

Data Visualisation

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[@ente_uta](#)



THE UNIVERSITY
of EDINBURGH

design
informatics



Visual+
Interactive
Data

outline for today

- What is data visualisation?
- How are data visualisations created?
- What is the purpose of data visualisation?
- Visualisation to facilitate research processes
- Critical perspectives on data visualisation
- Additional pointers
 - Visualization tools
 - Readings

what is data visualisation?

what is data visualization?

Data and information visualization is concerned with showing quantitative and qualitative information, so that a viewer can see patterns, trends or anomalies, constancy or variation, in ways that other forms—text and tables—do not allow.

Michael Friendly, 2008

M. Friendly. The Golden Age of Statistical Graphics. *Statistical Science*, 2008, Vol.23, No. 4, 502-535.

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showing trends, patterns, and anomalies

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

Anscombe's Quartet

showing trends, patterns, and anomalies

- Some statistical measures

- Mean

- $x = 9.0$
- $y = 7.5$

- Variance

- $x = 10$
- $y = 3.75$

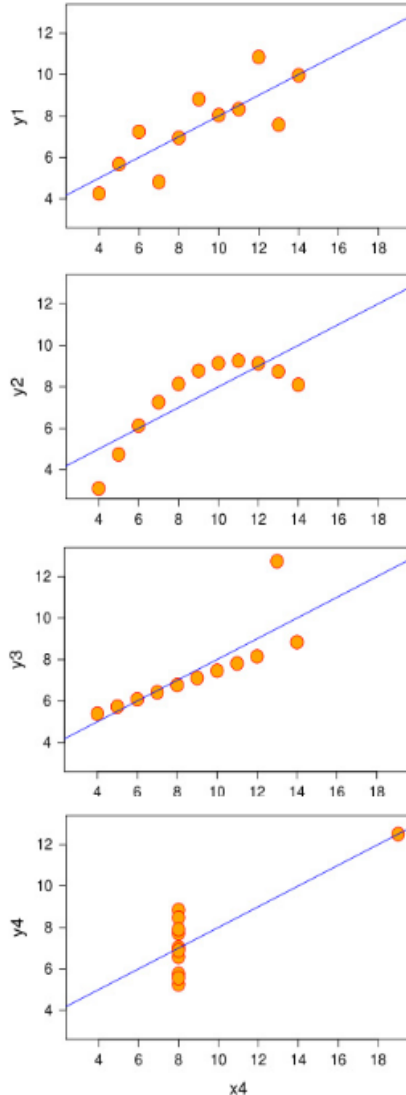
- Correlation

- 0.816

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
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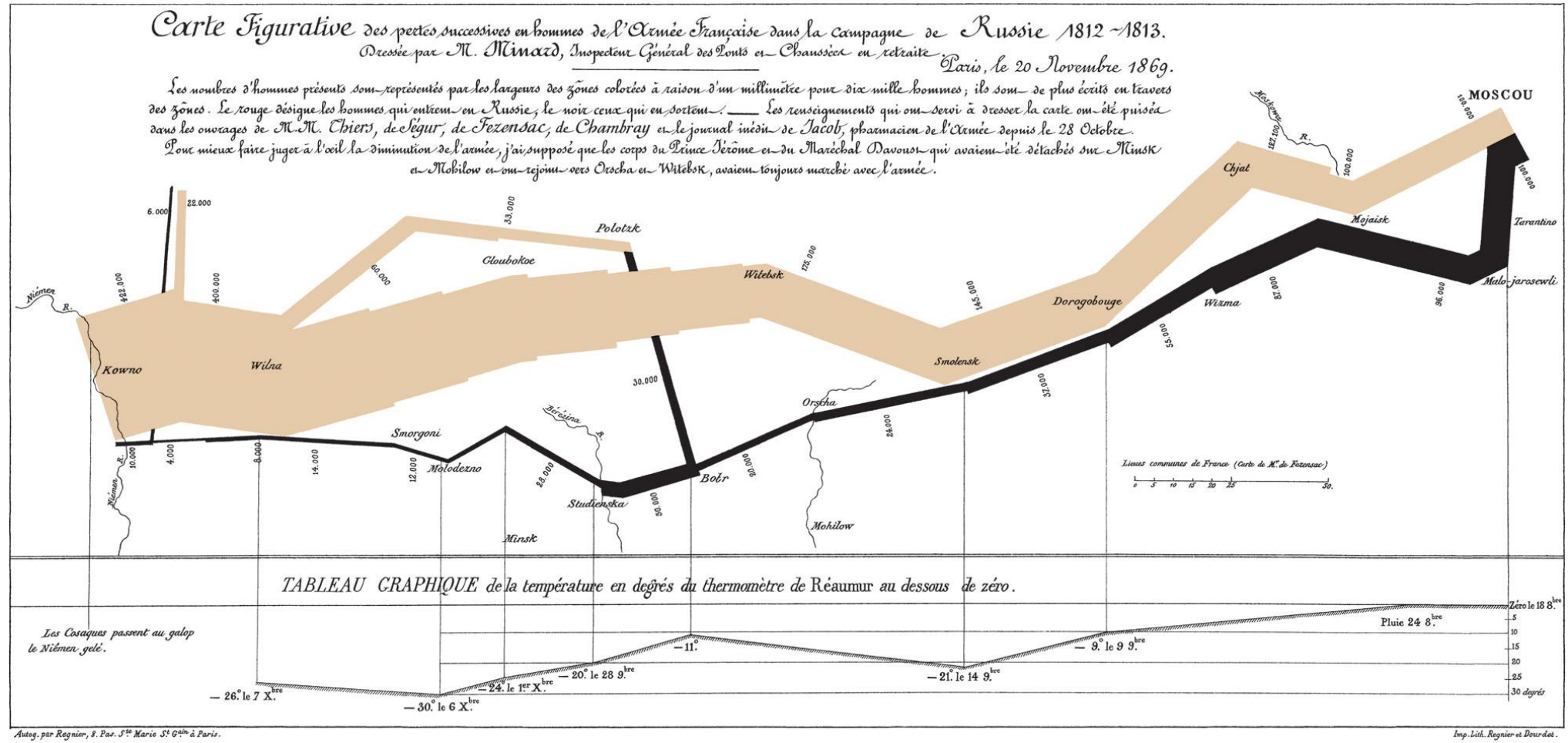
showing trends, patterns, and anomalies



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
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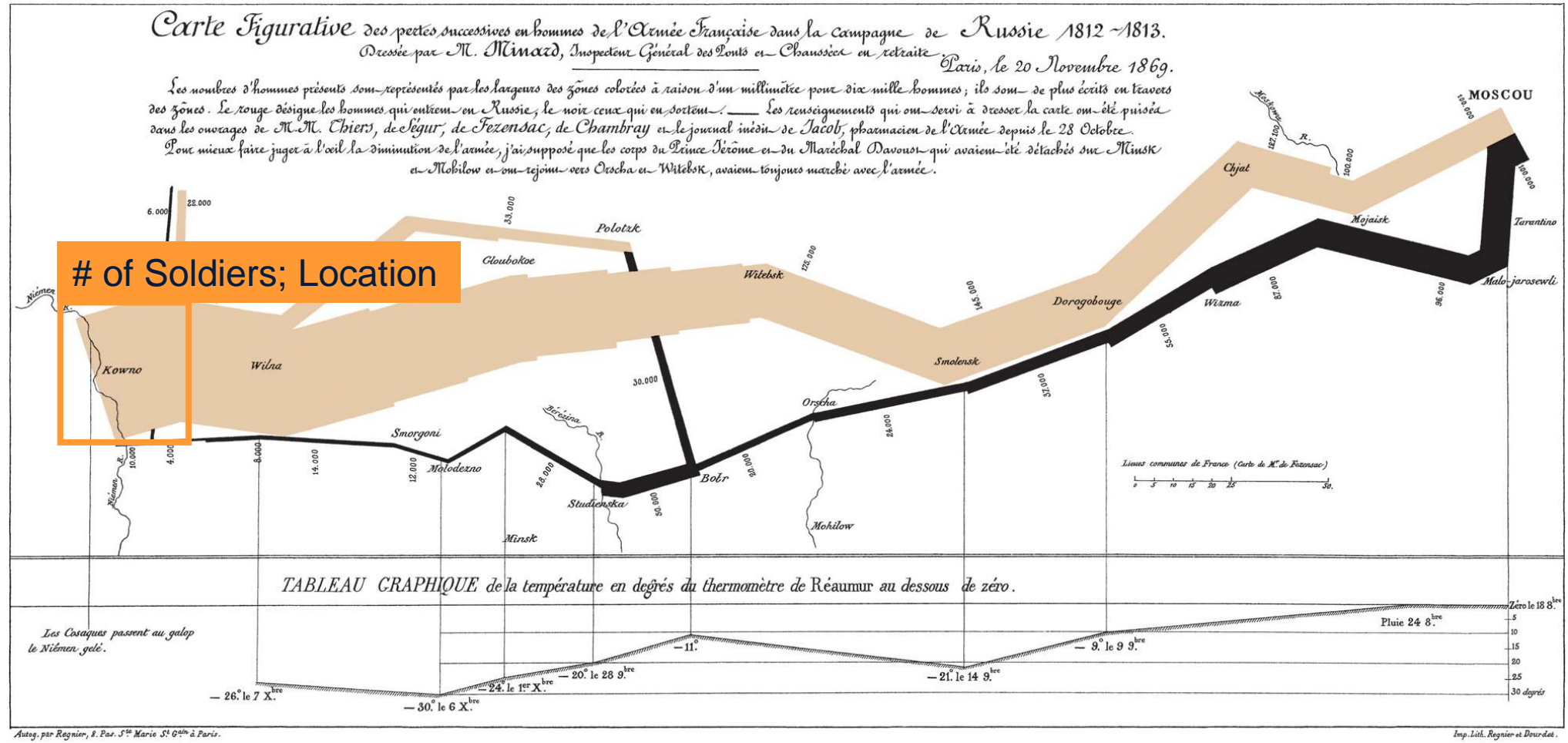
historic examples



Charles Minard's map of Napoleon's disastrous Russian campaign of 1812

http://en.wikipedia.org/wiki/Charles_Joseph_Minard

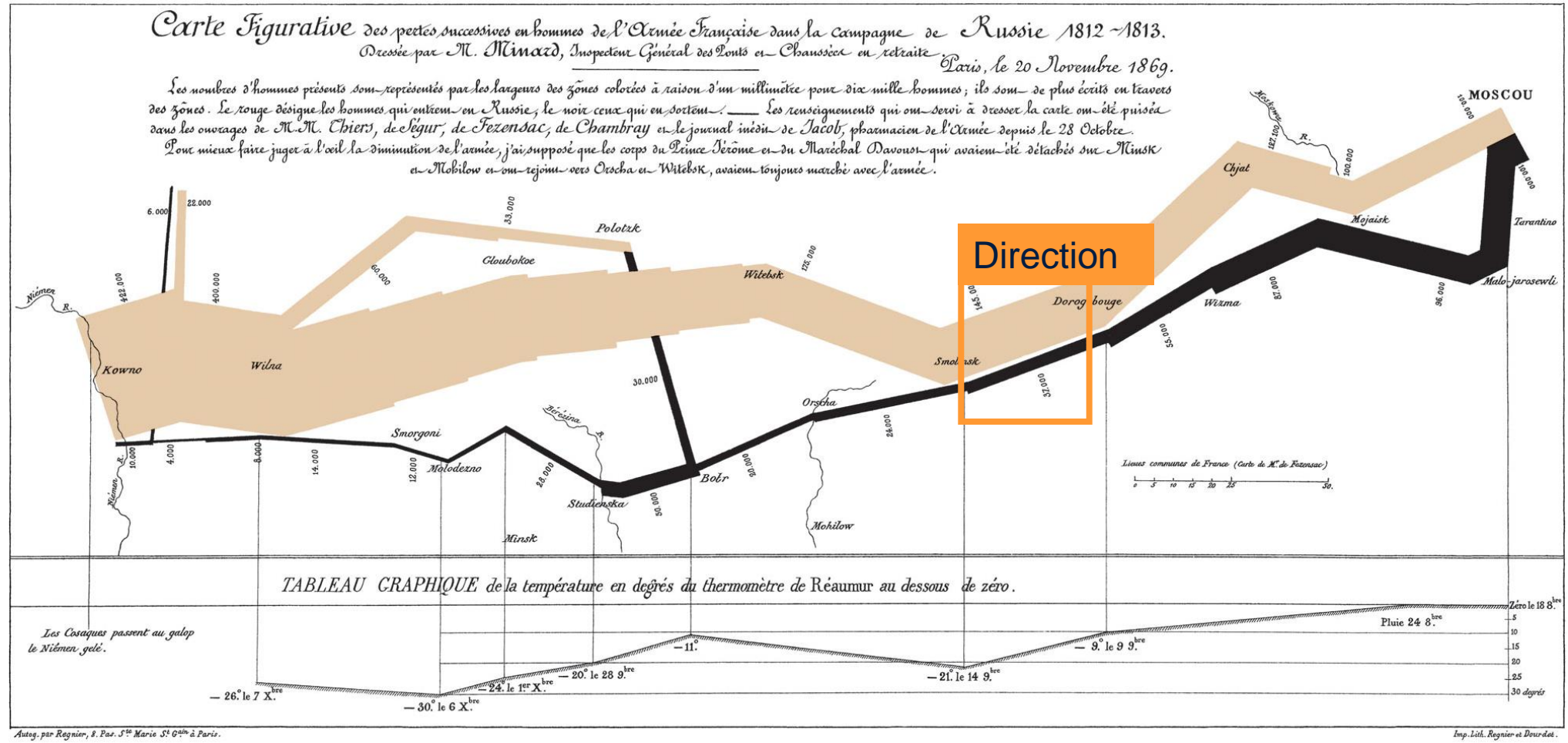
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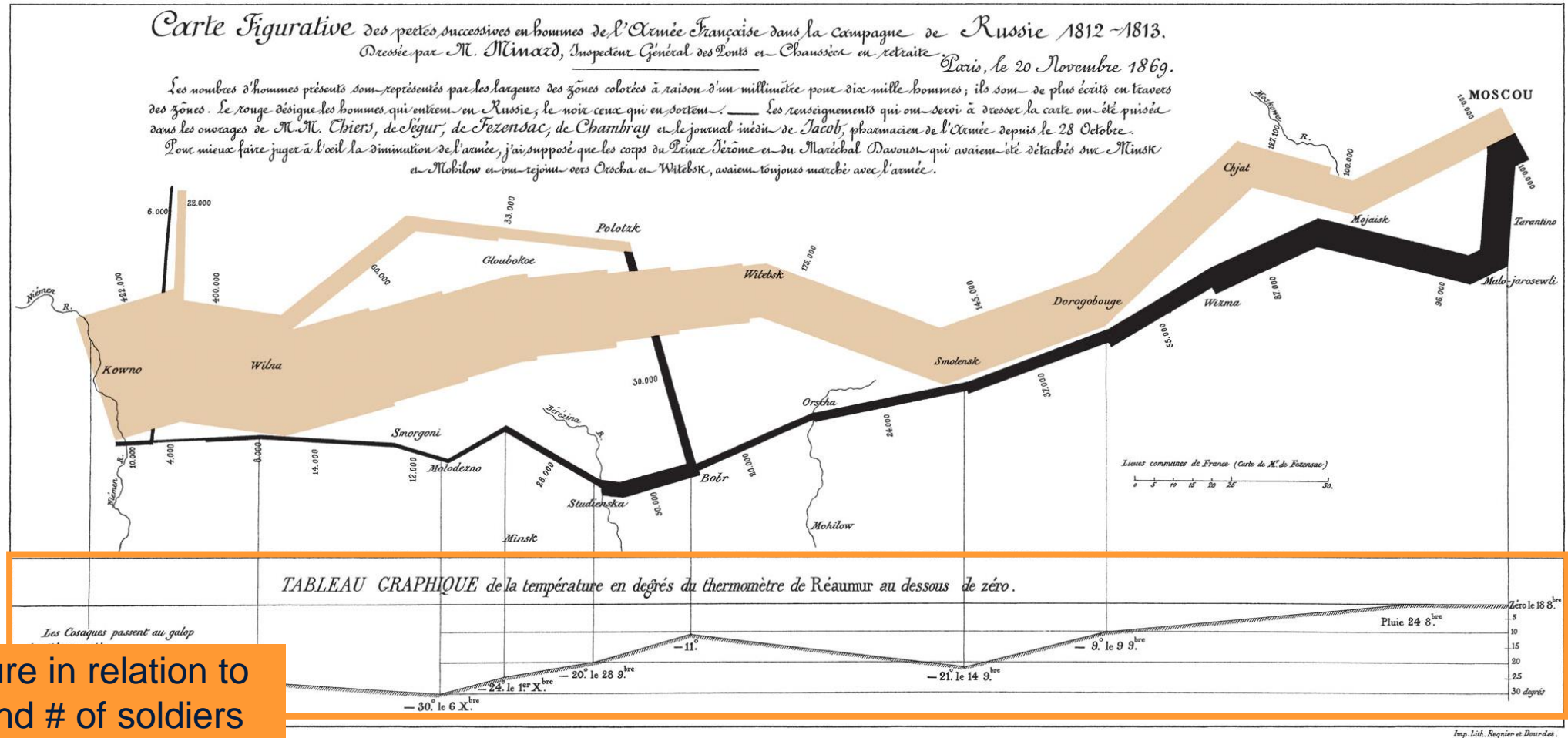
historic examples



