

Visualização de dados e a Web

Helder da Rocha



São Paulo, 27 de agosto de 2018

Visualização de dados e a Web

Gráficos que revelam informações

Gráficos que interagem com dados

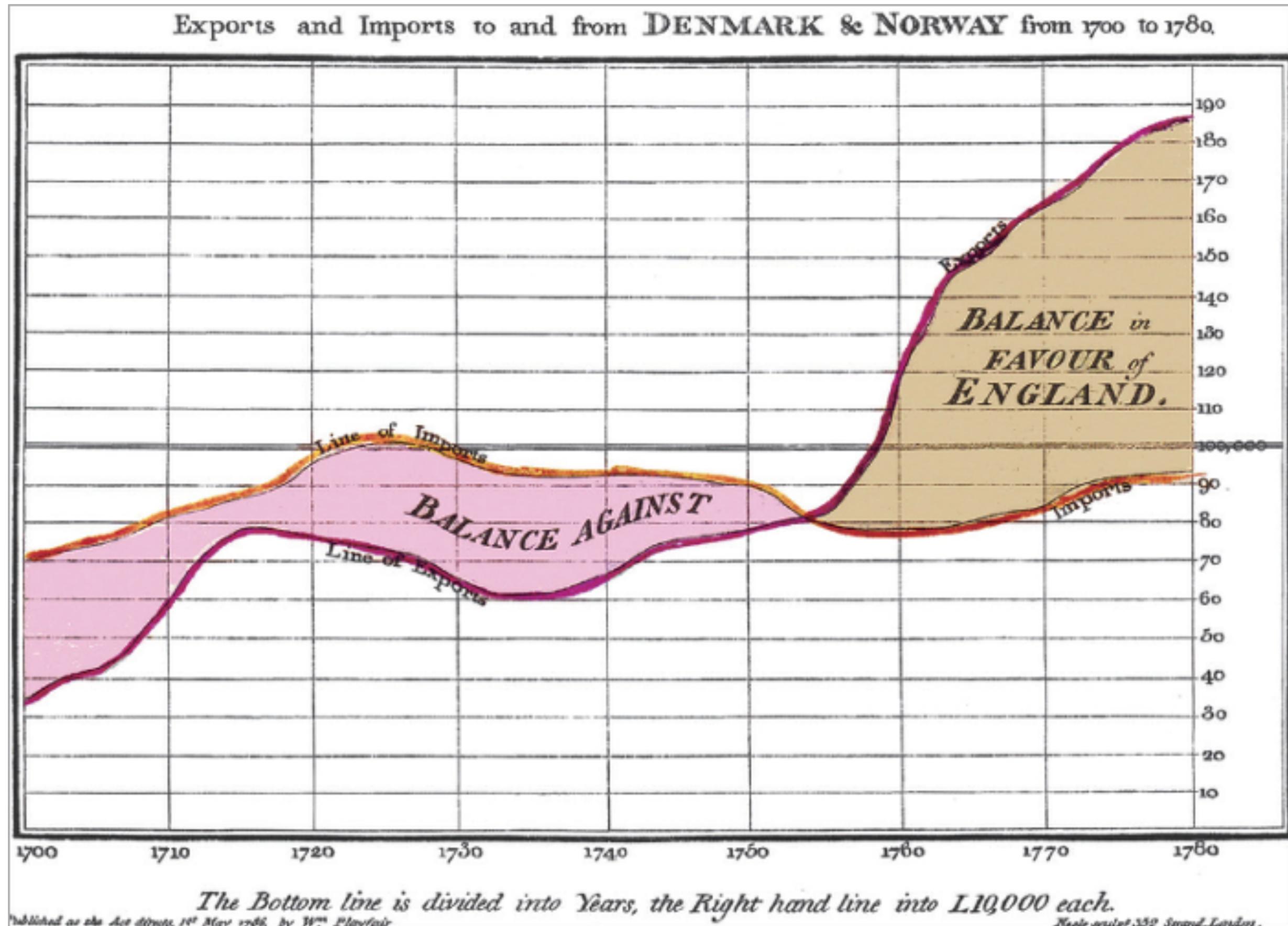
Gráficos que omitem, iludem e mentem

Tecnologias serviços e ferramentas



William Playfair (1786)

- "Inventor" dos gráficos de linha, área, barra, torta/ pizza



Charles Joseph Minard (1869)

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. Chiers, 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 Davout qui avaient été détachés sur Minsk et Mohilow et ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

