 9.0  | 8.77 | 9.0  | 7.11  | 8.0  | 8.84  |
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| 12.0 | 10.84 | 12.0 | 9.13 | 12.0 | 8.15  | 8.0  | 5.56  |
| 7.0  | 4.82  | 7.0  | 7.26 | 7.0  | 6.42  | 8.0  | 7.91  |
| 5.0  | 5.68  | 5.0  | 4.74 | 5.0  | 5.73  | 8.0  | 6.89  |





Query using Facebook API

- Node-link diagram

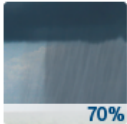
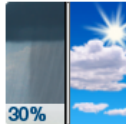


Query using Facebook API

- Node-link diagram
- Matrix display,  
API return order

5000-item  
result limit  
Silent failure

Extended Forecast for  
**Ann Arbor MI**

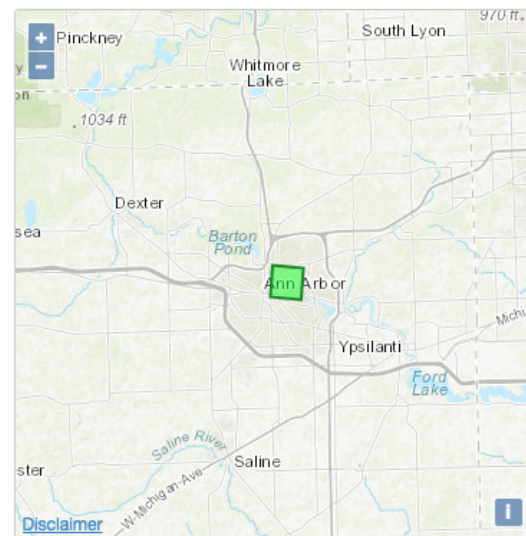
| Today                                                                             | Tonight                                                                           | Wednesday                                                                         | Wednesday Night                                                                   | Thursday                                                                           | Thursday Night                                                                      | Friday                                                                              | Friday Night                                                                        | Saturday                                                                            |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |  |  |  |
| Showers Likely                                                                    | Showers Likely                                                                    | Chance Showers then Mostly Sunny                                                  | Mostly Clear                                                                      | Mostly Sunny                                                                       | Partly Cloudy                                                                       | Mostly Sunny                                                                        | Partly Cloudy                                                                       | Partly Sunny                                                                        |
| High: 77 °F                                                                       | Low: 60 °F                                                                        | High: 66 °F                                                                       | Low: 43 °F                                                                        | High: 66 °F                                                                        | Low: 49 °F                                                                          | High: 68 °F                                                                         | Low: 47 °F                                                                          | High: 62 °F                                                                         |

## Detailed Forecast

|                        |                                                                                                                                                                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Today</b>           | Showers likely and possibly a thunderstorm. Cloudy, with a high near 77. South southwest wind 6 to 10 mph, with gusts as high as 18 mph. Chance of precipitation is 70%. New rainfall amounts between a tenth and quarter of an inch, except higher amounts possible in thunderstorms. |
| <b>Tonight</b>         | Showers likely and possibly a thunderstorm. Cloudy, with a low around 60. South southwest wind 9 to 14 mph, with gusts as high as 18 mph. Chance of precipitation is 70%. New rainfall amounts between a quarter and half of an inch possible.                                         |
| <b>Wednesday</b>       | A chance of showers before 8am. Cloudy through mid morning, then gradual clearing, with a high near 66. West northwest wind around 16 mph, with gusts as high as 23 mph. Chance of precipitation is 30%.                                                                               |
| <b>Wednesday Night</b> | Mostly clear, with a low around 43. West northwest wind 5 to 10 mph becoming light west after midnight.                                                                                                                                                                                |
| <b>Thursday</b>        | Mostly sunny, with a high near 66. Light south southwest wind increasing to 6 to 11 mph in the morning.                                                                                                                                                                                |
| <b>Thursday Night</b>  | Partly cloudy, with a low around 49.                                                                                                                                                                                                                                                   |
| <b>Friday</b>          | Mostly sunny, with a high near 68.                                                                                                                                                                                                                                                     |
| <b>Friday Night</b>    | Partly cloudy, with a low around 47.                                                                                                                                                                                                                                                   |
| <b>Saturday</b>        | Partly sunny, with a high near 62.                                                                                                                                                                                                                                                     |
| <b>Saturday Night</b>  | A chance of showers after 9pm. Mostly cloudy, with a low around 43.                                                                                                                                                                                                                    |
| <b>Sunday</b>          | A chance of showers. Partly sunny, with a high near 61.                                                                                                                                                                                                                                |
| <b>Sunday Night</b>    | A chance of showers. Mostly cloudy, with a low around 48.                                                                                                                                                                                                                              |
| <b>Monday</b>          | A chance of showers. Mostly cloudy, with a high near 70.                                                                                                                                                                                                                               |

Topographic

Click Map For Forecast



 Forecast Area

**Point Forecast:** Ann Arbor MI  
42.29°N 83.73°W (Elev. 764 ft)

**Last Update:** 8:16 am EDT Sep 25, 2018

**Forecast Valid:** 10am EDT Sep 25, 2018-6pm EDT Oct 1, 2018

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

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite 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. Thiers, de Ségur, de Fezensac, de Chambray et le journal inédit 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 Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow et qui rejoignent Orscha et Witebsk, avaient toujours marché avec l'armée.