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historic examples

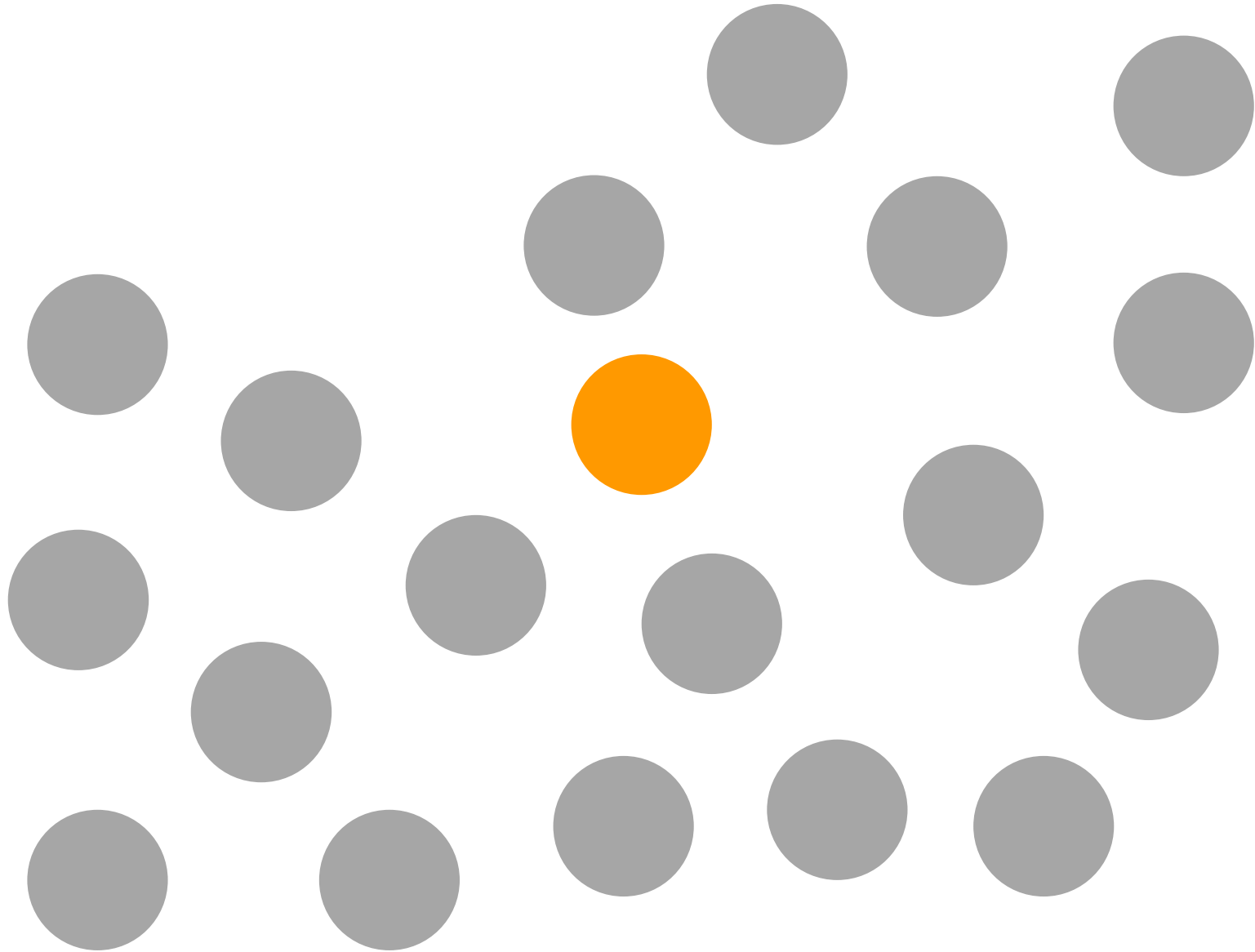


Temperature in relation to location and # of soldiers

Charles Minard's map of Napoleon's disastrous Russian campaign of 1812
http://en.wikipedia.org/wiki/Charles_Joseph_Minard

why is data visualization so powerful?

- Visualization leverages the **human visual system** to facilitate
 - Understanding
 - Discovery
 - Decision making
 - Communication
 - Memory
- Our brain is capable of quick and efficient visual information processing at a **pre-conscious level**



visualizing two quantities

hands-on exercise

- Take a sheet of paper and a pencil
- Given a data set that consists of two quantities: **75** and **37**
- Find as many ways as possible to visualize this data set!
- Sketch your visualisations
- Quantity goes over quality!

45 ways to communicate two quantities

1. writing, number notation



The familiar indo-arabic numerals notation in *a*, and the **babylonian numbers notation** in *b*.

2. squares



3. repeated icon



45 ways to communicate two quantities

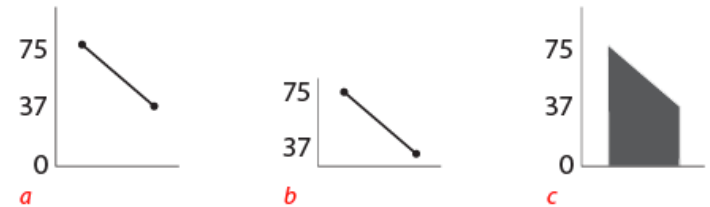
4. hundreds, tens, units, decimals... represented by squares



5. bars



6. line graph

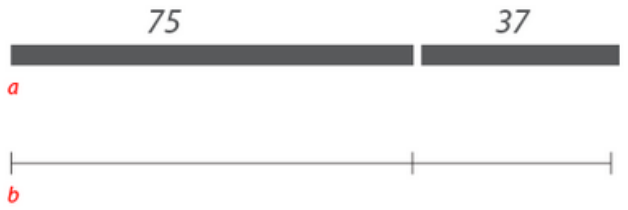


7. percentages bars

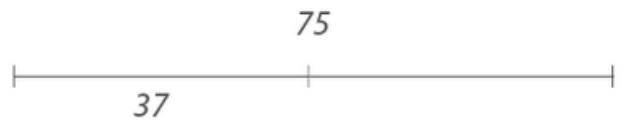


45 ways to communicate two quantities

8. spliced bar

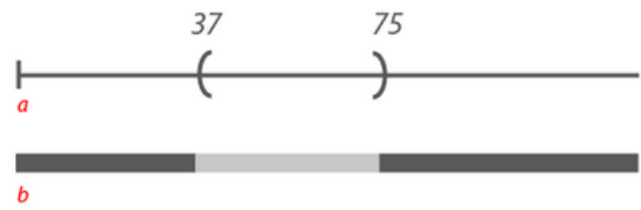


9. proportion

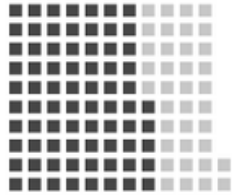


For the case one value is a part of the other.

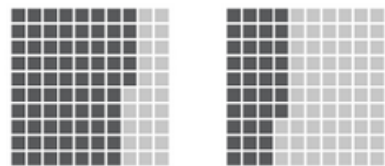
10. interval



11. squares merged



12. percentages in squares



45 ways to communicate two quantities

13. pie charts



14. donut chart



It differs from the pie chart because it can be nested into other donut charts in order to create a more complex visualization.

15. circle areas



16. semi-circle areas



45 ways to communicate two quantities

20. shape divided



21. square surfaces



22. shape surfaces



23. different shape surfaces

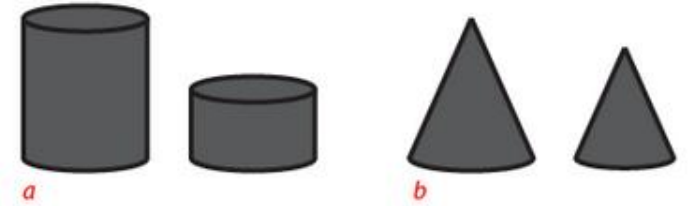


24. icon surfaces



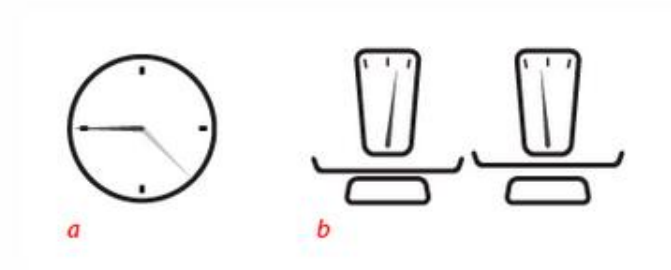
45 ways to communicate two quantities

26. volumes



In *a* the volume is proportional to the object's height, not the case for *b*, which is very difficult to read.

27. special metaphors



...for special units: a gauge for speeds, balances for weights

28. gray tones

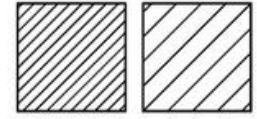


29. color scale



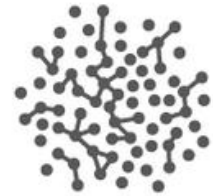
45 ways to communicate two quantities

38. dashed



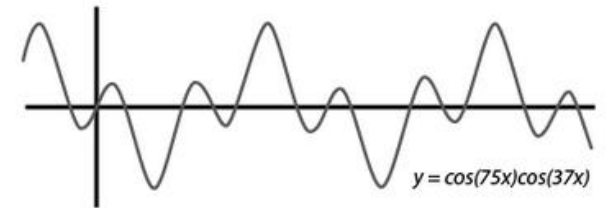
similar to .28 gray tones and .36 density.

39. nodes and connections in a network

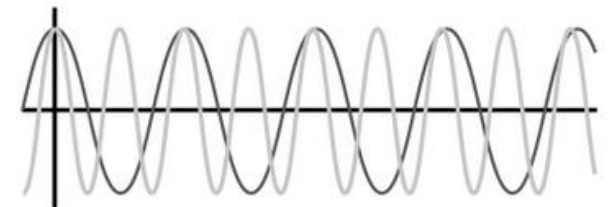


As we don't have more than the quantitative information, this visualization is only a way to have a first glance of the external structure of the network (the relations are chosen randomly).

40. parameters of a mathematical function



41. harmonic frequencies



reflections on the exercise

- There are many, many ways to visualise (even a small) dataset
- There is no “best” way to visualise a dataset!
- Visualisation design depends on
 - Data semantics: what do the numbers stand for?
 - Size of the dataset: the number of data points
 - The context in which the data is to be interpreted
 - The audience who will read and interpret the data
 - The messages/stories to be conveyed
- Visualisations are subjective and situated!

how are data visualisations created?

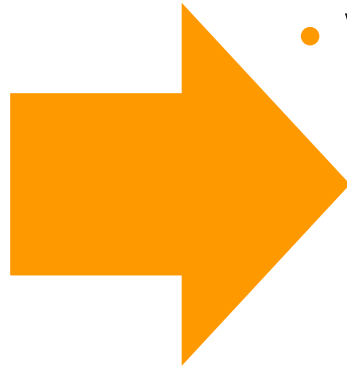
data attributes

- Data attributes
 - Categorical (e.g., movie genre, countries, types of animals...)
 - Ordered (e.g., rankings of all sorts, shirt sizes S, M, L...)
 - Quantitative (e.g., temperature, height, stock prices, word counts...)

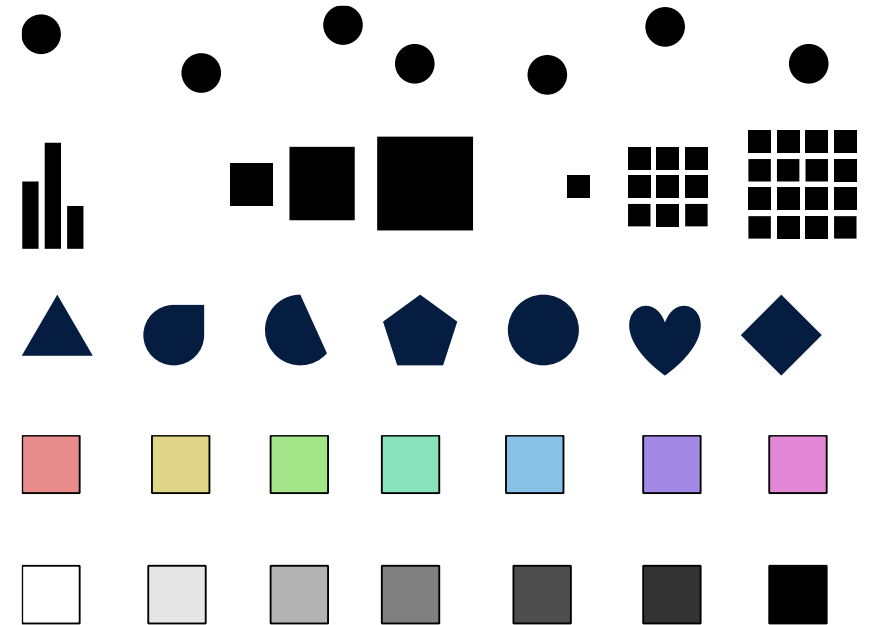
data attributes & visual variables

- Data attributes
 - Categorical
 - Ordered
 - Quantitative

Visual Mapping

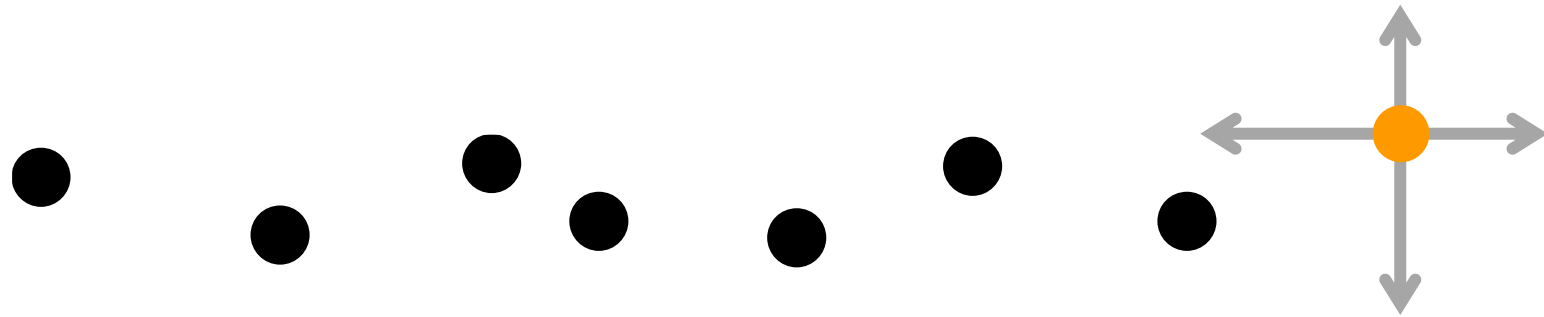


- Visual marks
 - Position
 - Size
 - Shape
 - Colour
 - Brightness



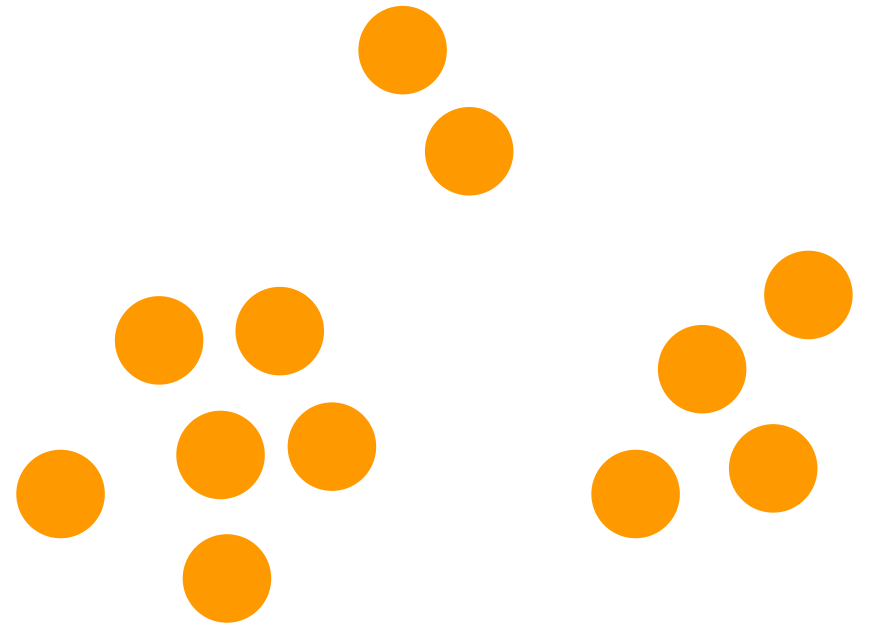
perceptual qualities of visual variables

- Position
 - Order can be perceived
 - Quantitative differences can be perceived



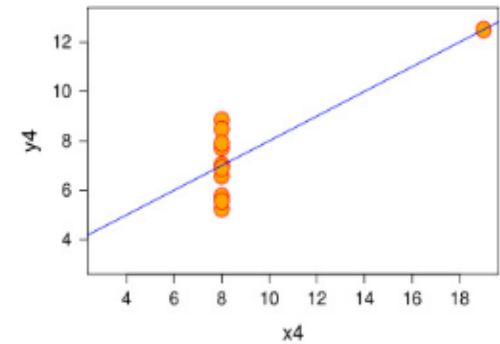
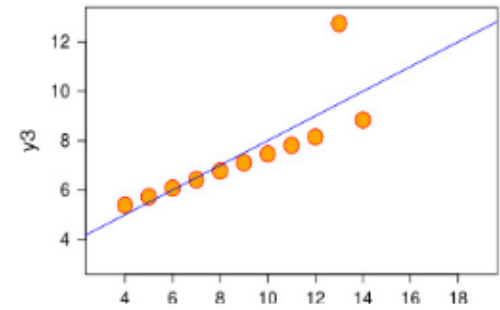
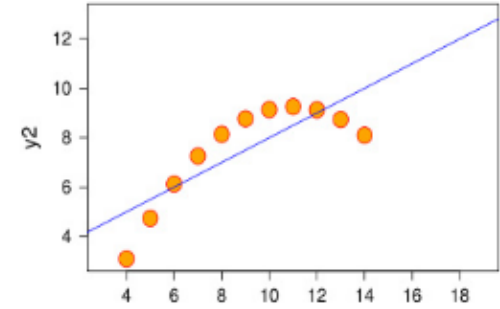
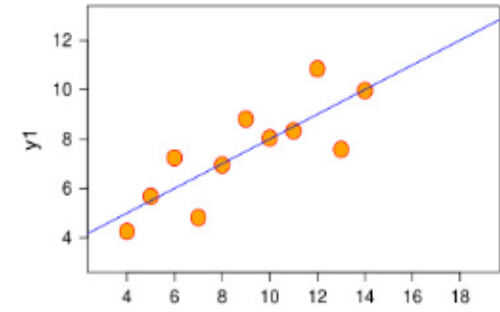
perceptual qualities of visual variables