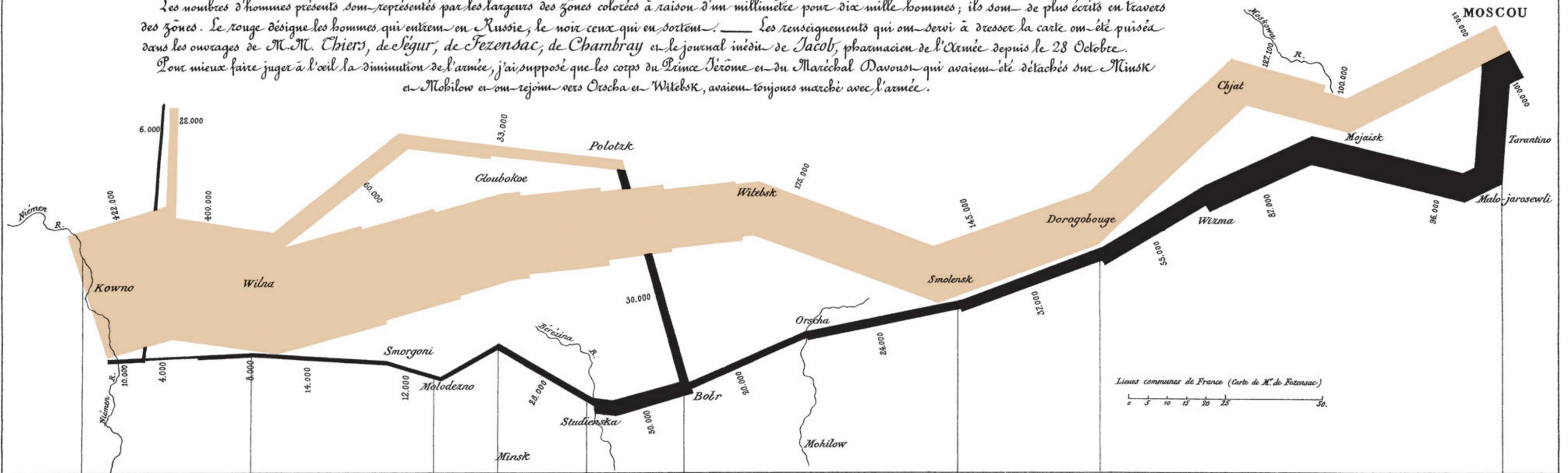
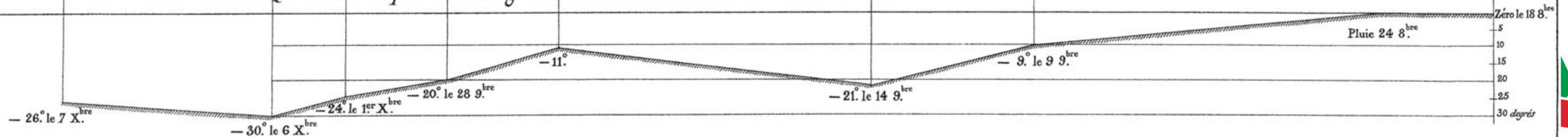


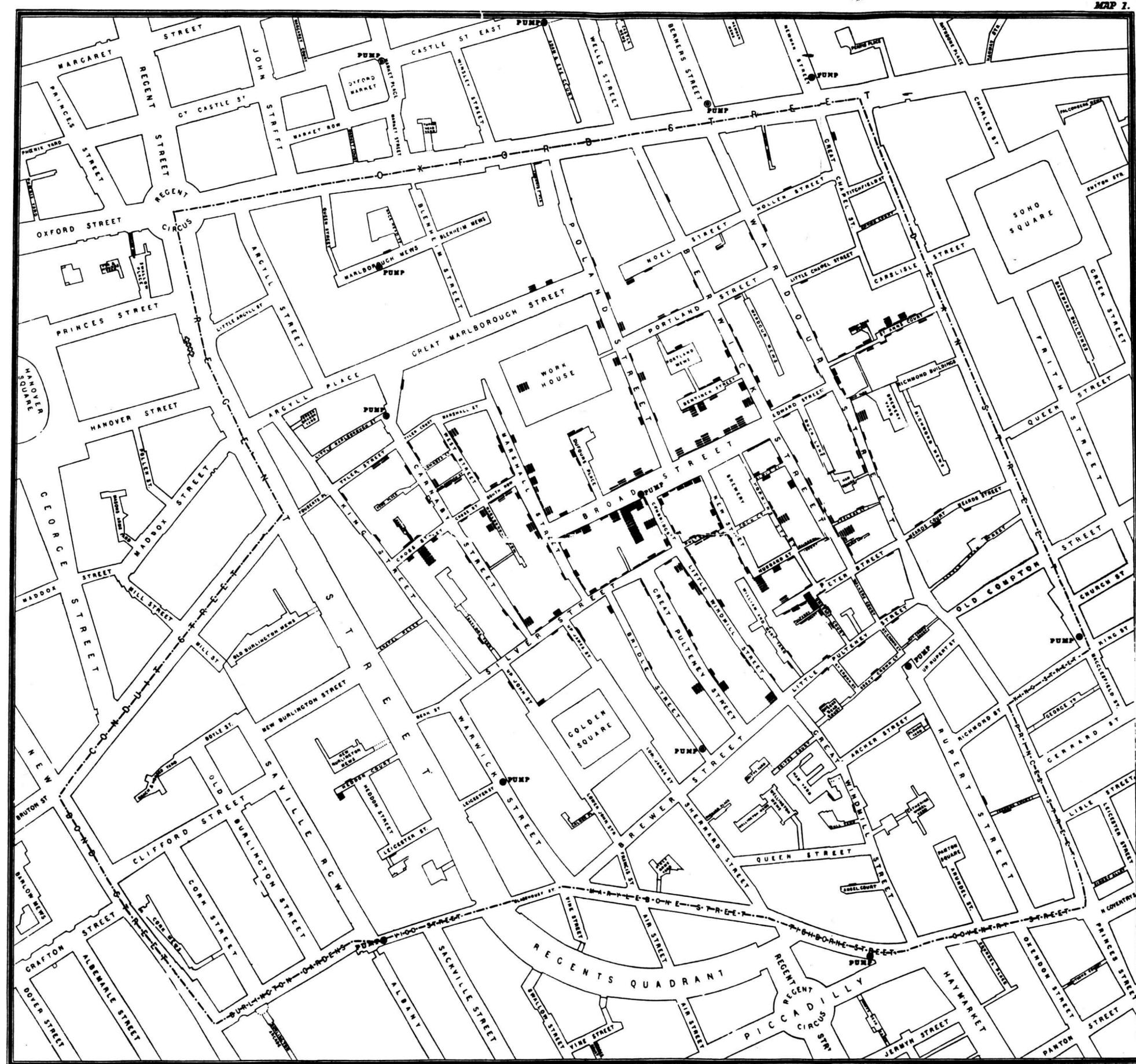
TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Cosaques passent au galop le Niemen gelé.