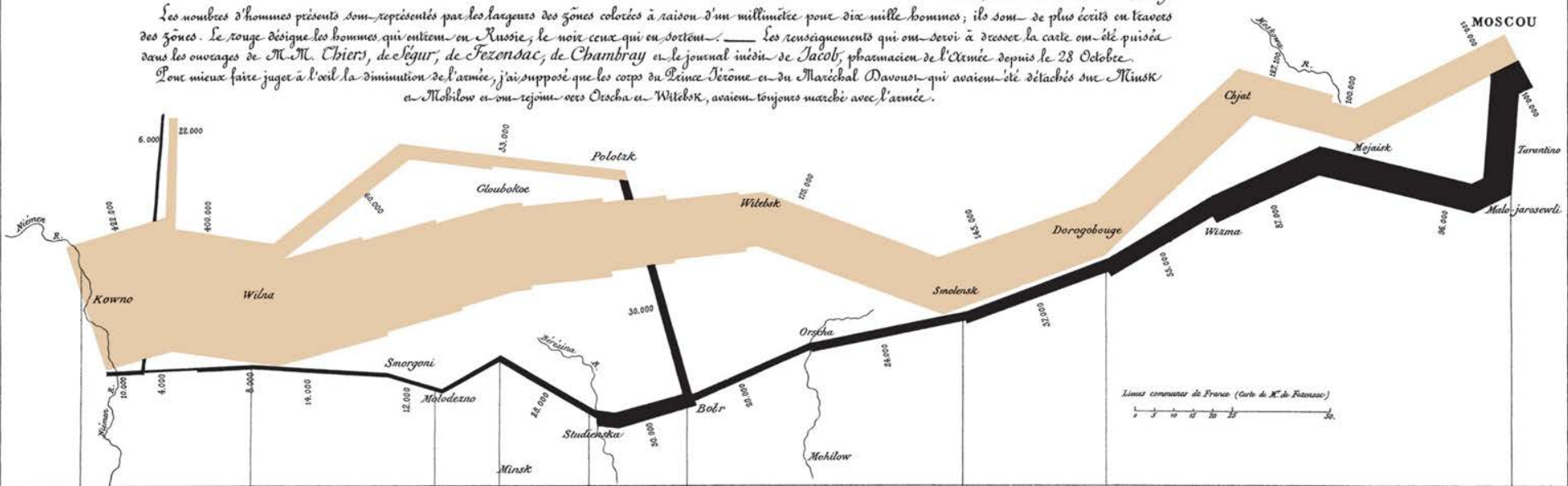
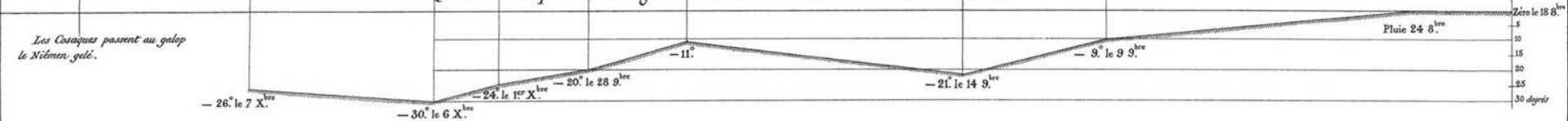
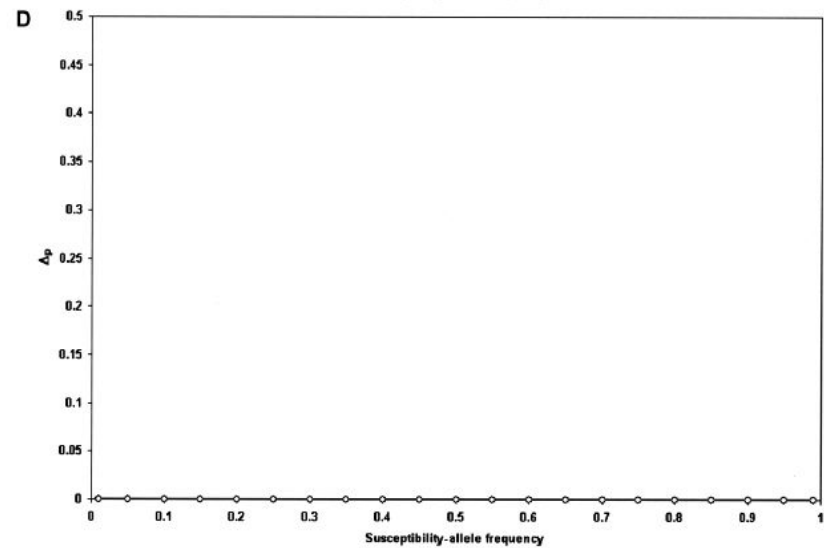
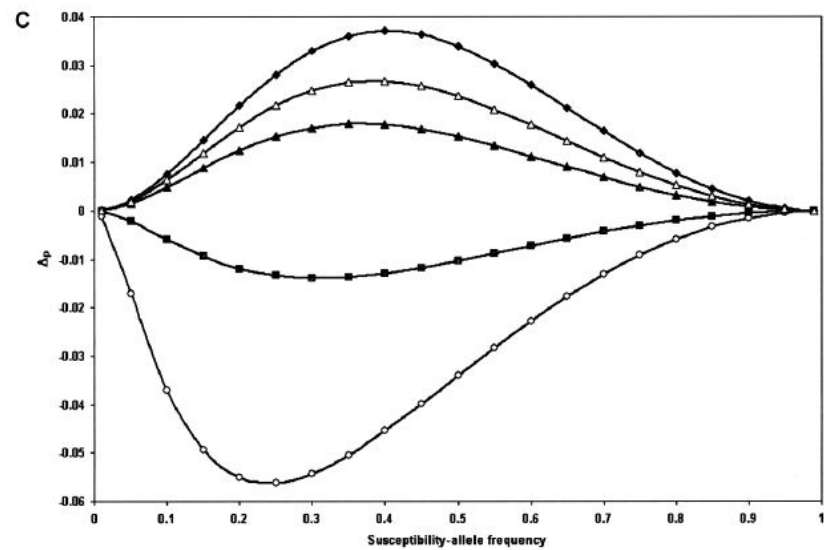