- Position
 - Order can be perceived
 - Quantitative differences can be perceived
 - Groupings and distinctions between groups can be perceived
 - Scales well to large data sets



example use of position

- Scatterplot



perceptual qualities of visual variables

- Size: changes in length, area, repetition
 - Order can be perceived



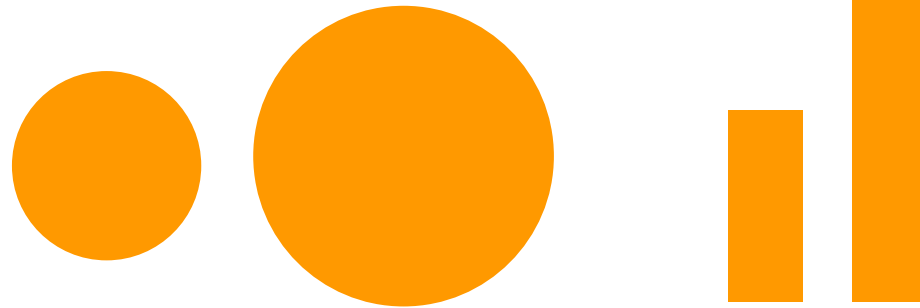
perceptual qualities of visual variables

- Size: changes in length, area, repetition
 - Order can be perceived
 - Quantitative differences can be perceived, BUT it depends on how size is used



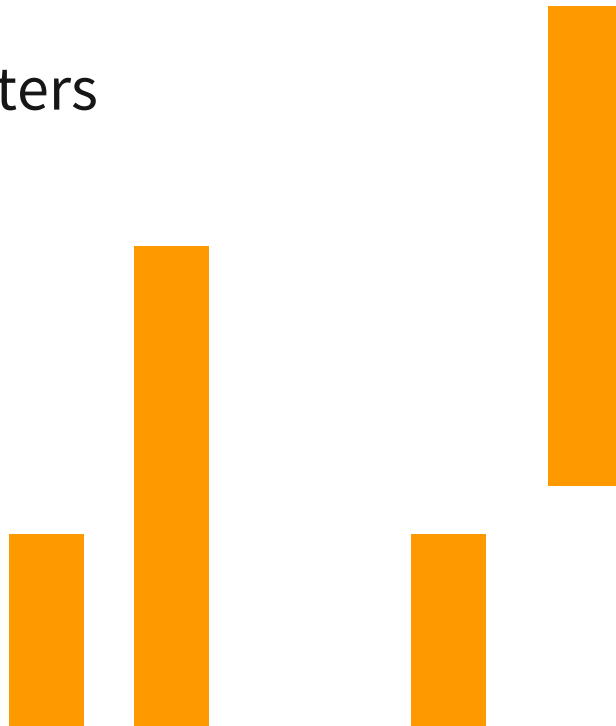
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- Size: changes in length, area, repetition
 - Order can be perceived
 - Quantitative differences can be perceived, BUT it depends on how size is used
 - Choice of mapping matters



perceptual qualities of visual variables

- Size: changes in length, area, repetition
 - Order can be perceived
 - Quantitative differences can be perceived, BUT it depends on how size is used
 - Choice of mapping matters
 - Alignment matters



perceptual qualities of visual variables

- Colour (hue)
 - Order cannot be perceived at a pre-conscious level (without a legend)
 - Quantitative differences cannot be perceived



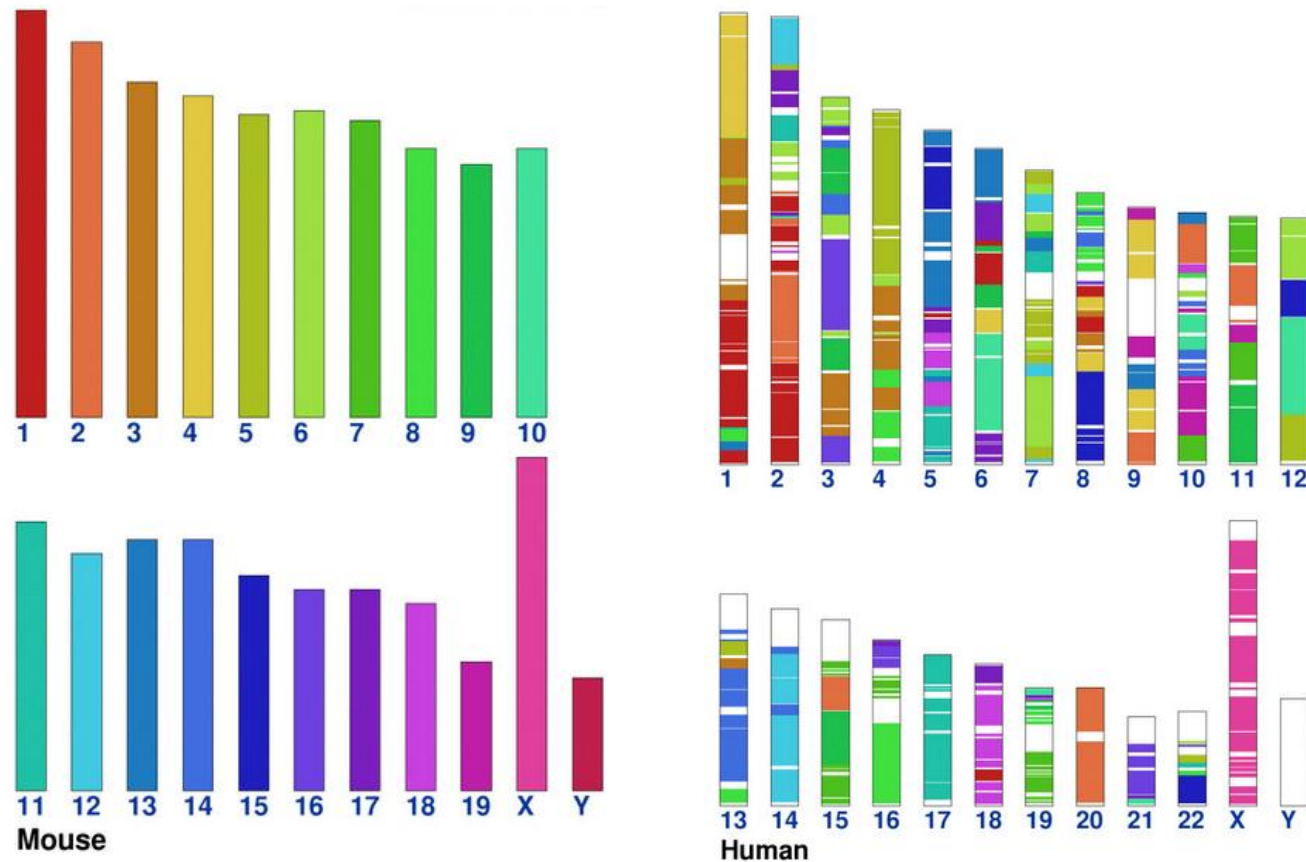
perceptual qualities of visual variables

- Colour (hue)
 - Order cannot be perceived (without a legend)
 - Quantitative differences cannot be perceived
 - Groupings and distinctions between groups can be perceived (within limits)



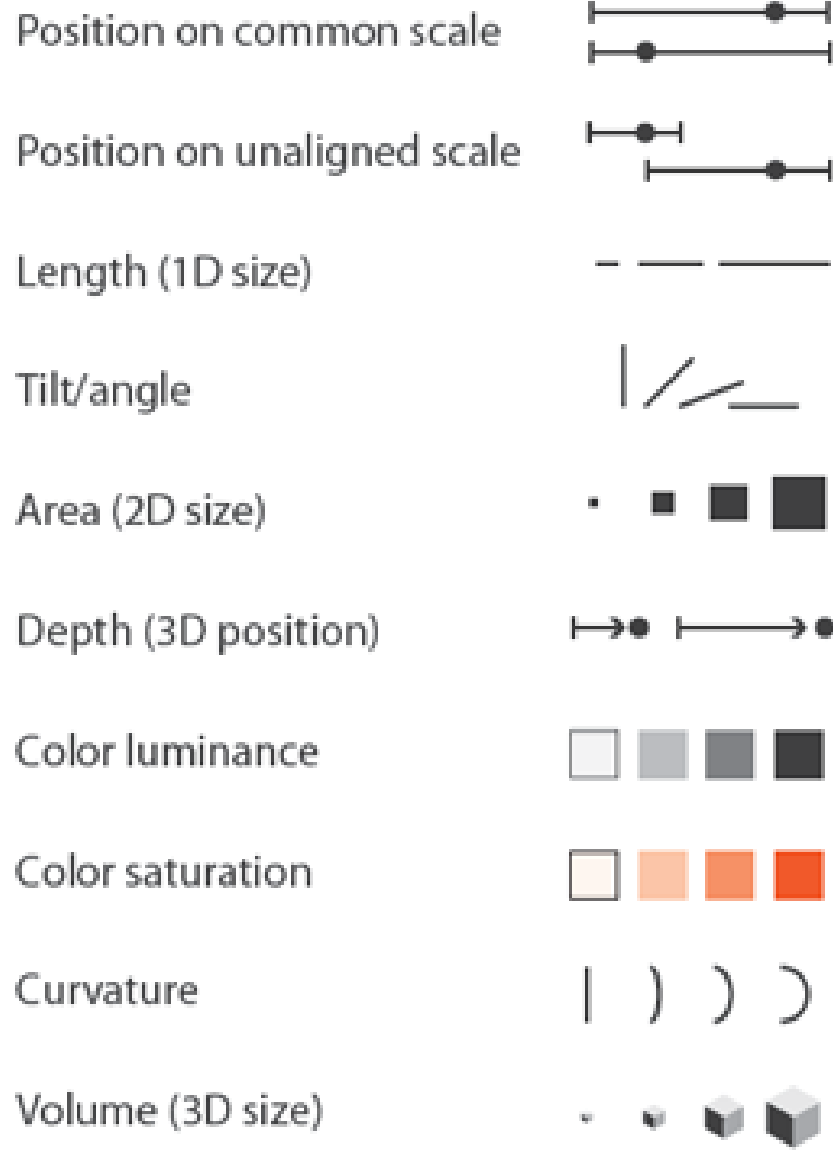
perceptual qualities of visual variables

- Colour



Channels: Expressiveness Types and Effectiveness Ranks

➔ Magnitude Channels: Ordered Attributes



➔ Identity Channels: Categorical Attributes



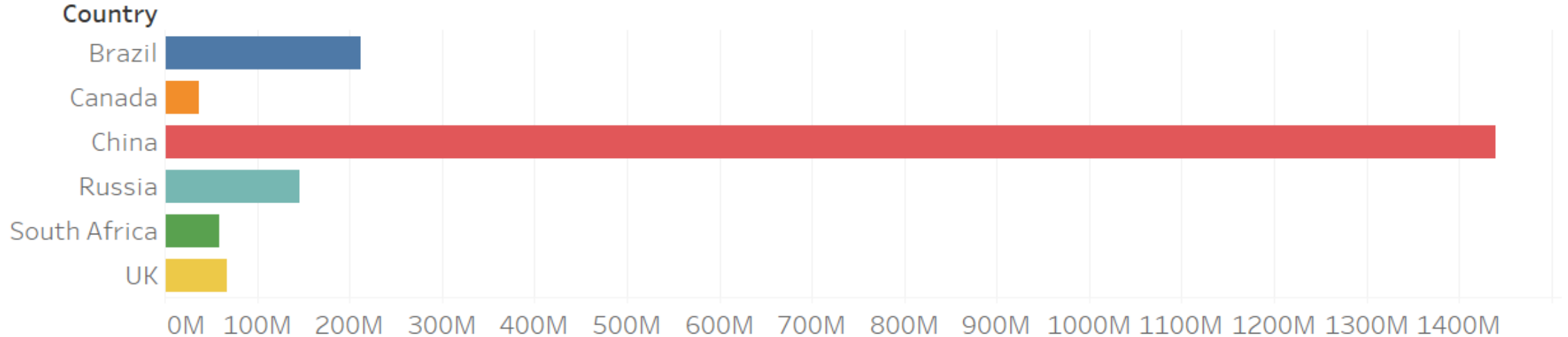
design principles of visualisations

- Expressiveness principle
- Effectiveness principle

design principles of visualisations

- Expressiveness principle

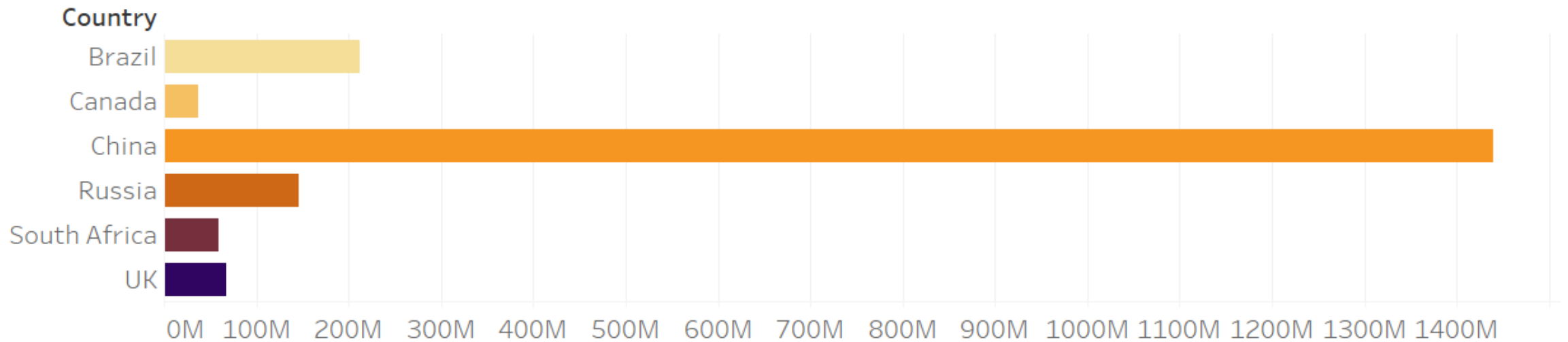
The visual encoding should express all of, and only, the information in the dataset attributes.



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design principles of visualisations

- Expressiveness principle

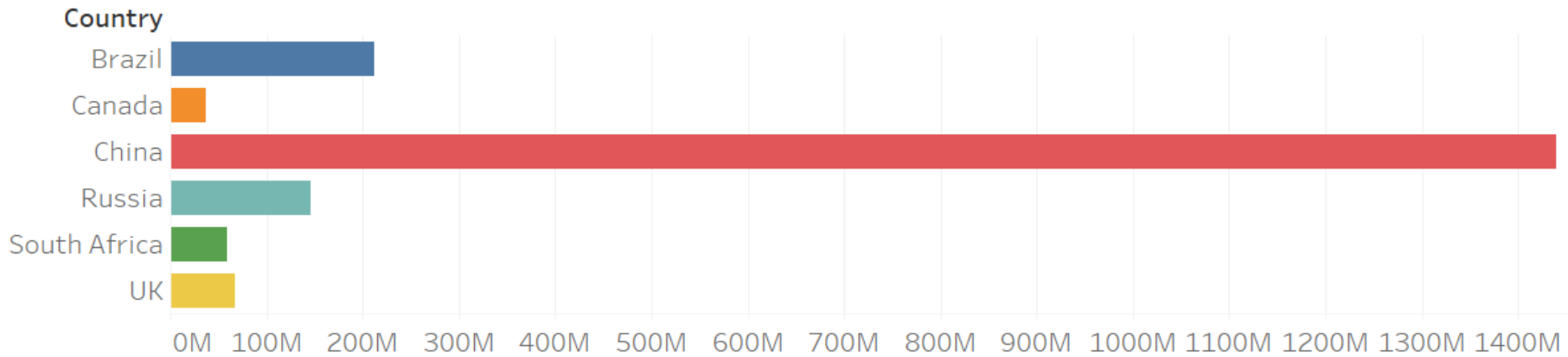
The visual encoding should express all of, and only, the information in the dataset attributes.

- Effectiveness principle

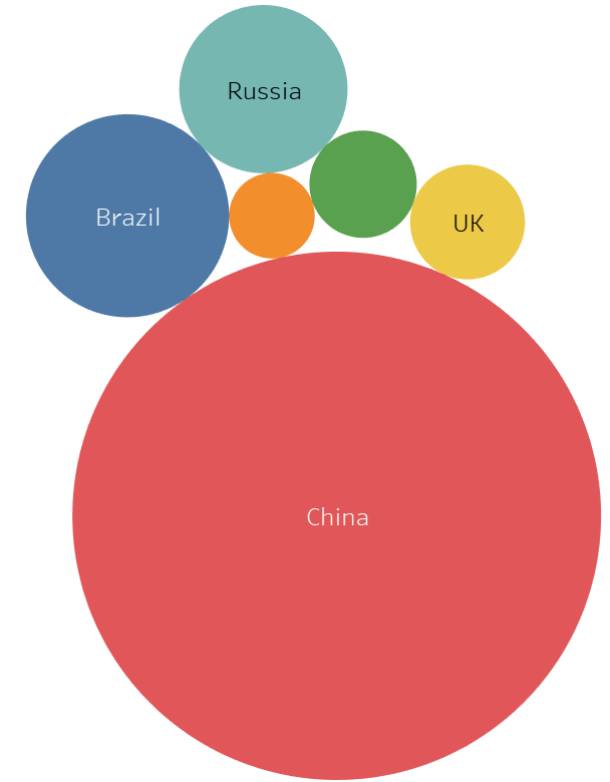
The importance of the data attribute should be encoded with the most effective visual variable, in order to be noticeable.

Which visualisation could be considered more effective?

Population of different countries.



Bar chart



Bubble chart

what is the purpose of data visualisation?

what is the purpose of data visualisation?

Data visualization is the graphical display of abstract information for two purposes: sense-making (also called data analysis) and communication.

Stephen Few

Data Visualisation for Human Perception.