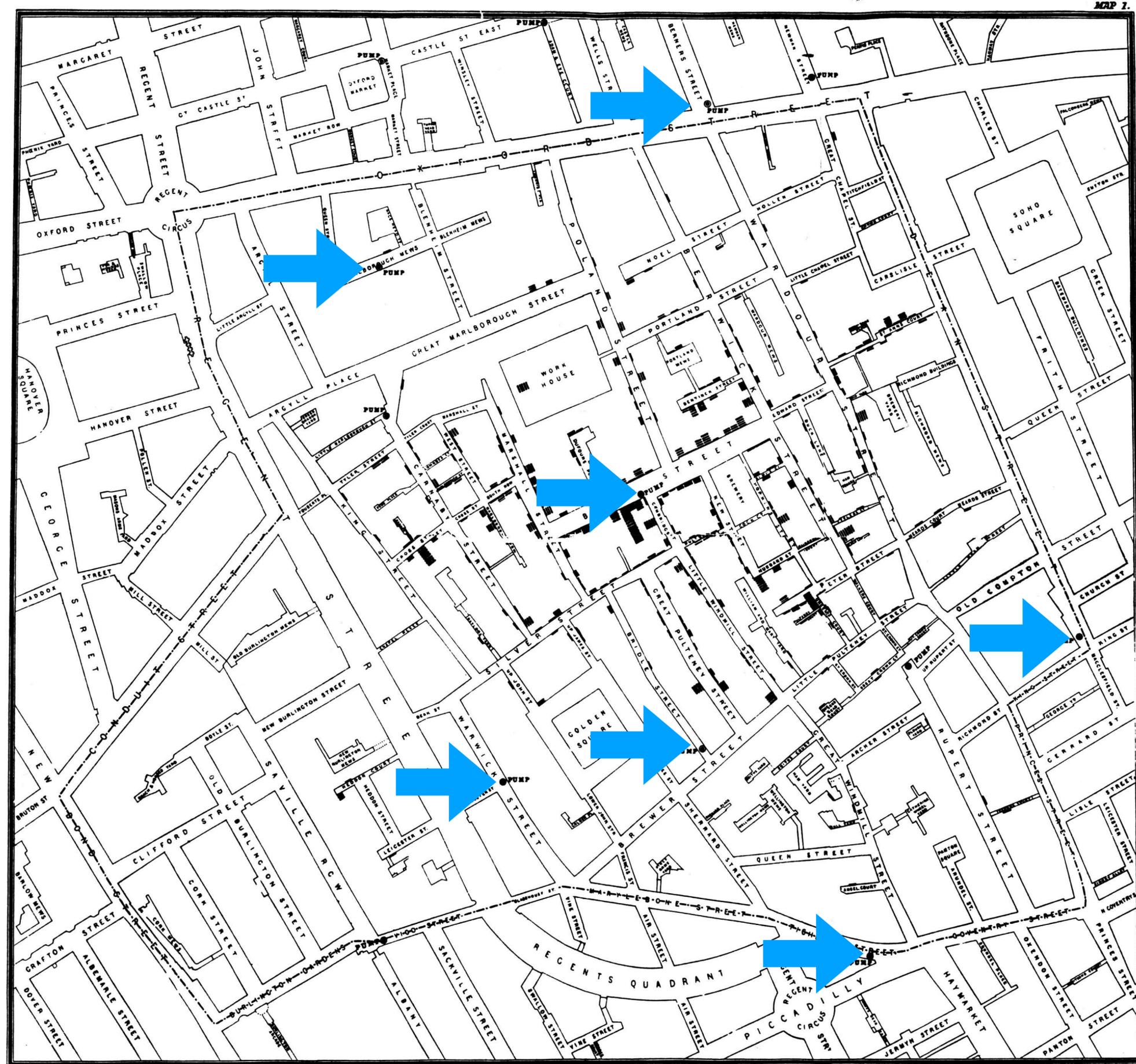
John Snow (1854)