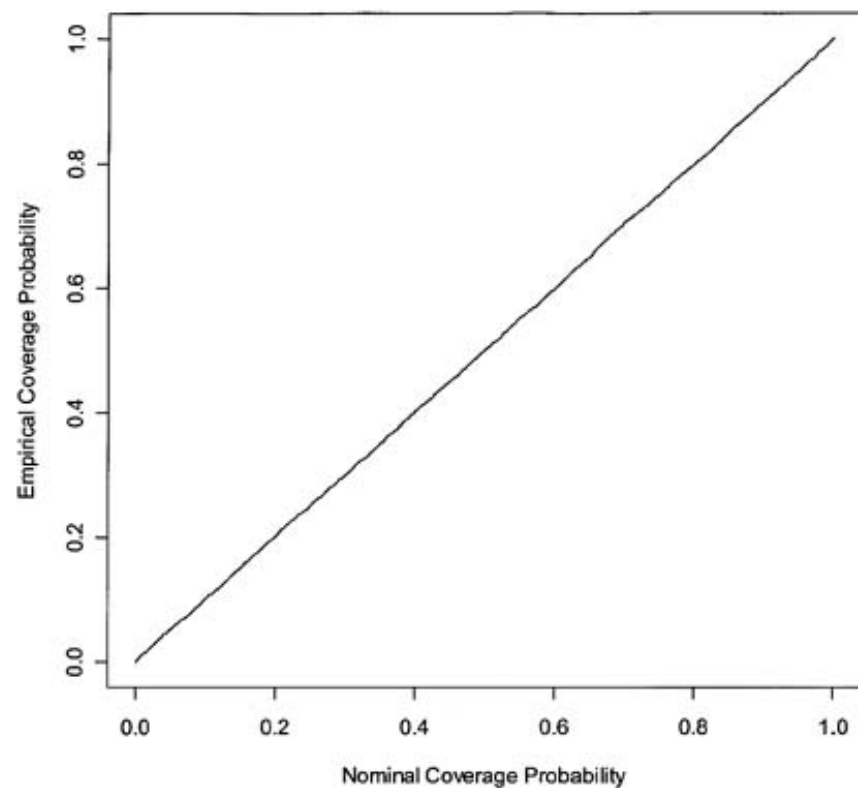
TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.