The Encyclopedia of Human-Computer Interaction, 2nd Edition

<https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/data-visualisation-for-human-perception>

what is the purpose of data visualisation?

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Stephen Few

Data Visualisation for Human Perception.

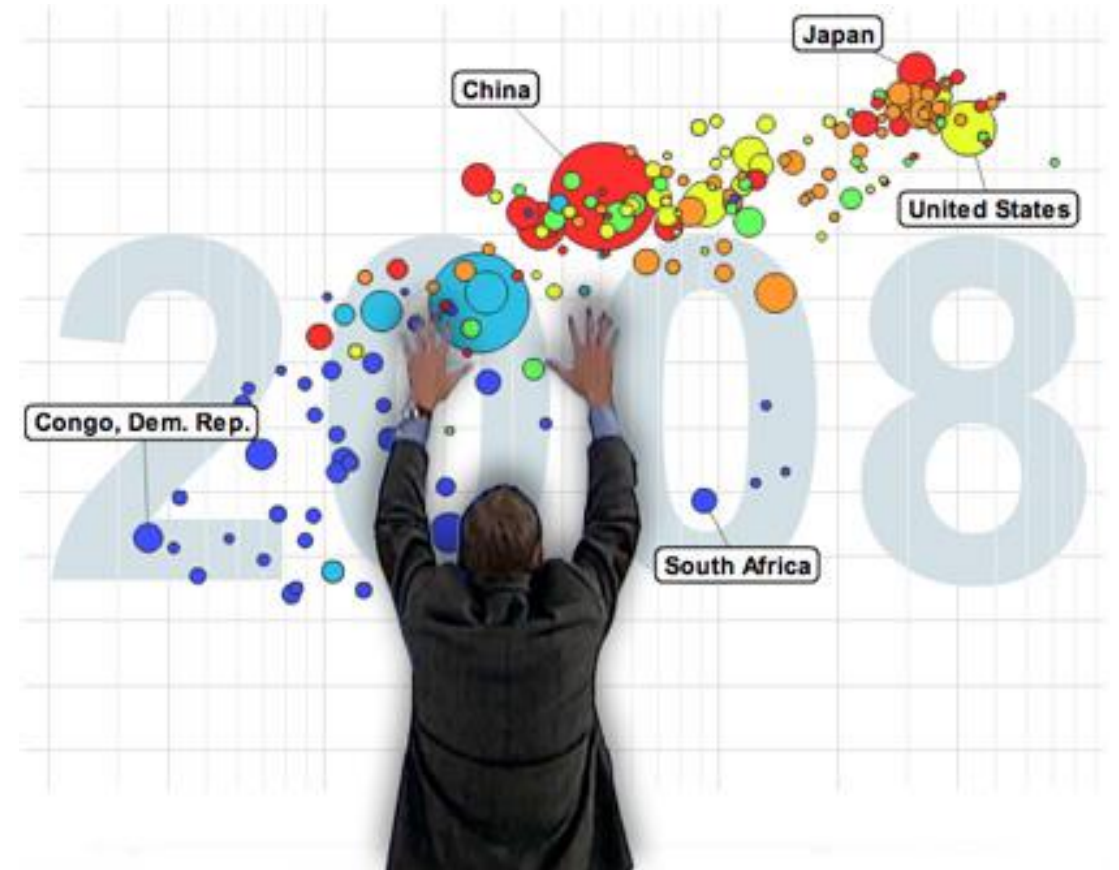
The Encyclopedia of Human-Computer Interaction, 2nd Edition

<https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/data-visualisation-for-human-perception>

visualization for communication

- Communication & explanation are in focus
- To present a story/message/fact
- Clearly defined message
- Clear focus – less is more
- Limited interaction to support message

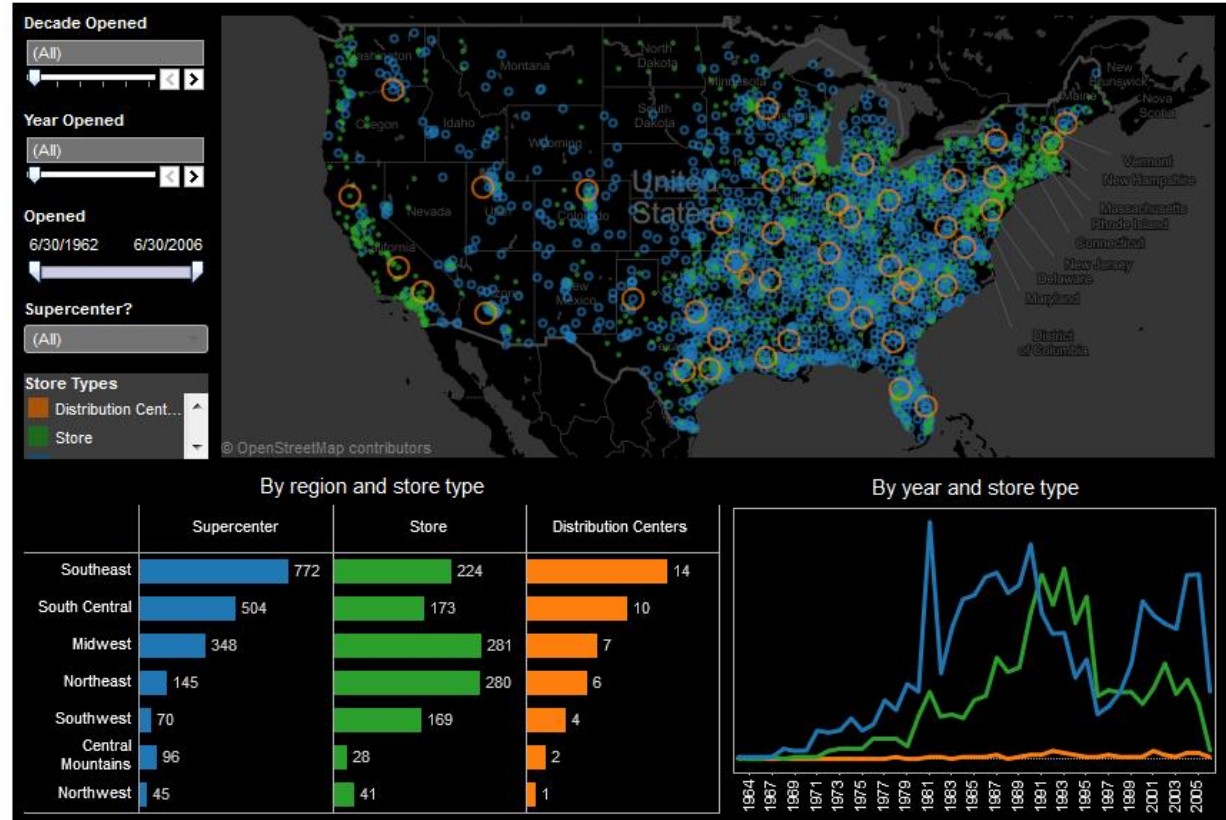
→ **Author-driven visualisation**



Hans Rosling; Gapminder
<https://www.gapminder.org/>
<https://www.youtube.com/watch?v=hVimVzgtD6w>

visualisation for sensemaking

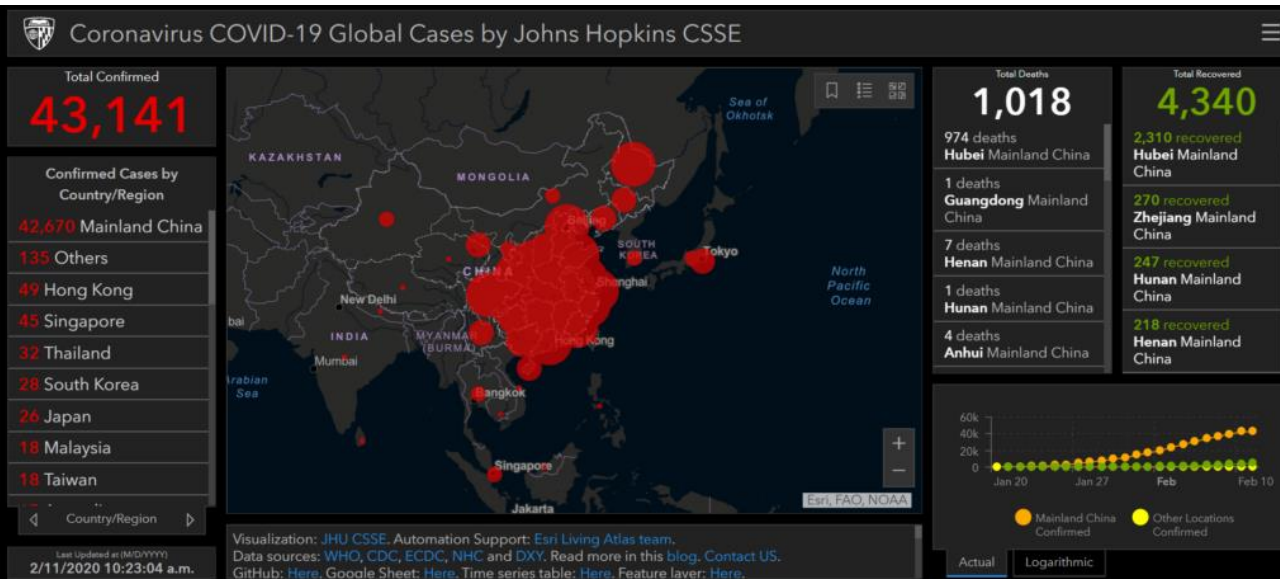
- Exploration & discovery are in focus
 - To discover something new
 - Open-ended goals
 - Multiple views on the data
 - Interactivity is important
- **Reader-driven visualisation**



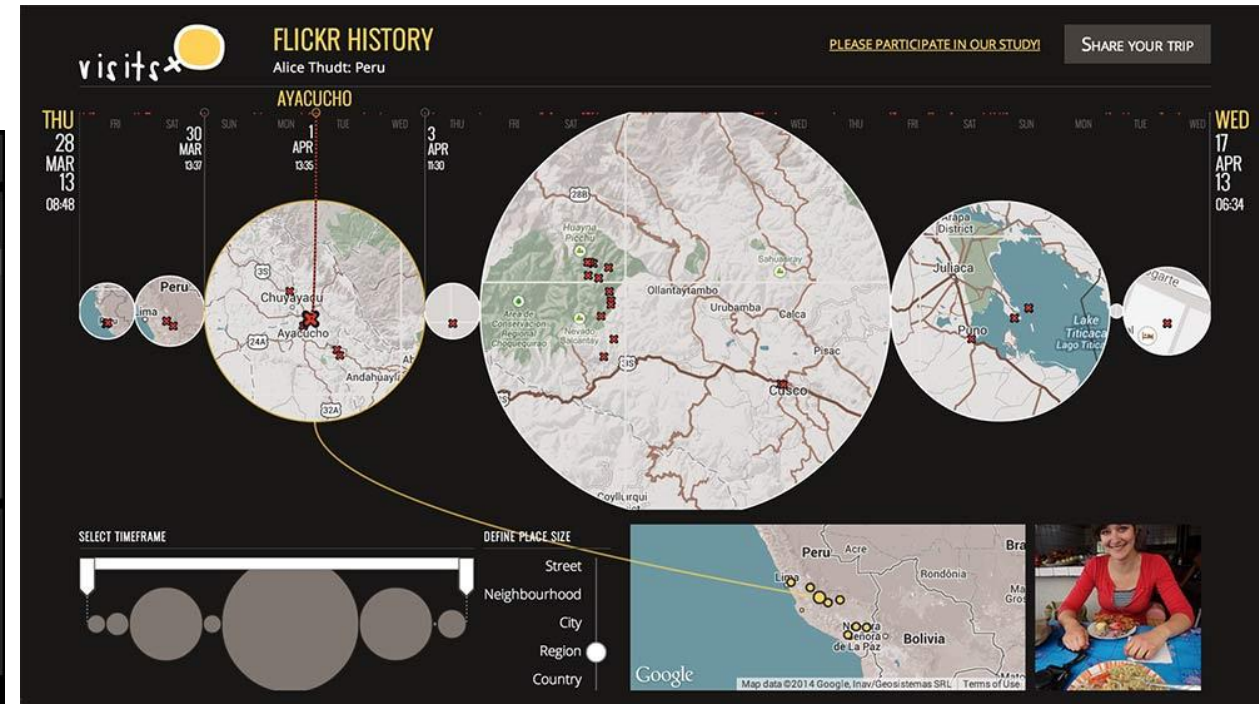
The Growth of WalMart through 2006
<https://www.freakalytics.com/tdwi-11-9/>

forms of visualisation

different forms of visualisation



<https://coronavirus.jhu.edu/map.html>



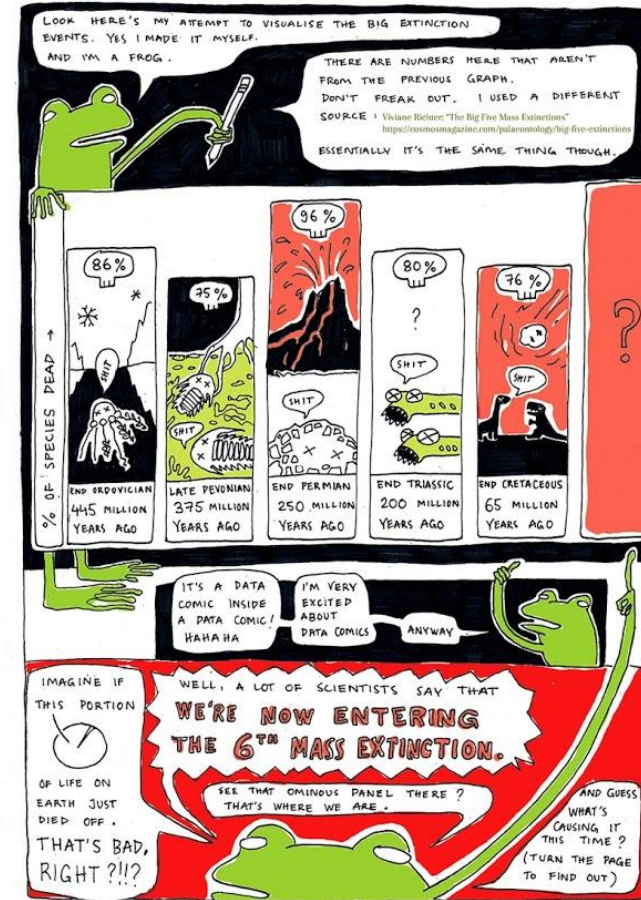
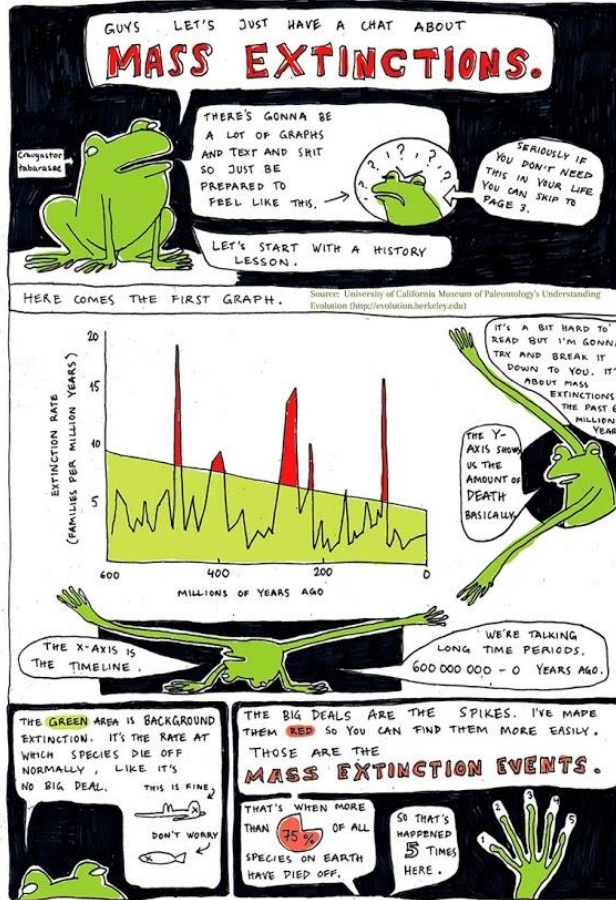
<http://v.isits.in/>

Interactive data visualizations

different forms of visualisation



Stefanie was banned by her husband from gathering data at her birthday dinner in a posh restaurant (for obvious reasons). Hence the "data void".