- Mapa mostra residências com casos de cólera durante a epidemia de 1854, em Londres



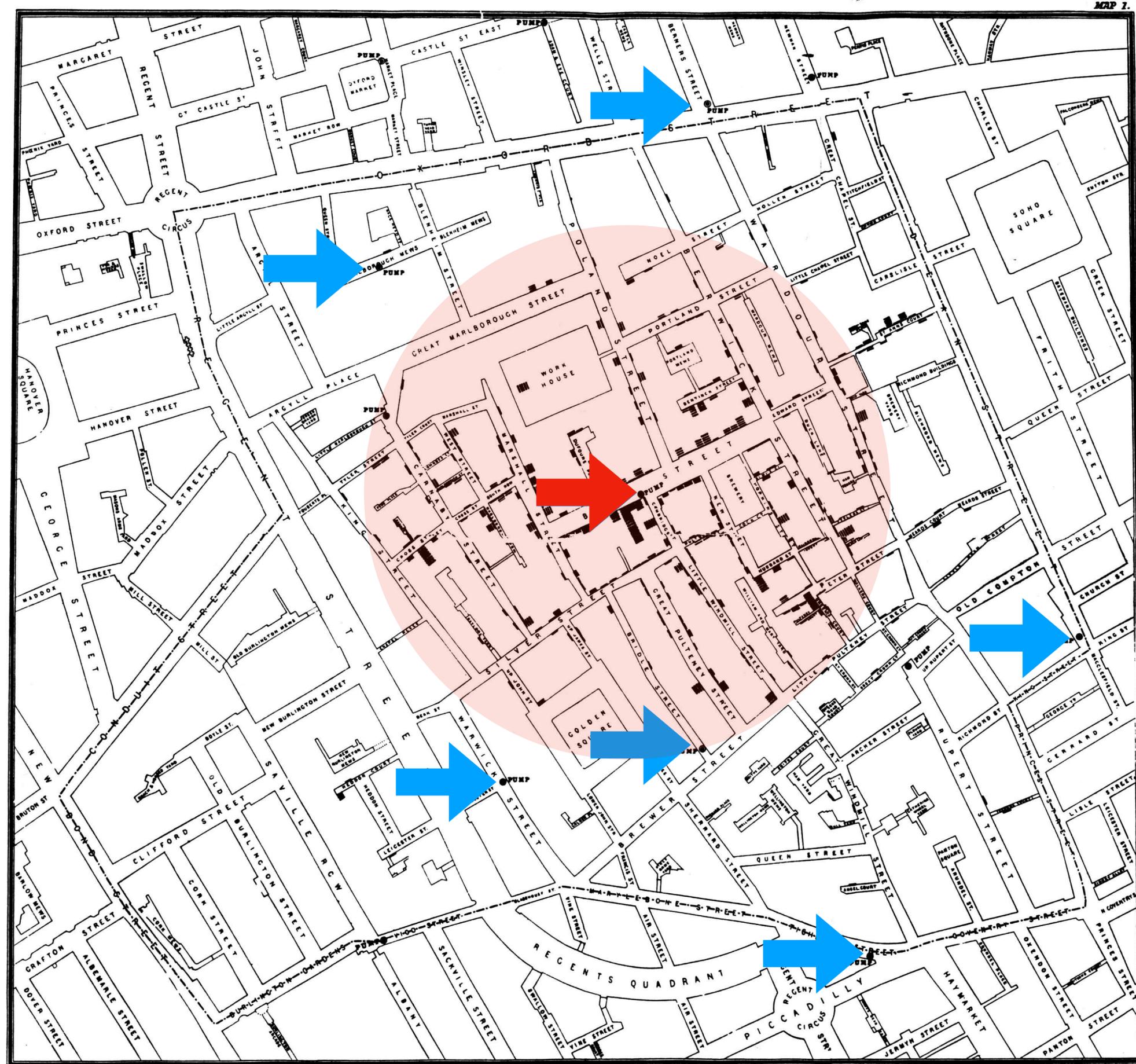
John Snow (1854)

- Mapa mostra residências com casos de cólera durante a epidemia de 1854, em Londres
- Setas mostram bombas d'água.



John Snow (1854)

- Mapa mostra residências com casos de cólera durante a epidemia de 1854, em Londres
- Setas mostram bombas d'água.
- Mapa revela dado importante: possível relação entre uma bomba d'água e casos de cólera