PRINCIPLES

# Data Density





**Figure 1** Empirical coverage of CIs for the relative-risk parameter  $\beta$  of haplotype 01100. Results are based on 10,000 simulated data sets with the same haplotype frequencies as the FUSION data. Haplotype 01100 has a multiplicative effect on disease risk, with  $\beta = 0.35$ .

| Country       | Refugees from Syria                                      | Percent of Population |
|---------------|----------------------------------------------------------|-----------------------|
| Lebanon       | estimated arrivals: 2.2 million<br>registered: 1,001,051 | 17%                   |
| Germany       | 600,000                                                  | 0.7%                  |
| Sweden        | 110,333                                                  | 1%                    |
| United States | 16,218                                                   | 0.004%                |

Data to Ink Ratio

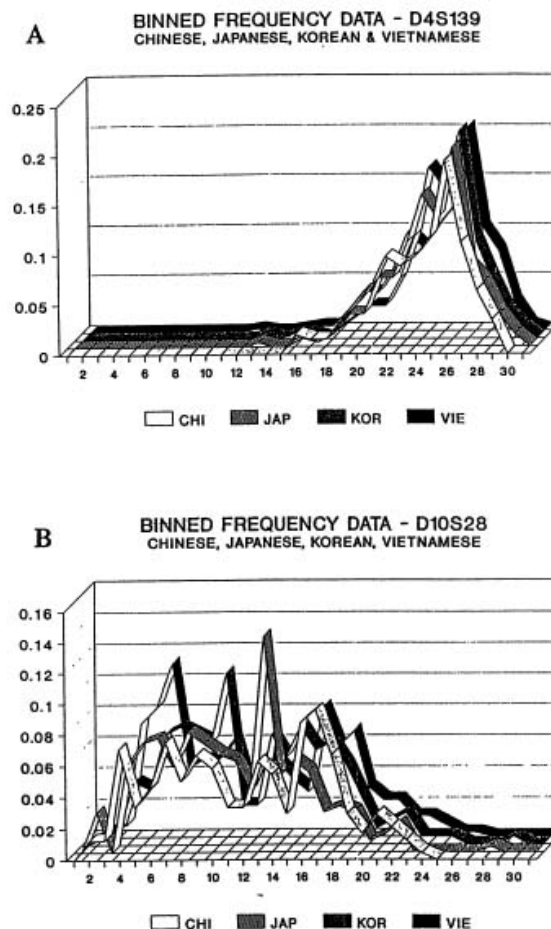
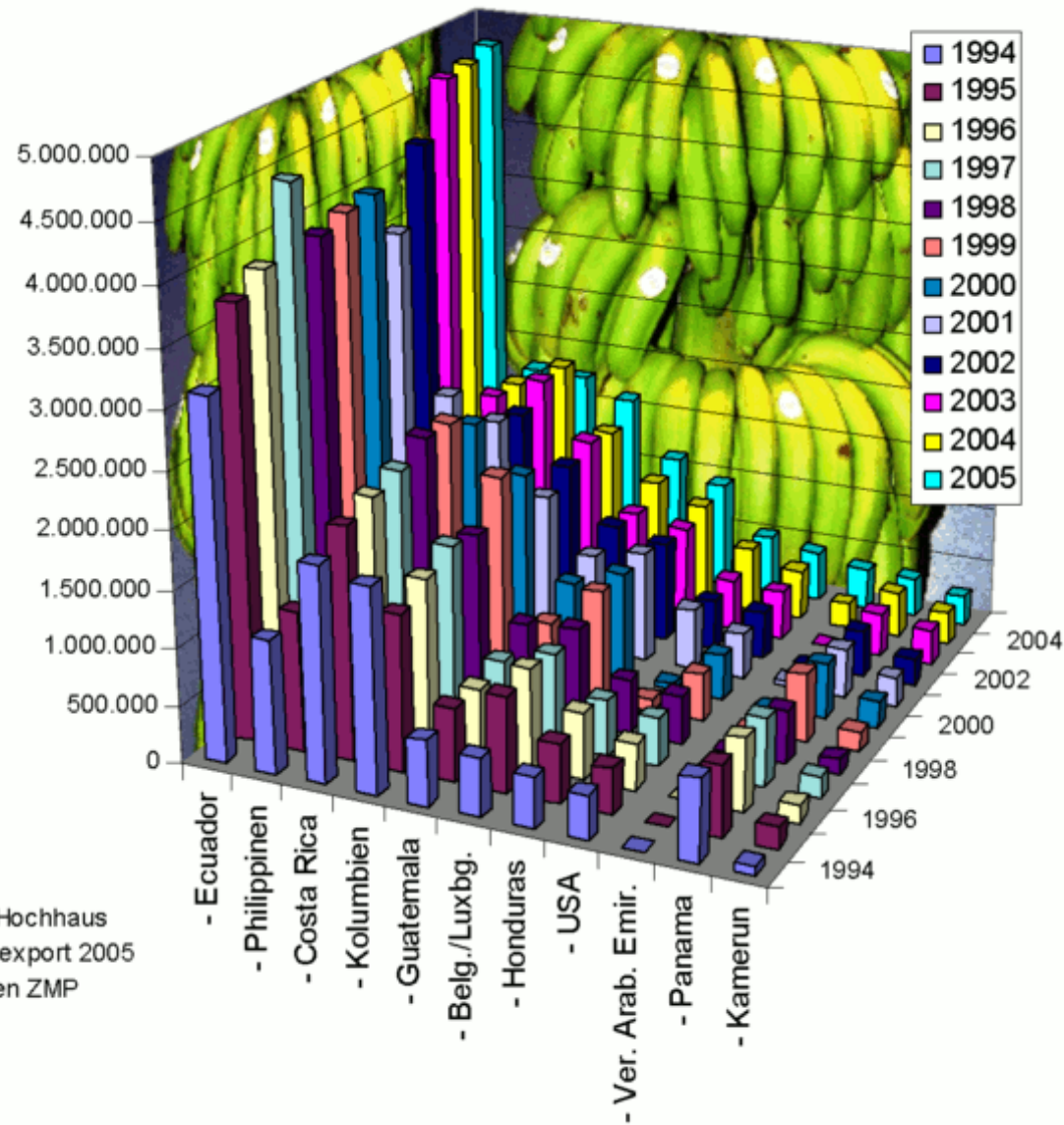