Dear Data. <https://www.dear-data.com/>

Data Comics. <https://datacomics.github.io/>

None-interactive data visualisations, sketched by hand

different forms of visualisation



<http://dataphys.org/list/how-much-sugar-do-you-consume/>



Atelier Brückner
<http://dataphys.org/list/walkable-age-pyramid>



Stefanie Prosavec and Miriam Quick
<http://dataphys.org/list/touching-air-necklace-shows-air-pollution>

Data physicalization

visualisation to facilitate research processes

trading consequences

- Environmental History

Colin M. Coates, Jim Clifford, Andrew Watson
Universities of York and Saskatchewan, Canada

- Text Mining & Ontology Development

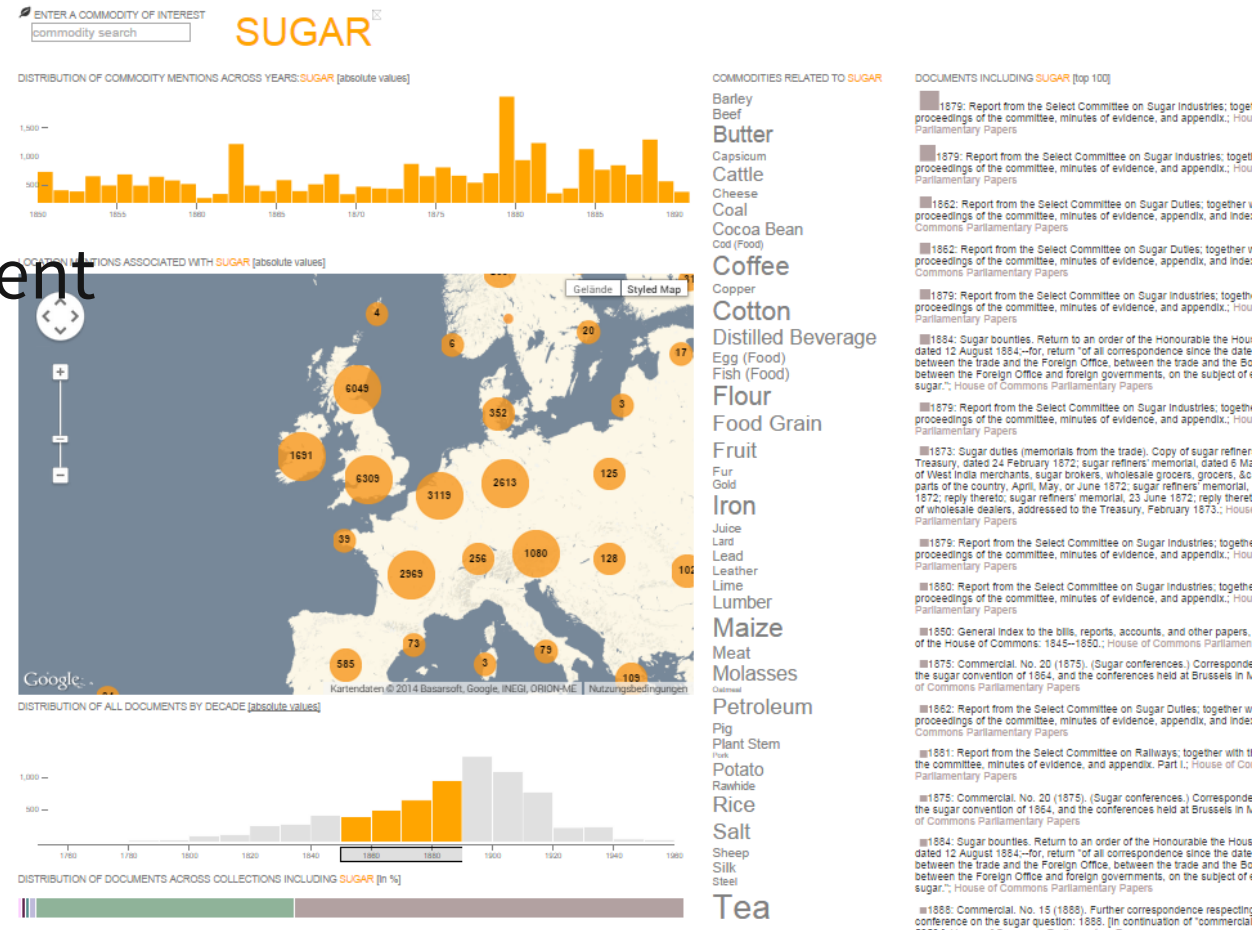
Bea Alex, Claire Grover, Ewan Klein
University of Edinburgh

- Information Visualization

Uta Hinrichs, Aaron Quigley
University of St Andrews

- Database Development

Jason Reid, Ian Fieldhouse, Nicola Osborne
EDINA

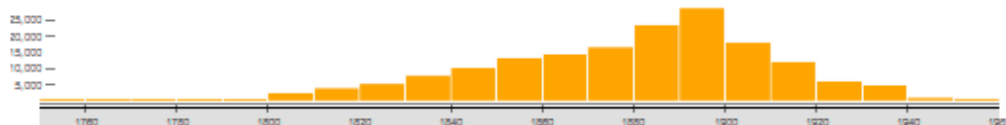


https://academic.oup.com/dsh/article/30/suppl_1/i50/364557

NUMBER OF LOCATION MENTIONS [absolute values]



DISTRIBUTION OF ALL DOCUMENTS BY DECADE [absolute values]



DISTRIBUTION OF DOCUMENTS ACROSS COLLECTIONS [%]



TOP 50 COMMODITY MENTIONS

- Barley
- Bituminous Coal
- Butter
- Cattle**
- Coal**
- Cod (Food)
- Copper
- Cotton
- Distilled Beverage
- Egg (Food)
- Fish (Food)**
- Flour
- Food Grain
- Fruit
- Fur
- Game (Food)
- Gold**
- Herring (Food)
- Horse
- Iron**
- Lead
- Leather
- Lime
- Lumber
- Maize**
- Meat
- Metal
- Opium
- Ore
- Petroleum**
- Pig
- Pinniped
- Potato
- Salmon (Food)
- Salt
- Saw
- Sheep
- Silk
- Silver (Color)**
- So (Dairy Product)
- Sole (Fish)
- Steel
- Sugar**
- Tea
- Tin**
- Tobacco

DOCUMENTS [top 100]

- 1908: Annual series of trade reports, serial no. 3917 to 4175 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1910: Annual series of trade reports: serial nos. 4388 to 4602, for session 1910 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1911: Annual series of trade reports: serial nos. 4603 to 4826, for session 1911 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1909: Annual series of trade reports, serial no. 4176 to 4387 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1913: Annual series of trade reports: serial nos. 4827 to 5041, for session 1912-13 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1906: Annual series of trade reports, serial no. 3475 to 3738 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1914: Annual series of trade reports: serial no. 5184 to 5389, for session 1914 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1907: Annual series of trade reports, serial no. 3739 to 3916 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1905: Annual series of trade reports, serial no. 3256 to 3474 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1902: Annual series of trade reports, serial no. 2696 to 2922 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1916: Annual series of trade reports: serial nos. 5390 to 5554, for session 1914-16 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1904: Annual series of trade reports, serial no. 3066 to 3255 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1894: Reports from H.M. Diplomatic and Consular Officers Abroad on Trade and Finance [Full version]; House of Commons Parliamentary Papers
- 1897: Reports from H.M. Diplomatic and Consular Officers Abroad on Trade and Finance [Full version]; House of Commons Parliamentary Papers
- 1896: Reports from H.M. Diplomatic and Consular Officers Abroad on Trade and Finance [Full version]; House of Commons Parliamentary Papers
- 1913: Annual series of trade reports: serial nos. 5042 to 5183, for session 1913 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers

ENTER A COMMODITY OF INTEREST

commodity search

SUGAR

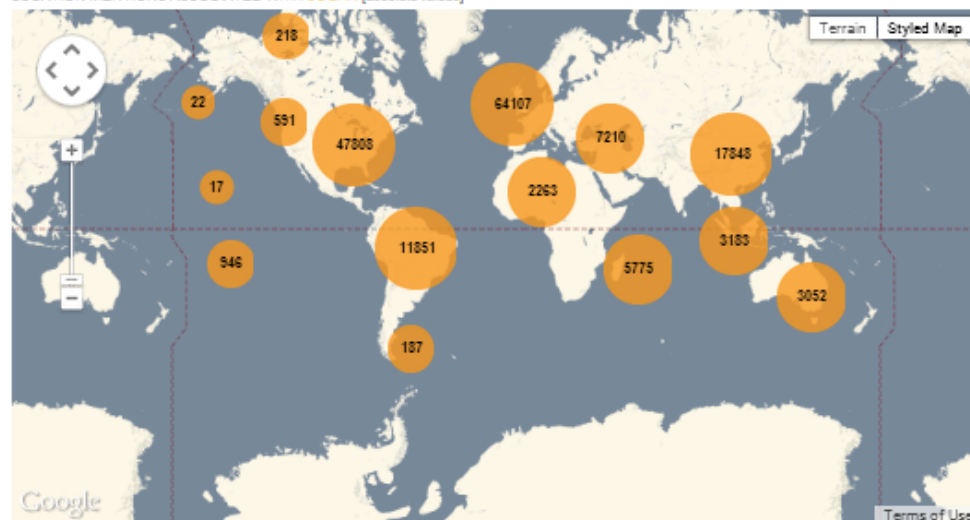
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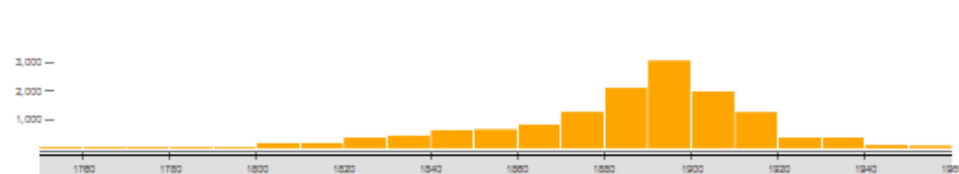
DISTRIBUTION OF COMMODITY MENTIONS ACROSS YEARS: SUGAR [absolute values]



LOCATION MENTIONS ASSOCIATED WITH SUGAR [absolute values]



DISTRIBUTION OF ALL DOCUMENTS BY DECADE [absolute values]



DISTRIBUTION OF DOCUMENTS ACROSS COLLECTIONS INCLUDING SUGAR [in %]



COMMODITIES RELATED TO SUGAR

- Apple
- Barley
- Beef
- Butter
- Capsicum
- Cattle
- Cheese
- Coal
- Cocoa Bean
- Cod (Food)
- Coffee
- Copper
- Cotton
- Distilled Beverage
- Egg (Food)
- Fish (Food)
- Flour
- Food Grain
- Fruit
- Fur
- Gold
- Iron
- Juice
- Lard
- Lead
- Leather
- Lime
- Lumber
- Maize
- Meat
- Molasses
- Petroleum
- Pig
- Plant Stem
- Potato
- Rawhide
- Rice
- Salt

DOCUMENTS INCLUDING SUGAR [top 100]

- 1862: Report from the Select Committee on Sugar Duties; together with the proceedings of the committee, minutes of evidence, appendix, and Index.; House of Commons Parliamentary Papers
- 1879: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1848: Eighth report from the Select Committee on Sugar and Coffee Planting; together with an appendix.; House of Commons Parliamentary Papers
- 1851: Second report from the Select Committee on Customs; together with the proceedings of the committee, minutes of evidence, appendix and Index.; House of Commons Parliamentary Papers
- 1898: West India Royal commission. Report of the West India Royal commission. Appendix C., Vol. I., containing part I., minutes of proceedings, reports of evidence, and copies of certain documents received in London.; House of Commons Parliamentary Papers
- 1848: First report from the Select Committee on Sugar and Coffee Planting; together with the minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1898: West India Royal commission. Report of the West India Royal commission. Appendix c., vol. II., containing parts II., III., IV. and V., proceedings, evidence, and documents relating to British Guiana, Barbados, Trinidad, and Tobago.; House of Commons Parliamentary Papers
- 1898: West India Royal commission. Report of the West India Royal commission. Appendix C., vol. III., containing parts VI. to XIII. Proceedings, evidence, and documents relating to the Windward Islands, the Leeward Islands, and Jamaica.; House of Commons Parliamentary Papers
- 1840: Report from the Select Committee on East India Produce; together with the minutes of evidence, an appendix, and Index.; House of Commons Parliamentary Papers
- 1848: Third report from the Select Committee on Sugar and Coffee Planting; together with the minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1899: Beer Materials Committee. Report of the Departmental Committee on Beer Materials.; House of Commons Parliamentary Papers
- 1832: Report from Select Committee on the Commercial State of the West India Colonies; together with the minutes of evidence, and an appendix and Index.; House of Commons Parliamentary Papers
- 1868: Commercial. No. 3 (1868). International conference on the sugar question. Minutes of proceedings and papers laid before the conference.; House of Commons Parliamentary Papers
- 1848: Seventh report from the Select Committee on Sugar and Coffee Planting; together with the minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1880: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1848: Fifth report from the Select Committee on Sugar and Coffee Planting; together with the minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1842: Report from the Select Committee on West India Colonies; together with the minutes of evidence, appendix, and Index.; House of Commons Parliamentary Papers
- 1919: East India (Industrial Commission, 1916-18). Minutes of evidence taken before the Indian Industrial Commission, 1916-18. Vol. I.—Delhi, United Provinces, and Bihar and Orissa.; House of Commons Parliamentary Papers
- 1910: Canada and the West Indies. Royal Commission on Trade Relations between Canada and the West Indies. Part III. Minutes of evidence taken in the West Indies; and appendices.; House of Commons Parliamentary Papers
- 1884: Sugar bounties. Return to an order of the Honourable the House of Commons, dated 12 August 1884.—for return 'of all correspondence since the date of the last return between the trade

filter by

ENTER A COMMODITY OF INTEREST

SUGAR

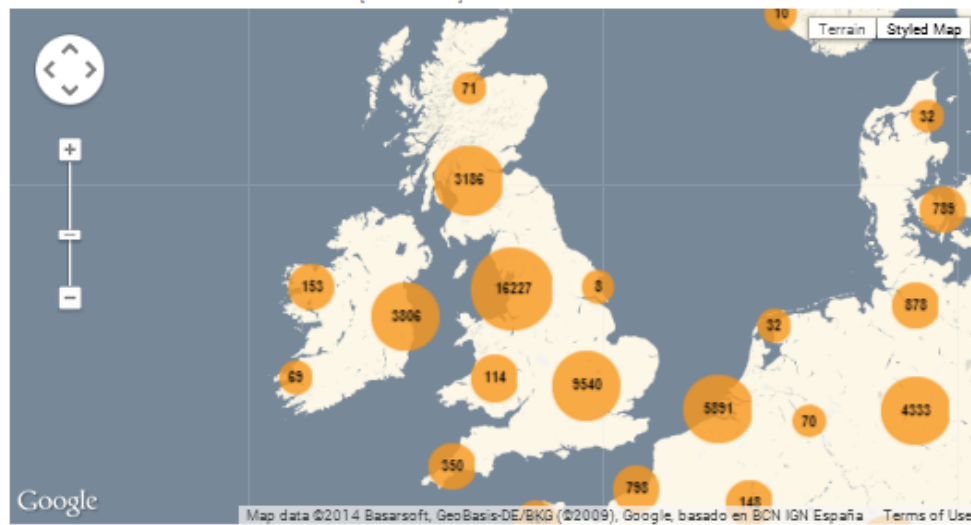
ABOUT



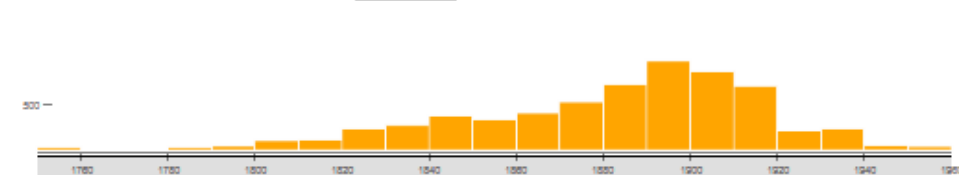
DISTRIBUTION OF COMMODITY MENTIONS ACROSS YEARS: SUGAR [absolute values]



LOCATION MENTIONS ASSOCIATED WITH SUGAR [absolute values]



DISTRIBUTION OF ALL DOCUMENTS BY DECADE [absolute values]



DISTRIBUTION OF DOCUMENTS ACROSS COLLECTIONS INCLUDING SUGAR [in %]



COMMODITIES RELATED TO SUGAR

- Apple
- Barley
- Beef
- Butter
- Capsicum
- Cattle
- Cheese
- Coal
- Cocoa Bean
- Cod (Food)
- Coffee
- Copper
- Cotton
- Distilled Beverage
- Egg (Food)
- Fish (Food)
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- Fruit
- Fur
- Gold
- Iron
- Juice
- Lard
- Lead
- Leather
- Lime
- Lumber
- Maize
- Meat
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- Petroleum
- Pig
- Plant Stem
- Potato
- Rawhide
- Rice
- Salt

DOCUMENTS INCLUDING SUGAR [top 100]

- 1879: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1910: Canada and the West Indies. Royal Commission on Trade Relations between Canada and the West Indies. Part IV. Minutes of evidence taken in London; and appendices.; House of Commons Parliamentary Papers
- 1862: Report from the Select Committee on Sugar Duties; together with the proceedings of the committee, minutes of evidence, appendix, and Index.; House of Commons Parliamentary Papers
- 1879: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1848: Eighth report from the Select Committee on Sugar and Coffee Planting; together with an appendix.; House of Commons Parliamentary Papers
- 1879: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1840: Report from the Select Committee on East India Produce; together with the minutes of evidence, an appendix, and Index.; House of Commons Parliamentary Papers
- 1850: General Index to the bills, reports, accounts, and other papers, printed by order of the House of Commons: 1845--1850.; House of Commons Parliamentary Papers
- 1875: Commercial. No. 20 (1875). (Sugar conferences.) Correspondence respecting the sugar convention of 1864, and the conferences held at Brussels in May 1875.; House of Commons Parliamentary Papers
- 1862: Report from the Select Committee on Sugar Duties; together with the proceedings of the committee, minutes of evidence, appendix, and Index.; House of Commons Parliamentary Papers
- 1909: Annual series of trade reports, serial no. 4176 to 4357 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1881: Report from the Select Committee on Railways; together with the proceedings of the committee, minutes of evidence, and appendix. Part I.; House of Commons Parliamentary Papers
- 1884: Sugar bounties. Return to an order of the Honourable the House of Commons, dated 12 August 1884--for, return "of all correspondence since the date of the last return between the trade and the Foreign Office, between the trade and the Board of Trade, and between the Foreign Office and foreign governments, on the subject of export bounties on sugar."; House of Commons Parliamentary Papers
- 1875: Commercial. No. 20 (1875). (Sugar conferences.) Correspondence respecting the sugar convention of 1864, and the conferences held at Brussels in May 1875.; House of Commons Parliamentary Papers
- 1934: Trade and navigation. Return (In part) to an order of the honourable the House of Commons, dated 30 January, 1934--for, accounts relating to trade and navigation of the United Kingdom for each month during the year 1934.; House of Commons Parliamentary Papers
- 1937: Trade and navigation. Return (In part) to an order of the honourable the House of Commons dated 20 January, 1937--for accounts relating to trade and navigation of the United Kingdom for each month during the year 1937.; House of Commons Parliamentary Papers
- 1888: Commercial. No. 15 (1888). Further correspondence respecting the international conference on the sugar question: 1888. [In continuation of "commercial No. 2 (1888)."] C. 5259.; House of Commons Parliamentary Papers
- 1834: Catalogue of parliamentary reports, and a breviat of their contents: arranged under heads according to the subjects. 1696-1834.; House of Commons Parliamentary Papers
- 1916: Annual series of trade reports: serial nos. 5390 to 5554, for session 1914-16 (Trade, Navigation, Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers