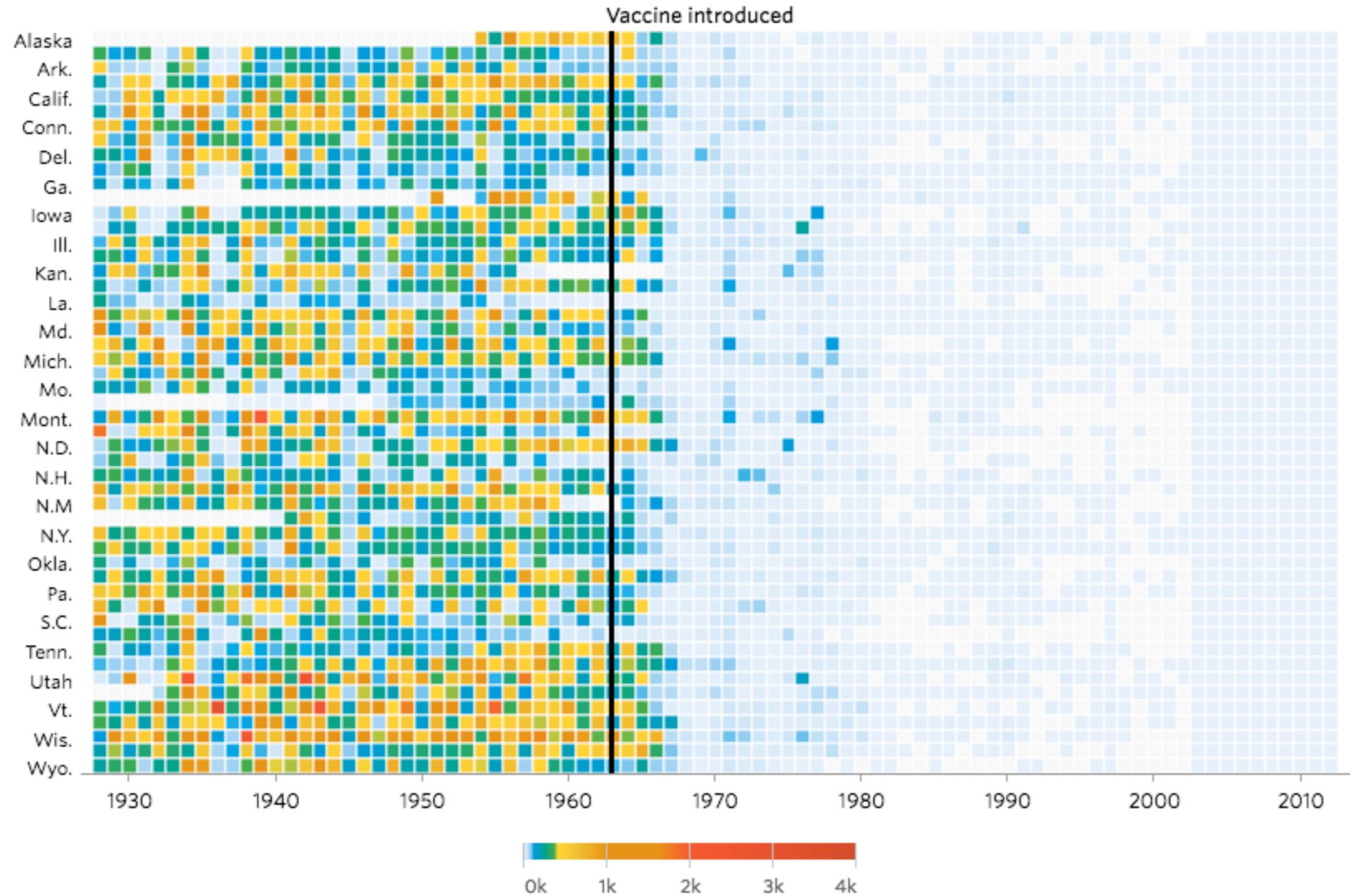
Vacinação contra o sarampo

T. DeBold, D. Friedman. "Battling
Infectious Diseases in the 20th
Century: The Impact of Vaccines"

WSJ, Feb 11, 2015

graphics.wsj.com/infectious-diseases-and-vaccines/

Measles



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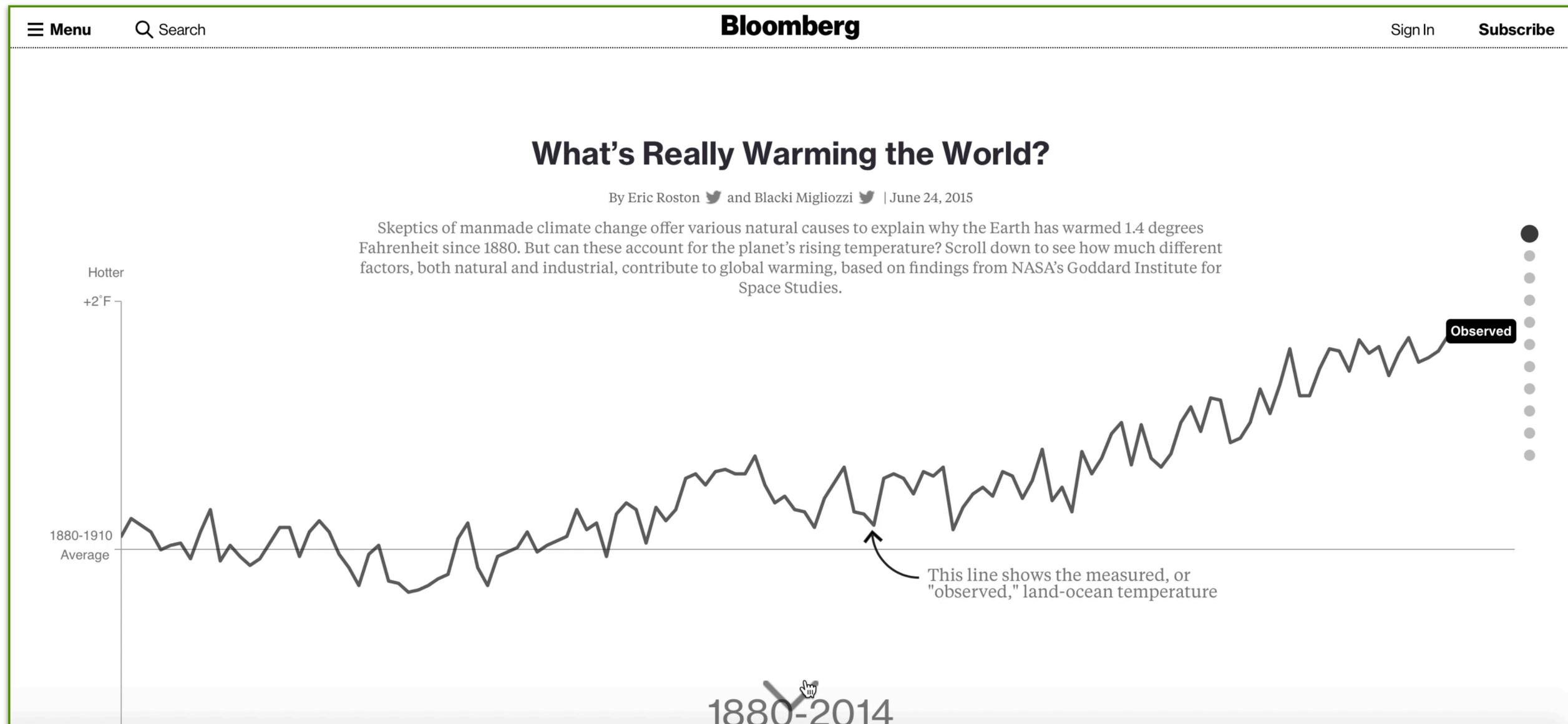
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Informações dinâmicas