FIG. 4. Fixed bin distribution (histogram) for two loci and four Asian subpopulations (used with permission from John Hartmann): the boundaries of the 30 bins (vertical axis) are determined by the FBI; these bins are not of equal length. Sample sizes (numbers of individuals) for Chinese, Japanese, Korean and Vietnamese are 103, 125, 93 and 215 for D4S139 and 120, 137, 100 and 193 for D10S28. The horizontal axis is the bin number; bins are not of equal length.

# Export von Bananen in Tonnen von 1994-2005



Dr. Hochhaus  
Banexport 2005  
Daten ZMP

Space over Time

# Drought in the New York Times

<http://www.nytimes.com/interactive/2014/upshot/mapping-the-spread-of-drought-across-the-us.html>

<http://www.nytimes.com/interactive/2012/07/20/us/drought-footprint.html>

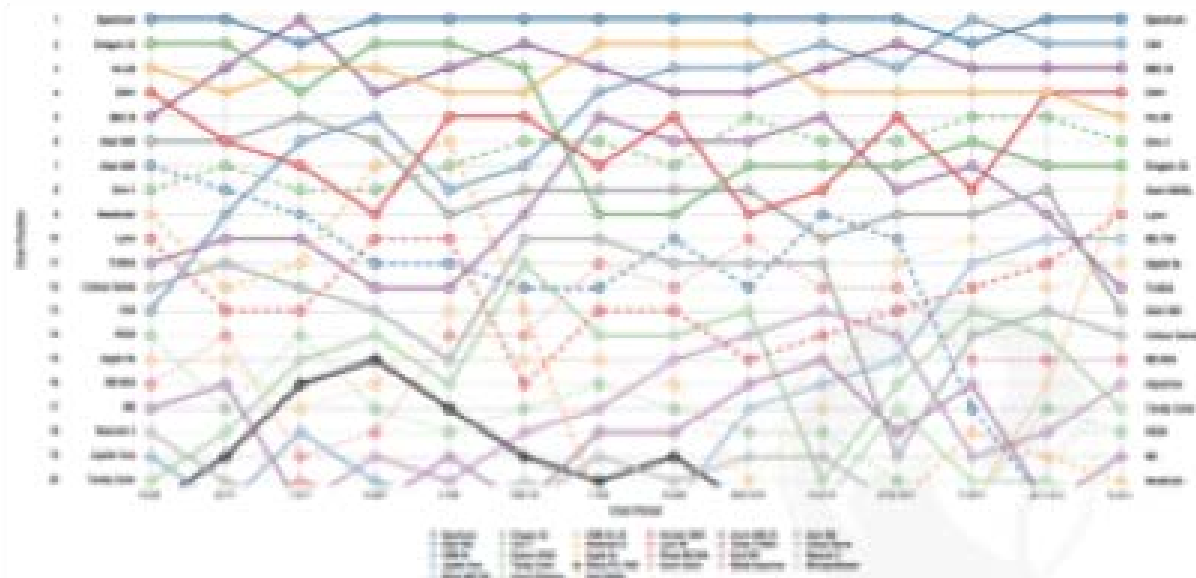
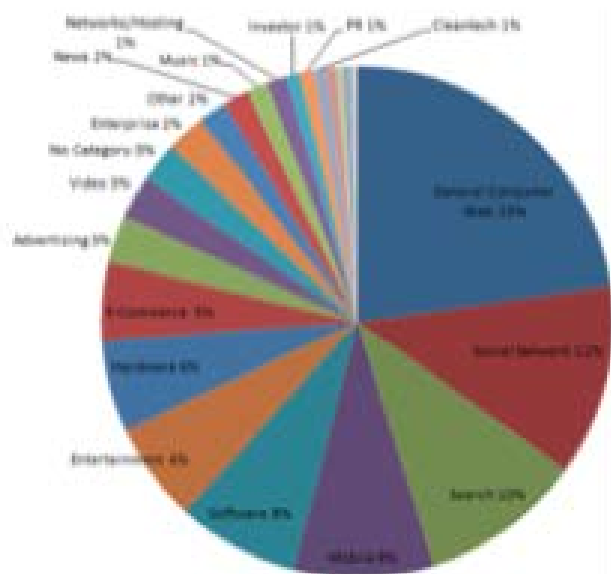
# Layering/Grouping





|   |                       |
|---|-----------------------|
| 5 | 4                     |
| 4 | 5                     |
| 3 | 1, 2, 4, 6, 7         |
| 2 | 0, 4, 4, 6.5, 7, 7, 8 |
| 1 | 1, 5                  |