ENTER A COMMODITY OF INTEREST

commodity search

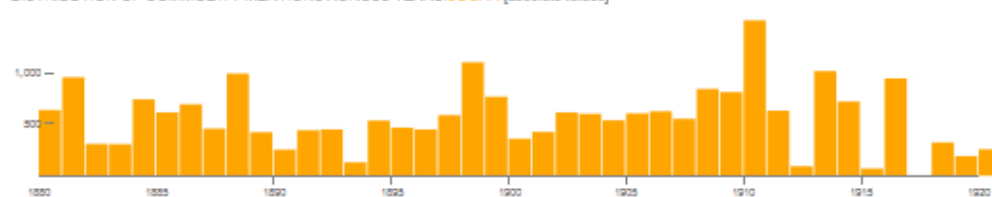
SUGAR

ABOUT

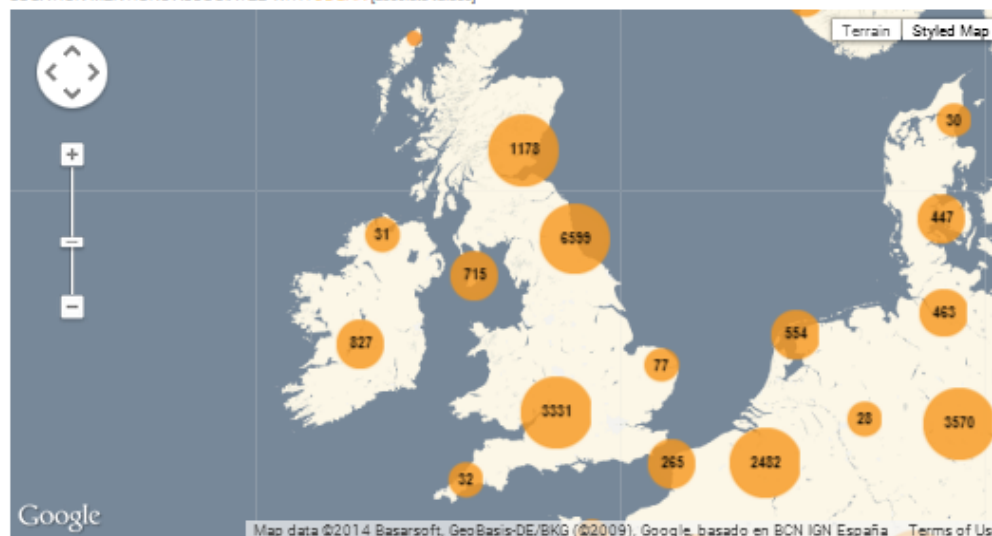


filter by

DISTRIBUTION OF COMMODITY MENTIONS ACROSS YEARS: SUGAR [absolute values]



LOCATION MENTIONS ASSOCIATED WITH SUGAR [absolute values]



DISTRIBUTION OF ALL DOCUMENTS BY DECADE [absolute values]



DISTRIBUTION OF DOCUMENTS ACROSS COLLECTIONS INCLUDING SUGAR [in %]

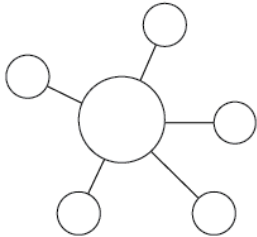
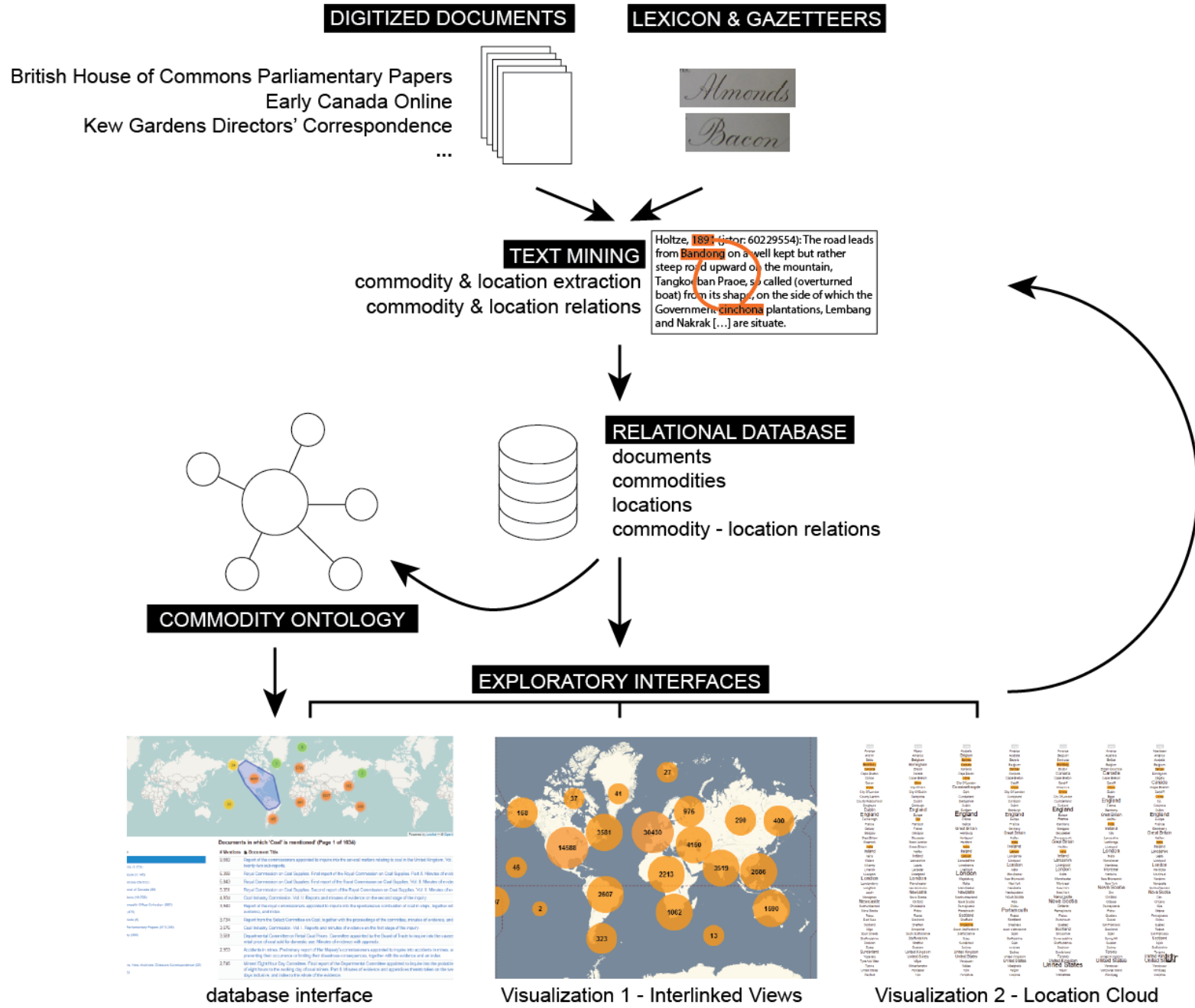


COMMODITIES RELATED TO SUGAR

- Apple
- Barley
- Beer
- Butter
- Cattle
- Cheese
- Coal
- Cocoa Bean
- Cod (Food)
- Coffee
- Copper
- Cotton
- Distilled Beverage
- Egg (Food)
- Fish (Food)
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- Lard
- Lead
- Leather
- Lime
- Lumber
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- Meat
- Molasses
- Petroleum
- Pig
- Plant Stem
- Potato
- Rawhide
- Rice
- Salt
- Sheep

DOCUMENTS INCLUDING SUGAR [top 100]

- 1910: Canada and the West Indies. Royal Commission on Trade Relations between Canada and the West Indies. Part IV. Minutes of evidence taken in London; and appendices.; House of Commons Parliamentary Papers
- 1881: Report from the Select Committee on Railways; together with the proceedings of the committee, minutes of evidence, and appendix. Part I.; House of Commons Parliamentary Papers
- 1909: Annual series of trade reports, serial no. 4176 to 4387 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1884: Sugar bounties. Return to an order of the Honourable the House of Commons, dated 12 August 1884.—for, return "of all correspondence since the date of the last return between the trade and the Foreign Office, between the trade and the Board of Trade, and between the Foreign Office and foreign governments, on the subject of export bounties on sugar."; House of Commons Parliamentary Papers
- 1888: Commercial. No. 15 (1888). Further correspondence respecting the International conference on the sugar question: 1888. [in continuation of "commercial No. 2 (1888)"; "C. 5259"]; House of Commons Parliamentary Papers
- 1916: Annual series of trade reports: serial nos. 5390 to 5554, for session 1914-16 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1880: Report from the Select Committee on Sugar Industries; together with the proceedings of the committee, minutes of evidence, and appendix.; House of Commons Parliamentary Papers
- 1910: Annual series of trade reports: serial nos. 4388 to 4602, for session 1910 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1905: Annual series of trade reports, serial no. 3256 to 3474 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1914: Annual series of trade reports: serial no. 5184 to 5389, for session 1914 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1885: Trade and navigation. Return (in part) to an order of the Honourable the House of Commons, dated 19 February 1885.—for, accounts relating to trade and navigation of the United Kingdom, for each month during the year 1885.; House of Commons Parliamentary Papers
- 1887: Condition of the working classes. Tabulation of the statements made by men living in certain selected districts of London in March 1887.; House of Commons Parliamentary Papers
- 1884: Sugar bounties. Return to an order of the Honourable the House of Commons, dated 12 August 1884.—for, return "of all correspondence since the date of the last return between the trade and the Foreign Office, between the trade and the Board of Trade, and between the Foreign Office and foreign governments, on the subject of export bounties on sugar."; House of Commons Parliamentary Papers
- 1885: Trade and navigation. Return (in part) to an order of the Honourable the House of Commons, dated 19 February 1885.—for, accounts relating to trade and navigation of the United Kingdom, for each month during the year 1885.; House of Commons Parliamentary Papers
- 1908: Annual series of trade reports, serial no. 3917 to 4175 (Trade. Navigation. Shipping: Annual and miscellaneous series (foreign countries)) [Full version]; House of Commons Parliamentary Papers
- 1884: Sugar bounties. Return to an order of the Honourable the House of Commons, dated 12 August 1884.—for, return "of all correspondence since the date of the last return between the trade and the Foreign Office, between the trade and the Board of Trade, and between the Foreign Office and foreign governments, on the subject of export bounties on sugar."; House of Commons



visualisation informs text mining

- Lime among the top 50 commodities???



Gold

Iron

Juice
Lard
Lead

Leather

Lime

Lumber

Maize

Meat

Molasses

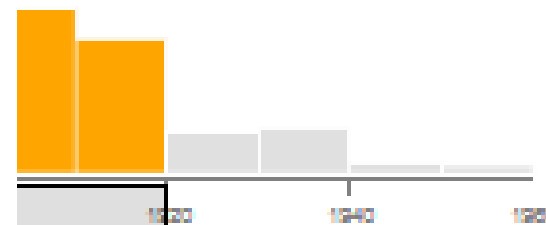
Petroleum

Pig

Plant Stem

Potato

Rawhide



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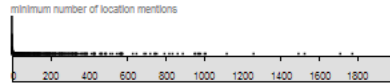
■1908: Ann
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insights from initial visualisation inform new visualisation approaches

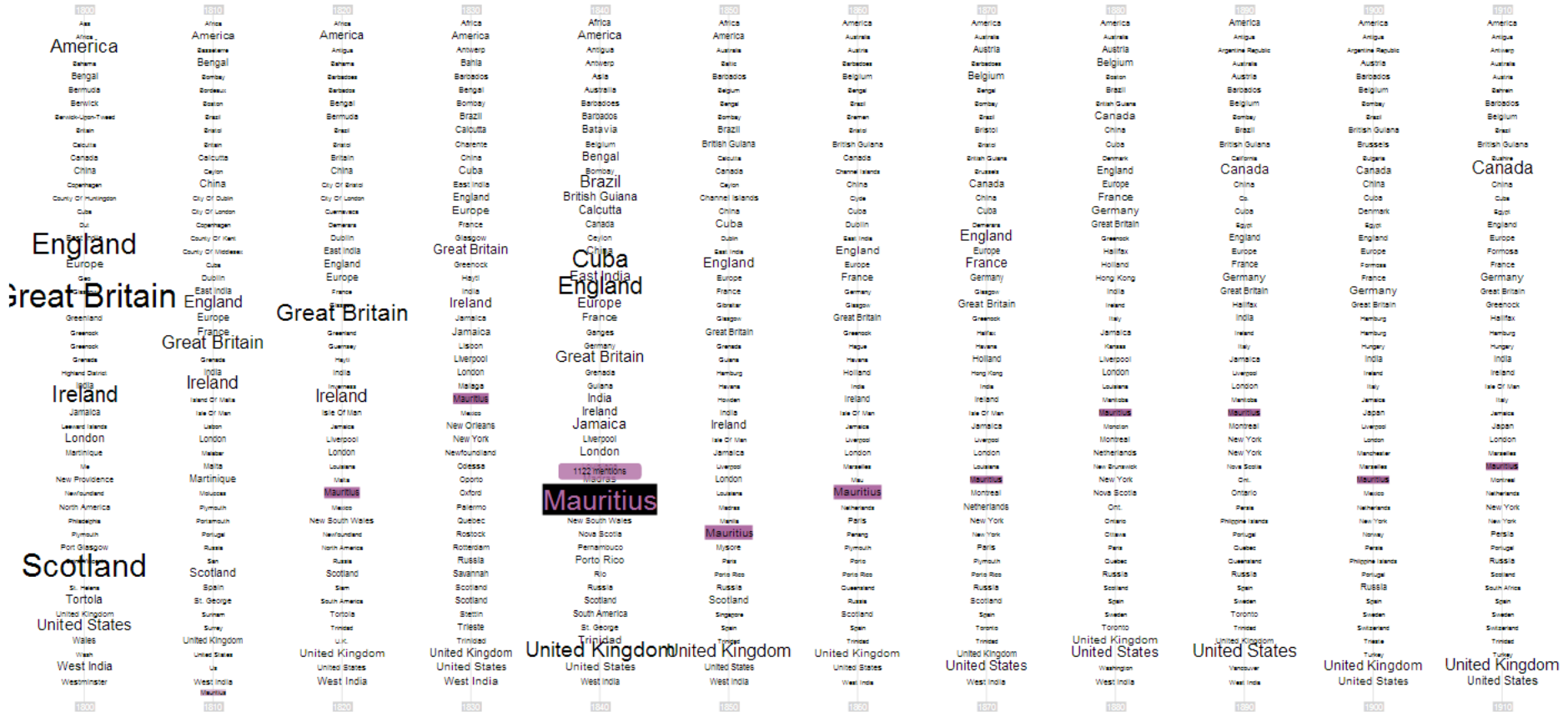
enter a commodity of interest

[view data: sugar](#)

enter a location of interest



top 50 location mentions by decade



The new doctor was named _.

The new nurse was named _.

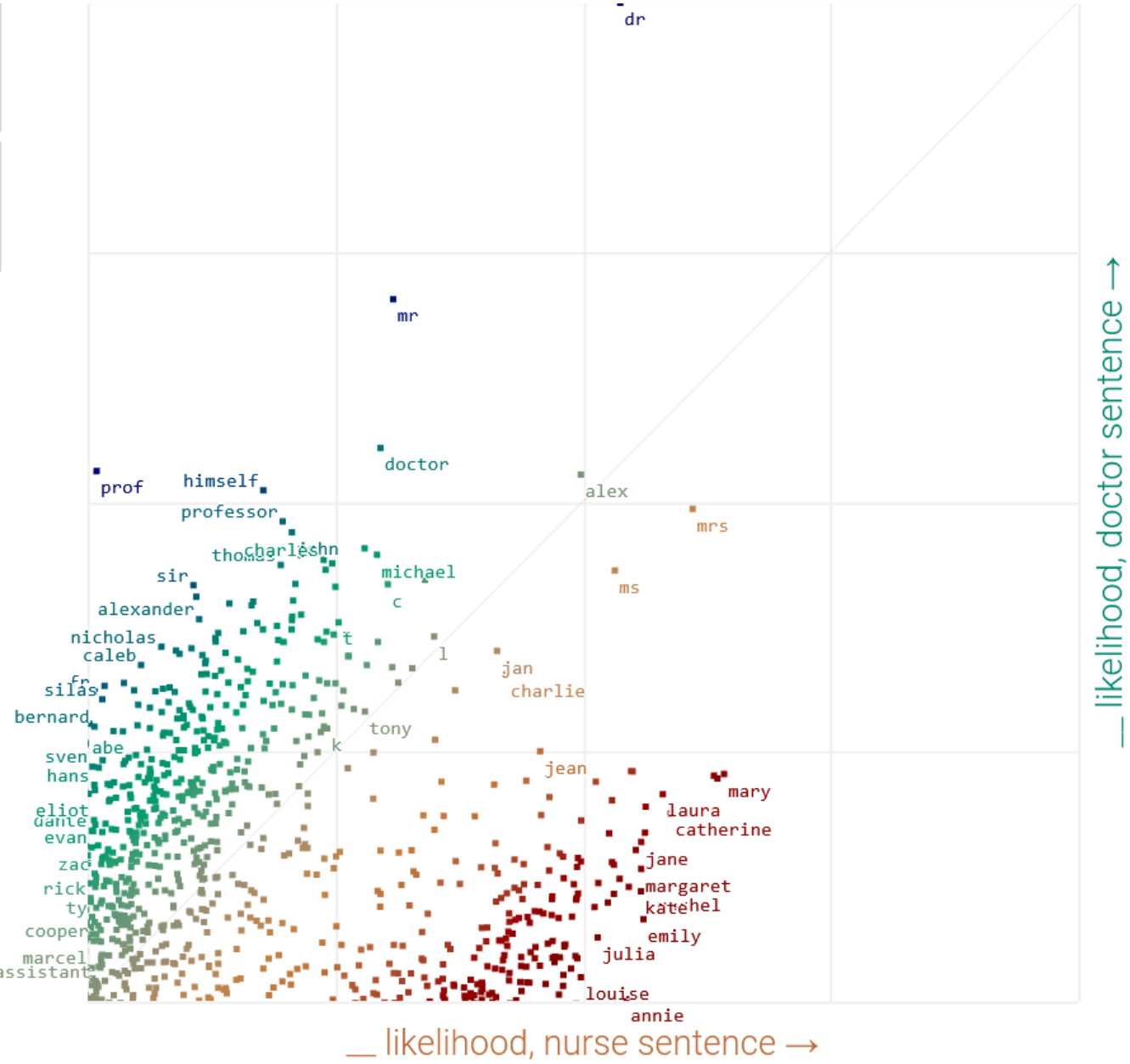
Number of Tokens ⓘ

- 30
- 200
- 1000
- 5000
- All

Chart Type ⓘ

- Likelihoods
- Differences

Update



What Have Language Models Learned?