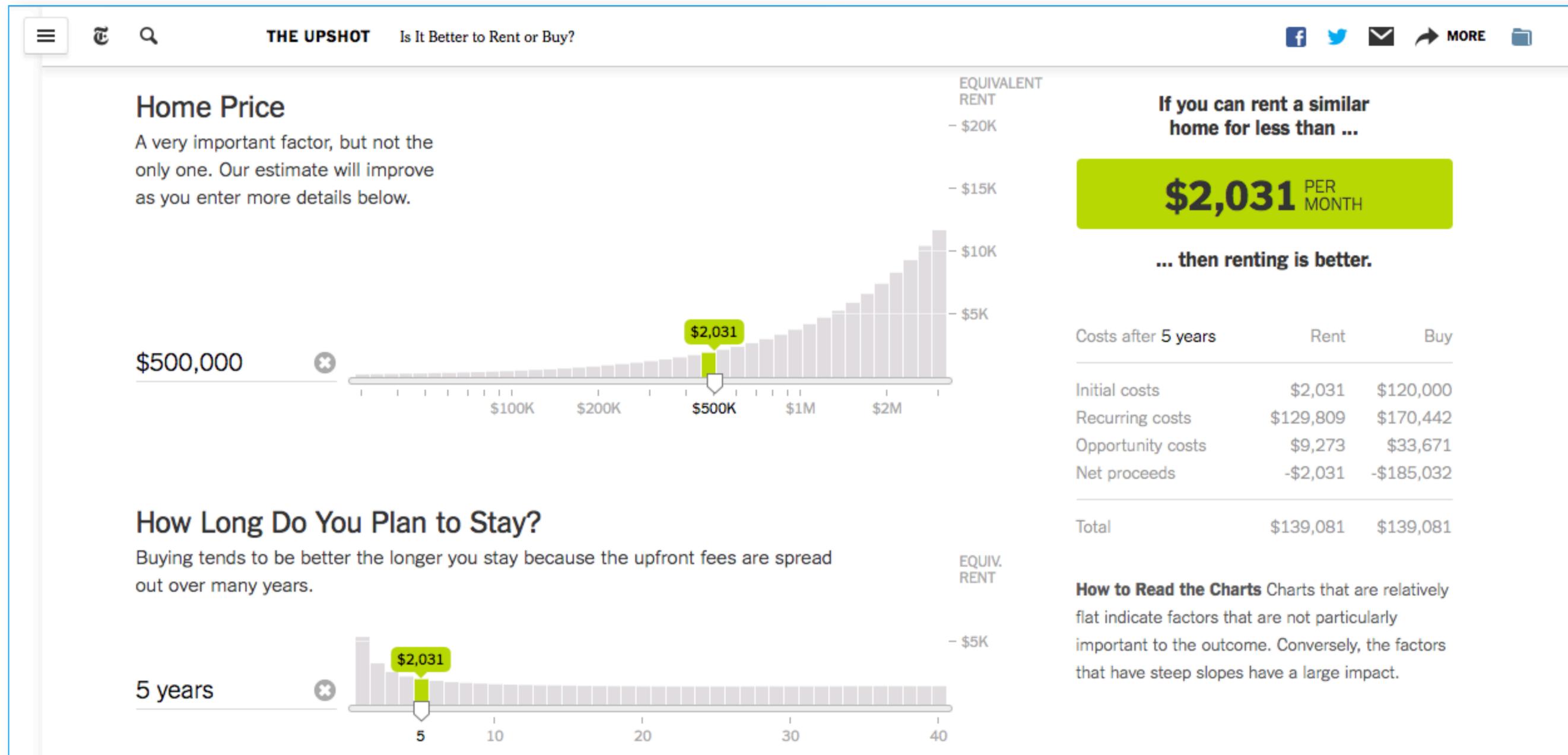


E. Roston, B. Migliozi. "What's Really Warming the World?" Bloomberg, June 24, 2015

Veja app interativa → www.bloomberg.com/graphics/2015-whats-warming-the-world/



Informações interativas



M. Bostock, S. Carter, A. Tse. "Is It Better to Rent or Buy?" NYTimes. May 22, 2014.

Veja app interativa → www.nytimes.com/interactive/2014/upshot/buy-rent-calculator.html



Informações em tempo real

- + contexto
- + detalhe

flightradar24
LIVE AIR TRAFFIC

Log in UTC 06:16

AIRCRAFT 1,500 / 11,703

AIRPORT DELAYS

AIRPORT	ARR	DEP
Larnaca (LCA)	1.0	3.3
Vancouver (YVR)	1.3	2.7
Jeju (CJU)	1.2	2.3
Naha (OKA)	0.6	2.8
Dubai (DXB)	0.4	2.9

[Go to delay map](#)

TWEETS

Pope Francis is returning to Rome aboard @AerLingus #EI2408.
<https://t.co/DCR5xv1...>
12 hours ago

Once again across the Atlantic.
<https://t.co/5UdWTXtck4>
<https://t.co/2ncnu0...>
1 day ago