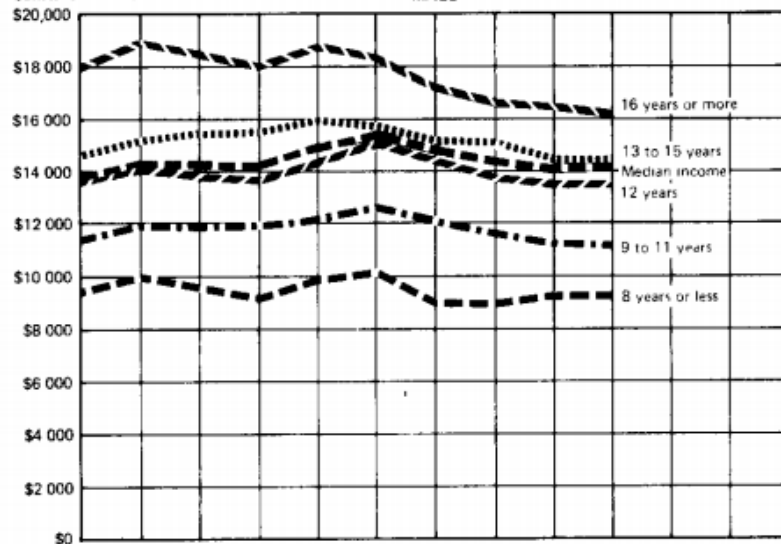
Total hot dogs  
eaten in 10  
minutes.



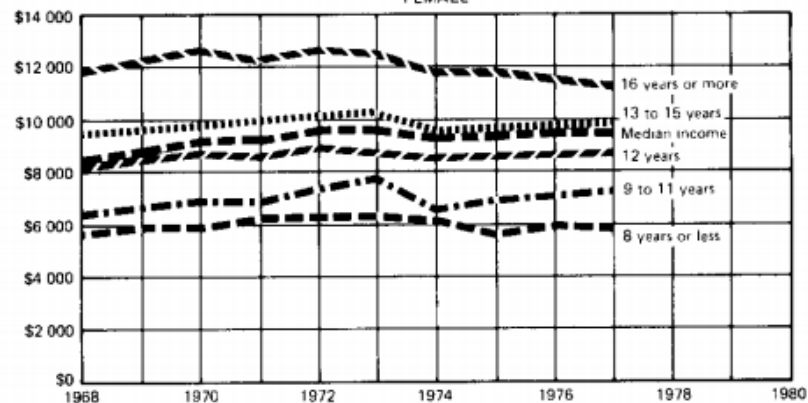
**Median Income of Year-Round, Full-Time  
Workers 25 to 34 Years Old, by Sex and  
Educational Attainment, 1968-1977**