Adam Pearce

<https://pair.withgoogle.com/explorables/fill-in-the-blank>

critical perspectives on visualization

critiquing the form of representation

- Manipulating scales



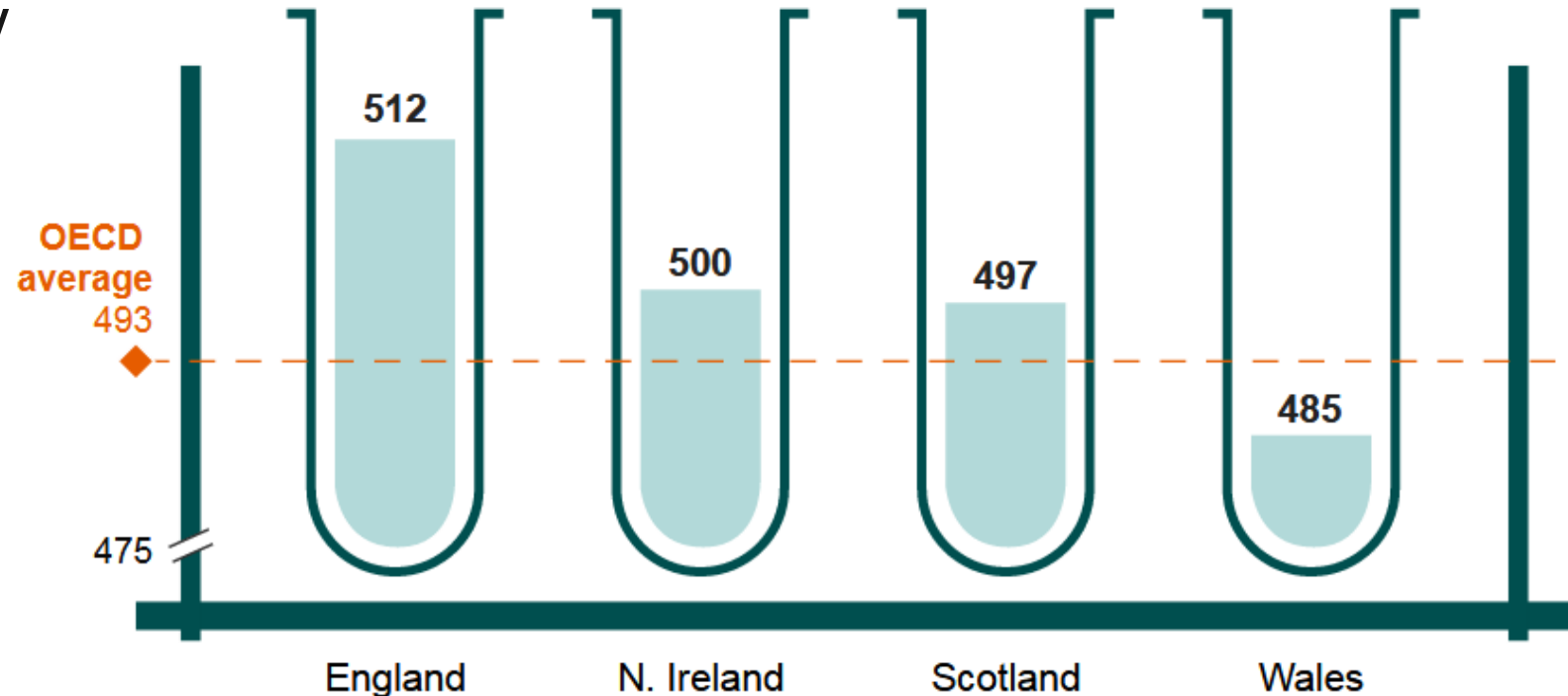
<http://www.vislies.org/2016/gallery/>

critiquing the form of representation

England best at science, with only Wales below OECD average

Pisa science scores, by UK nation

- Obscuring uncertainty



BBC, 2016

<http://www.bbc.co.uk/news/education-38157811>

Note: The above figures are based on survey data and so contain a small margin of error

Source: OECD

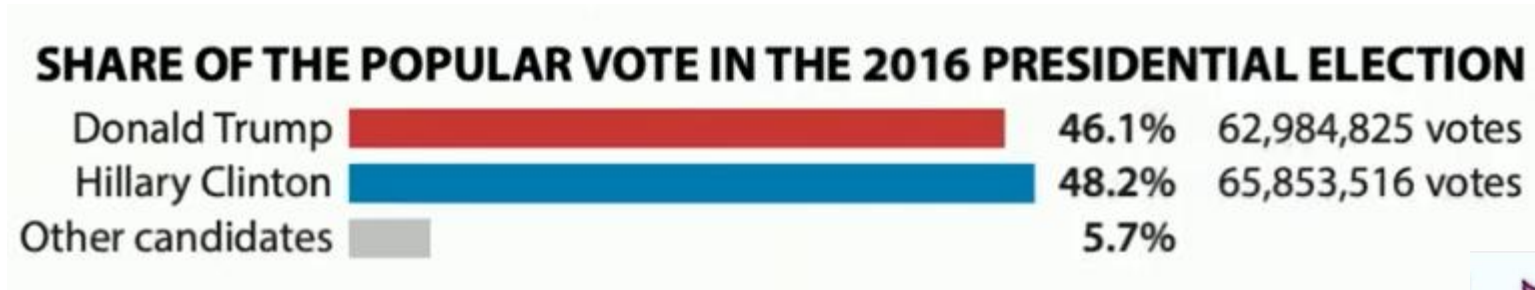
critiquing the form of representation



Map tweeted by Trump in October 2019

<https://edition.cnn.com/2019/10/01/politics/trump-impeach-this-map-fact-check/index.html>

misleading through specific mapping choices

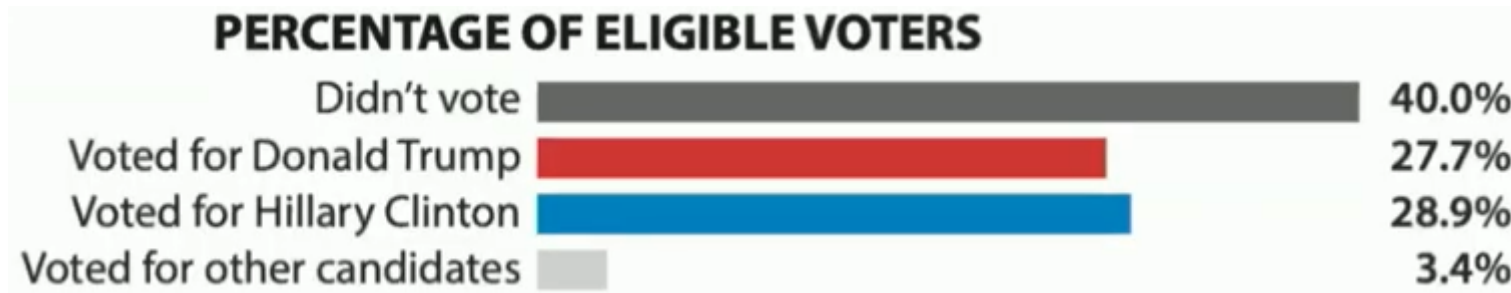


Visualization by Alberto Cairo

<https://www.youtube.com/watch?v=DhGW99CFbAM>



misleading through specific mapping choices

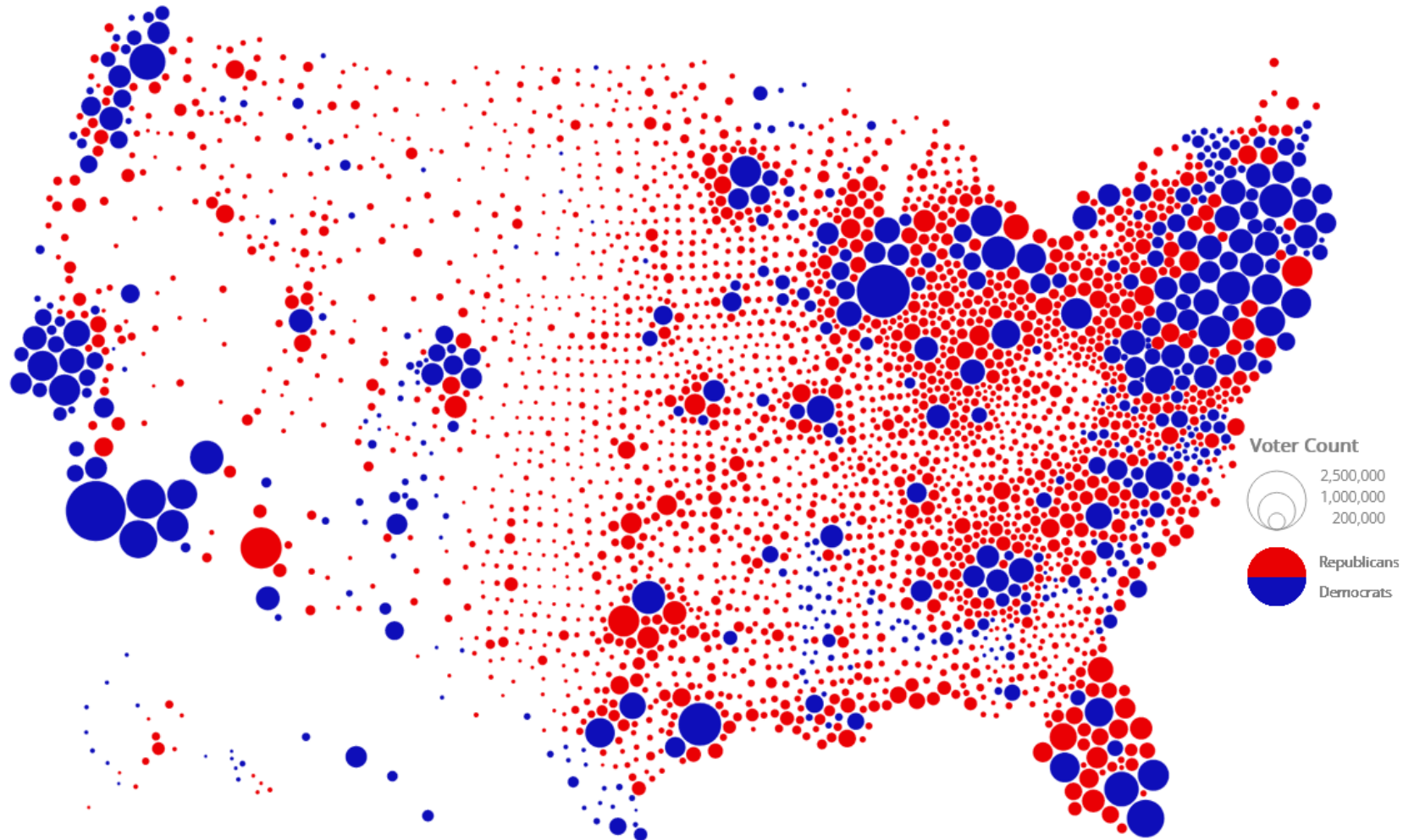


Visualization by Alberto Cairo

<https://www.youtube.com/watch?v=DhGW99CFbAM>



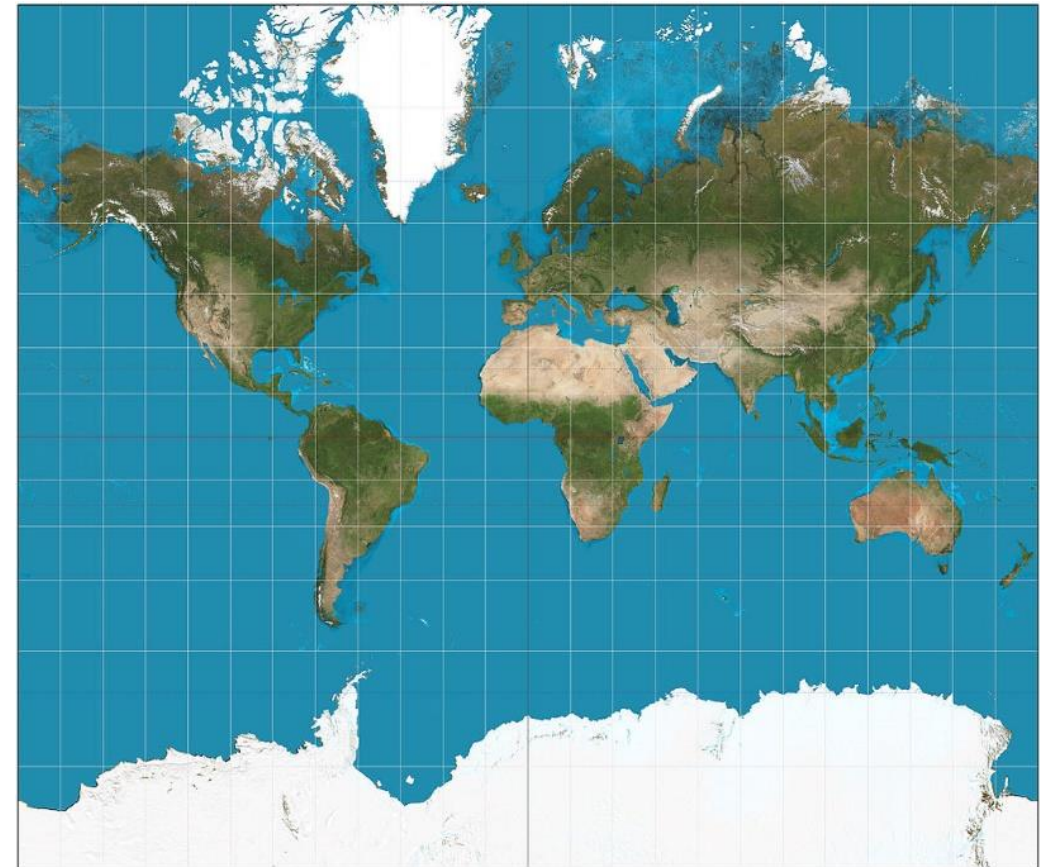
critiquing the form of representation



<https://try-to-impeach-this.jetpack.ai/>

maps are political

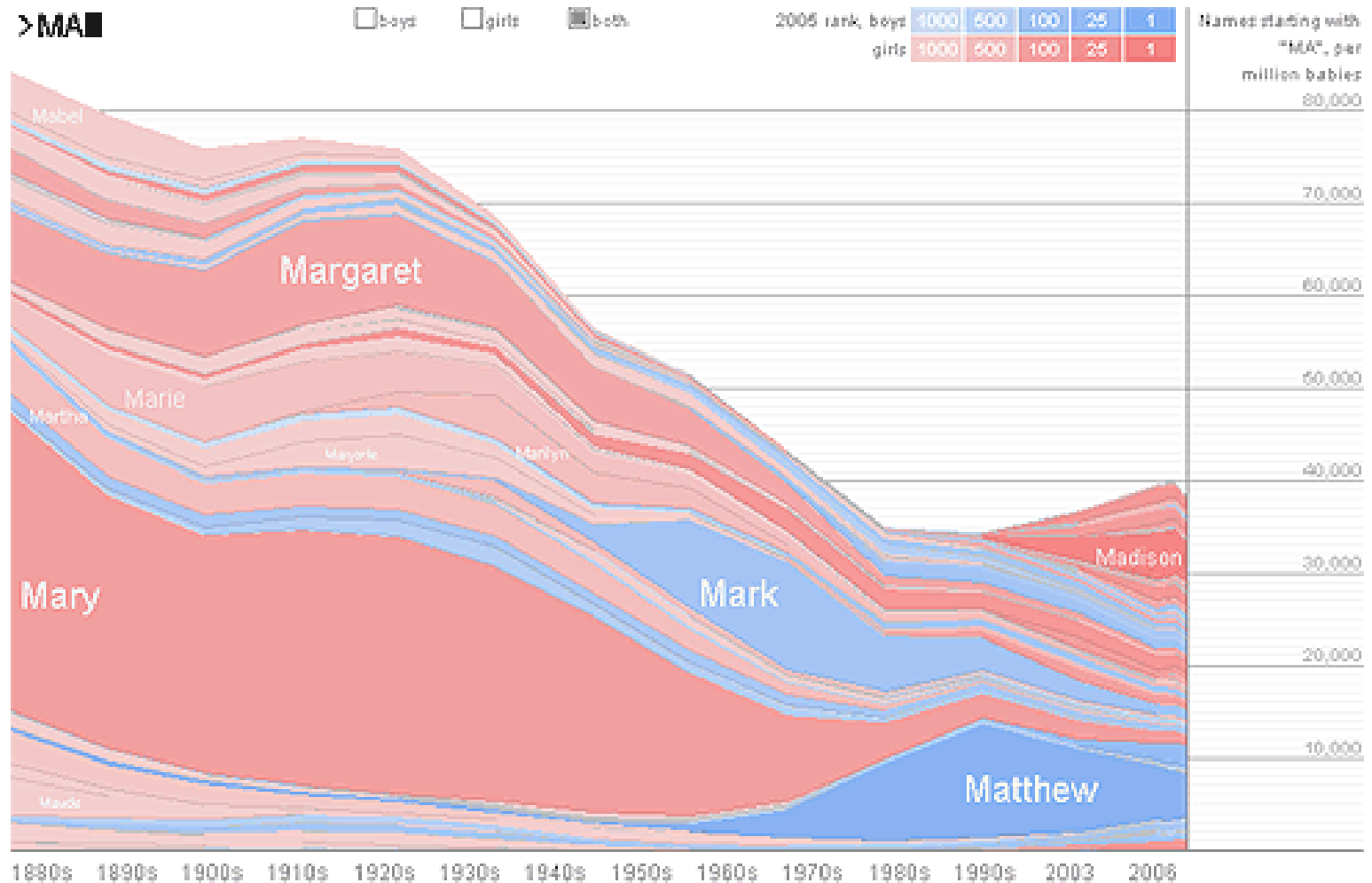
- Mercator projection is problematic
- Countries far away from the equator are heavily distorted



ethical & political considerations

- What values or assumptions does the visualisation promote?
- What perspectives are rendered invisible or muted?
- Do the potential benefits of a visualisation outweigh the possible harm it might cause?