Constant 1977 dollars

MALE



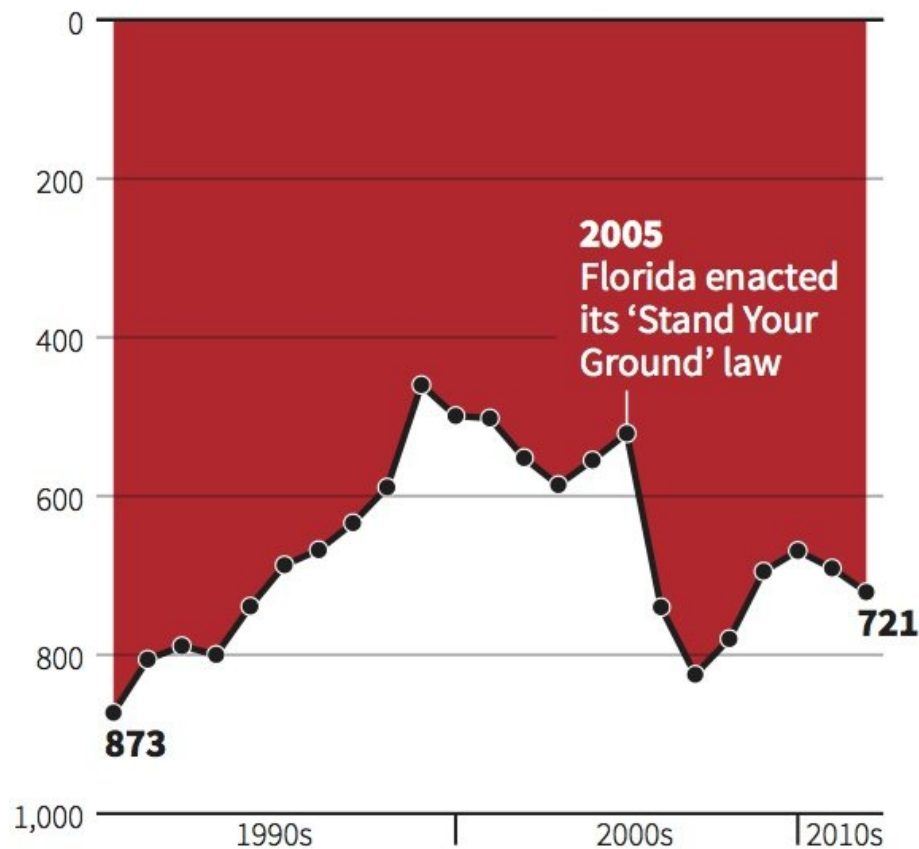
FEMALE



# Accuracy in Representation

# Gun deaths in Florida

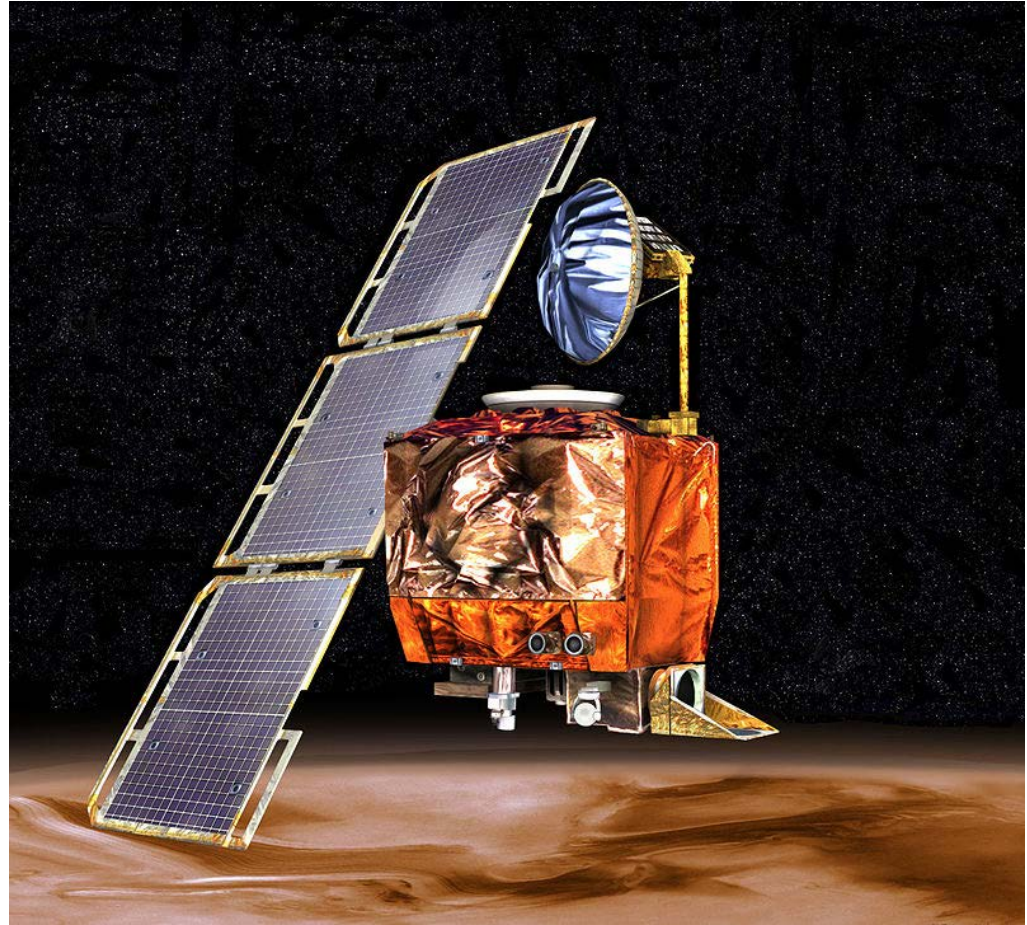
Number of murders committed using firearms



Source: Florida Department of Law Enforcement

# Mars Climate Orbiter

- Mass: 338 kilograms (745 lb)
- Power: 500 watts
- Cost: \$125 Million
- Launched: December 11, 1998
- Crashed: September 23, 1999



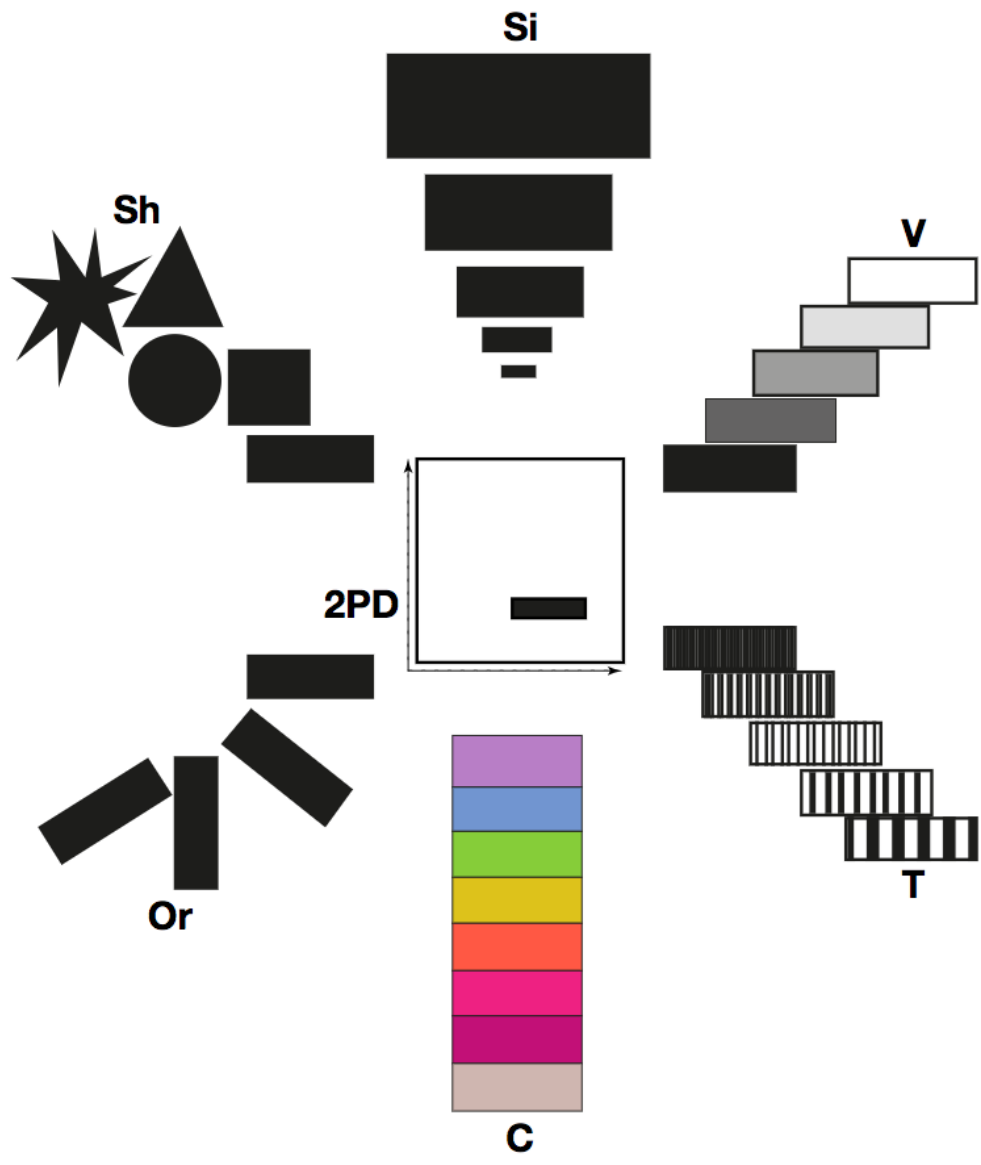
## Per capita consumption of margarine (US)

[Upload this image to imgur](#)

**Correlation: 0.992558**



VISUALIZING



| LEVEL OF THE RETINAL VARIABLES |                                                           |                                                                          |                                                     |                                                                        |
|--------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------|
| PLANAR DIMENSIONS              | ASSOCIATION<br>≡<br>The marks can be perceived as SIMILAR | SELECTION<br>≠<br>The marks are perceived as DIFFERENT, forming families | ORDER<br>○<br>The marks are perceived as ORDERED    | QUANTITY<br>Q<br>The marks are perceived as PROPORTIONAL to each other |
|                                |                                                           |                                                                          |                                                     |                                                                        |
| SIZE                           |                                                           |                                                                          |                                                     |                                                                        |
| VALUE                          |                                                           |                                                                          |                                                     |                                                                        |
| TEXTURE                        |                                                           |                                                                          |                                                     |                                                                        |
| COLOR                          |                                                           |                                                                          |                                                     |                                                                        |
| ORIENTATION                    |                                                           |                                                                          |                                                     |                                                                        |
| SHAPE                          |                                                           |                                                                          |                                                     |                                                                        |
|                                |                                                           |                                                                          | Conventions leading to the ELEMENTARY READING LEVEL |                                                                        |