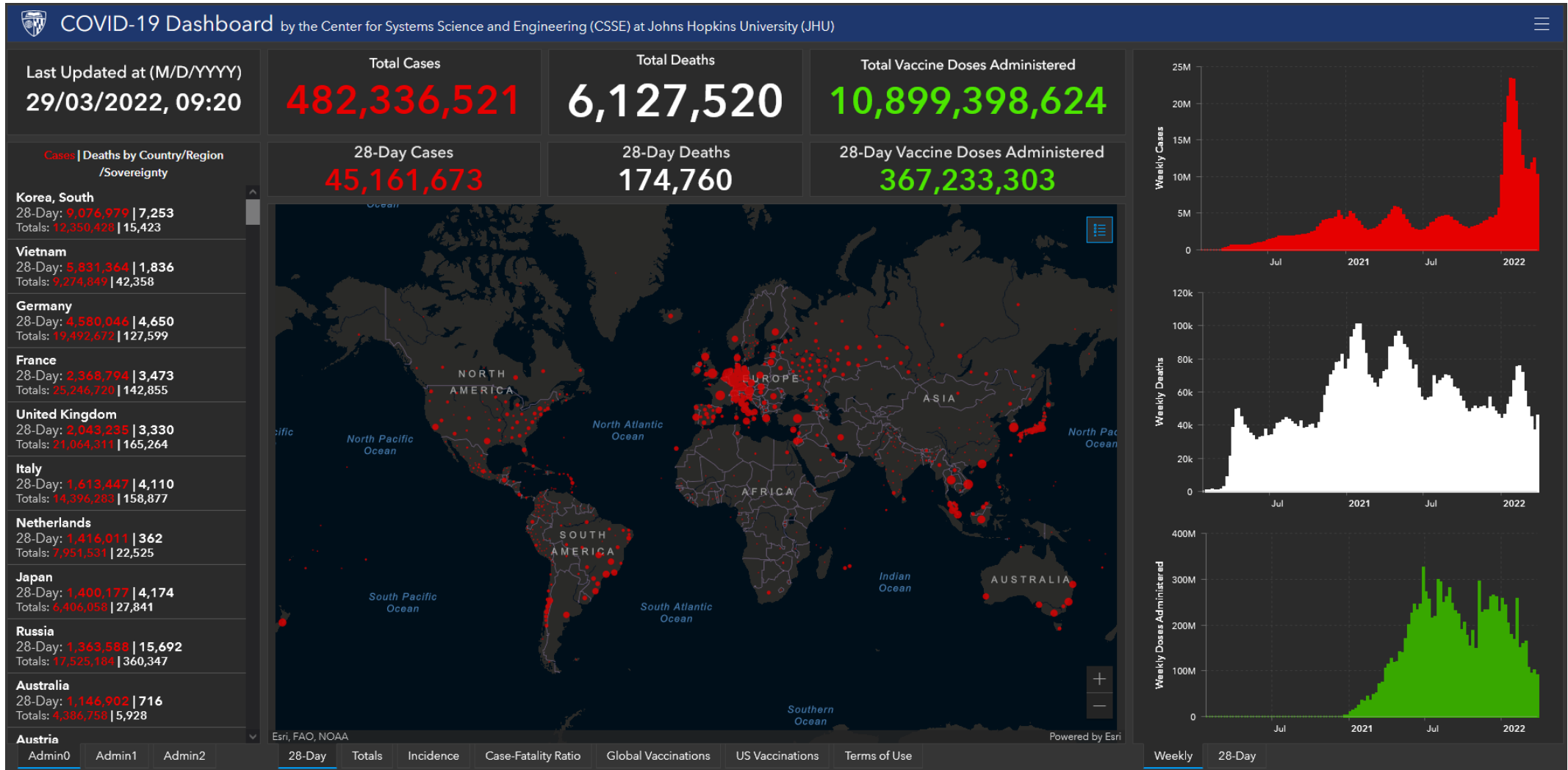
Name voyager (2005)



<http://www.bewitched.com/namevoyager.html>

Covid-19 Dashboard

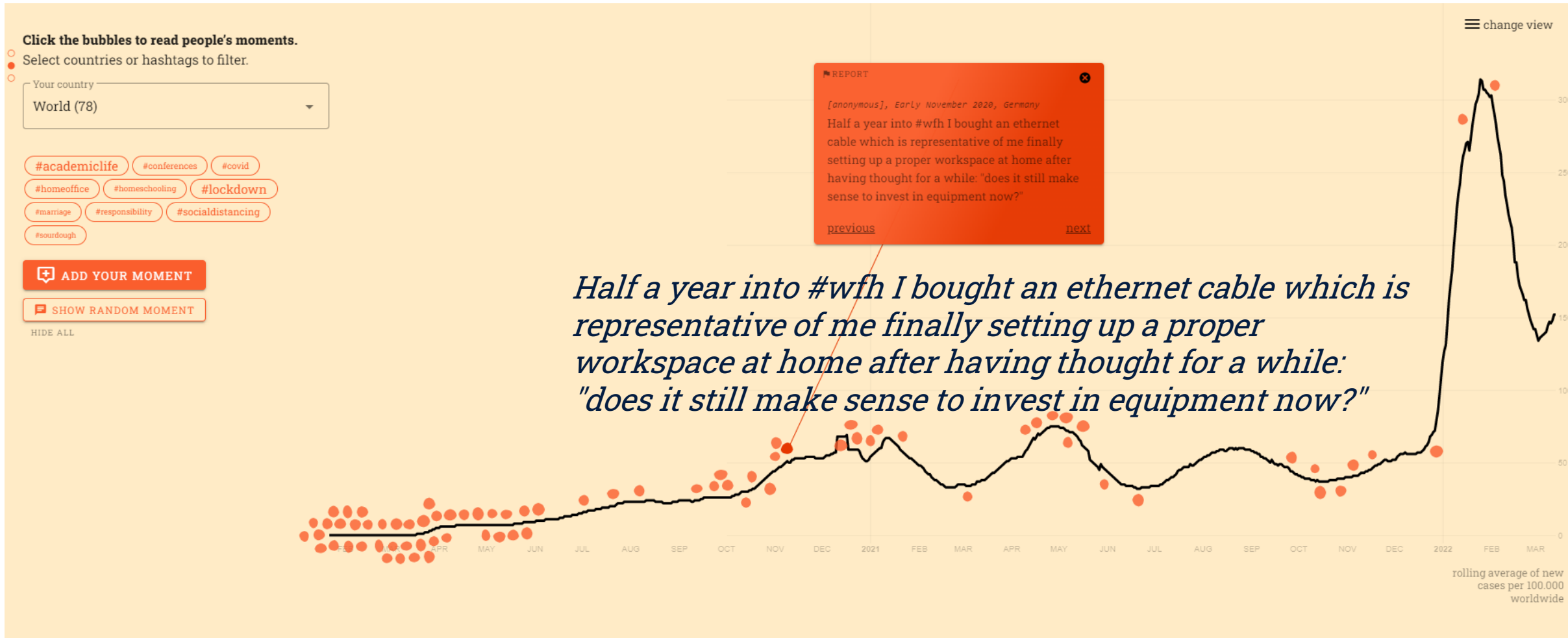
Center for Systems Science and Engineering at Johns Hopkins University



<https://gisanddata.maps.arcgis.com/apps/dashboards/bda7594740fd40299423467b48e9ecf6>

Corona Moments

Center for Systems Science and Engineering at Johns Hopkins University

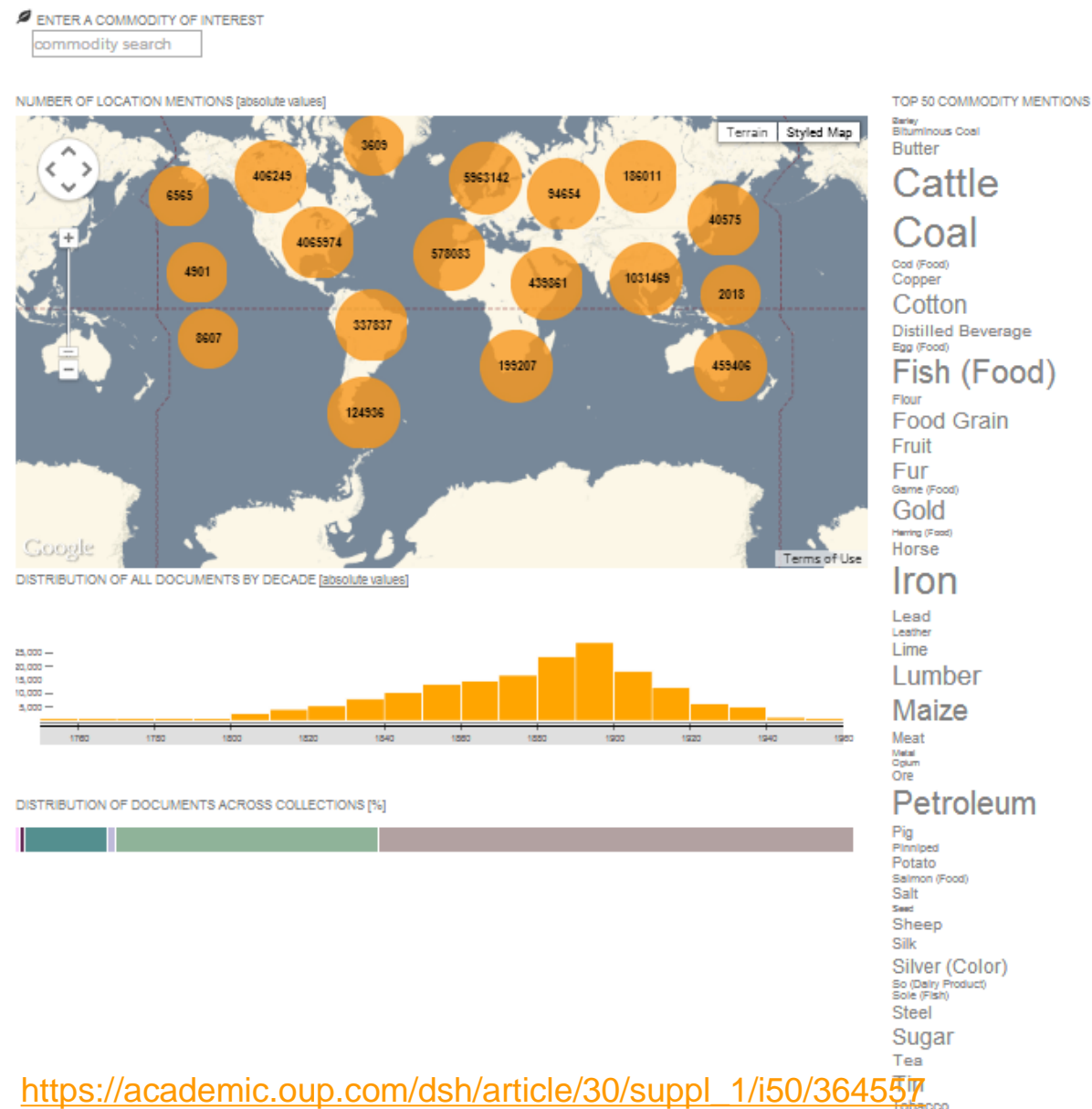


Trading Consequences

- Points of critique
 - Disclosure of sources and intentions
 - Data provenance
 - Make the invisible visible

→ *Visualisation is about showing & telling*

Alberto Cairo



https://academic.oup.com/dsh/article/30/suppl_1/i50/364557

additional pointers

visualization tools

- Libraries

- Python

- <https://towardsdatascience.com/top-6-python-libraries-for-visualization-which-one-to-use-fe43381cd658>

- JavaScript

- D3.js <https://d3js.org/>

- R packages

- <https://towardsdatascience.com/the-7-r-packages-you-should-be-using-for-data-visualisation-e29010cefe51>

- Off-the-shelf tools

- Tableau Desktop

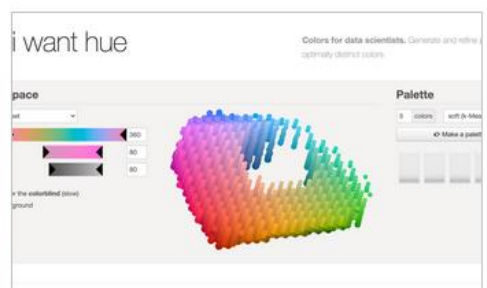
- Student license: <https://www.tableau.com/en-gb/academic/students>

- Raw Graphs <https://rawgraphs.io/>

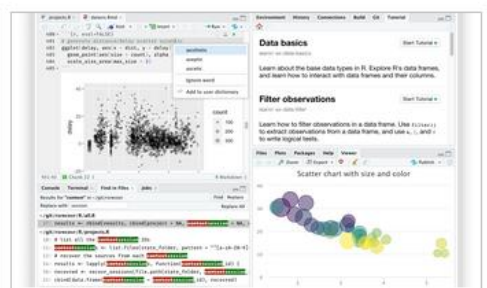
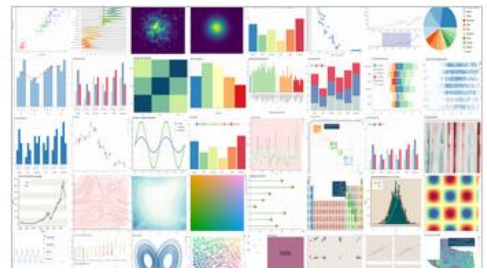
AVAILABILITY	PROGRAMMING SKILLS	PLATFORM	FEATURES	TYPE OF DATA	VISUALIZATION
34 Free 28 Open source 18 Paid	23 None 11 Javascript 6 Python 2 Java 10 Other 1 Matlab 4 R	17 Apple 20 Windows 12 Linux 22 Web 8 Library 1 Other	23 Web-publishing 26 File exports 10 Other 11 Wizard 9 PDF Export	33 Numeric 25 Geographic 29 Temporal 12 Text 18 Other 5 Network	11 Networks 25 Maps 32 Basic charts 17 Advanced charts



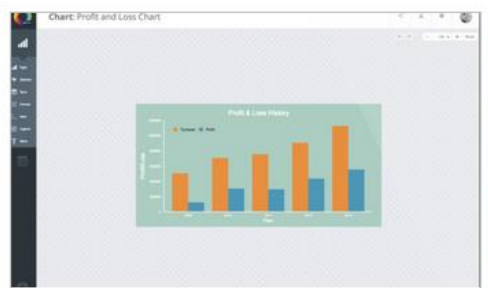
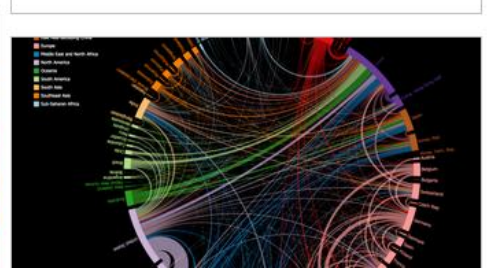
COLORBREWER
<https://colorbrewer2.org/>
 Intended for use as a diagnostic tool for evaluating the robustness of individual colour schemes.



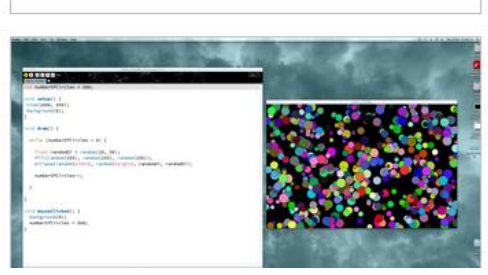
IWANTHUE
<https://medialab.github.io/iwanthue/>
 Colors for data scientists. Generate and refine palettes of optimally distinct colors.



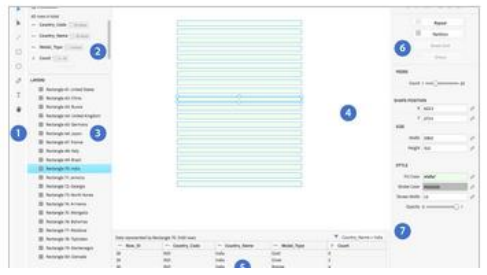
RSTUDIO
<https://rstudio.com/>
 RStudio is an integrated development environment for R, a programming language for statistical computing and...



CHARTBLOCKS
<https://www.chartblocks.com/en/>
 Build a chart in minutes in the easy to use chart designer, choosing from dozens of chart types and then...



GEPHI
<https://gephi.org/>
 Gephi is an open-source network analysis and visualization software package written in Java on the NetBea...



further reading

- Alberto Cairo. **The Truthful Art.** <http://www.thefunctionalart.com/>
- Tamara Munzner. **Visualization Analysis & Design.** <https://www.cs.ubc.ca/~tmm/vadbook/>
- Giorgia Lupi. **Data Humanism, The Revolution will be Visualized** <http://giorgialupi.com/data-humanism-my-manifesto-for-a-new-data-wol>
- Michael Correll. **Ethical Dimensions of Visualization Research.** Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, 2019.
<https://arxiv.org/pdf/1811.07271.pdf>