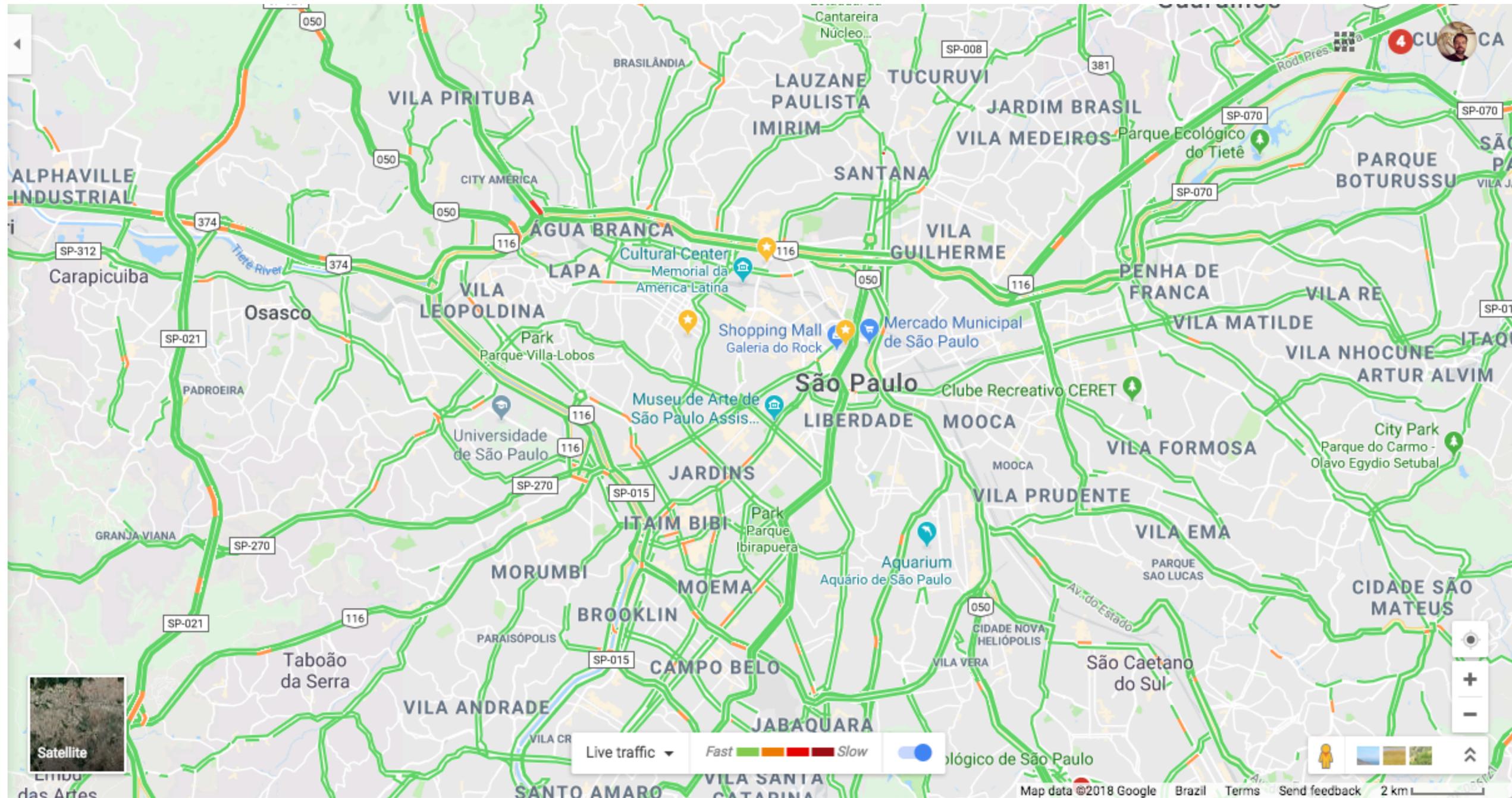
BLOG POSTS

AvTalk Episode 38: The Horizon Q400 Incident

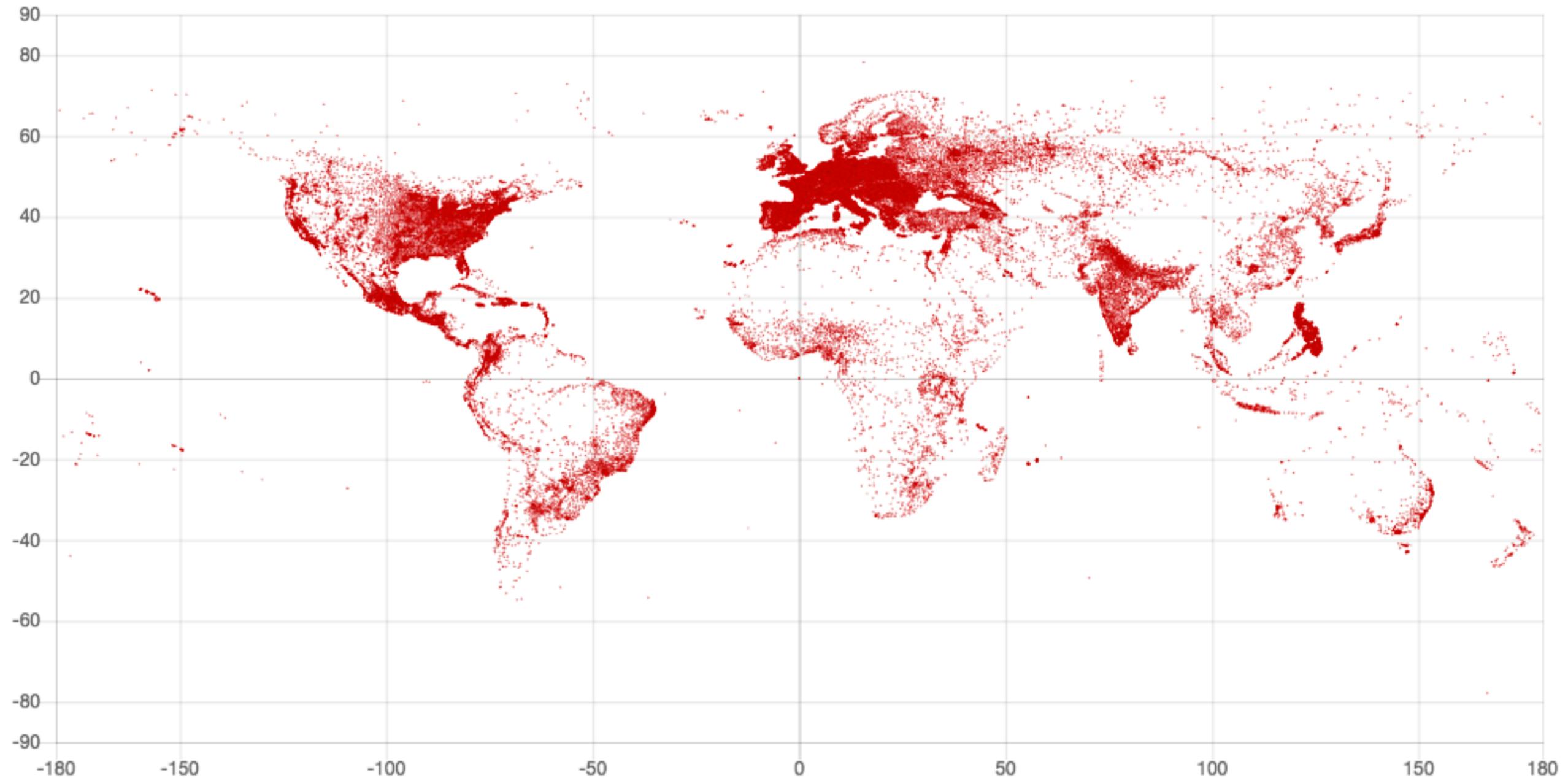


Informações em tempo real

- + contexto
- + detalhe



Big Data



Latitude e longitude de + de 100000 localidades com mais de 1000 habitantes **revela** mapa da presença humana.

Gráfico gerado com [Chart.js](#) + dados obtidos em [geonames.org](#)



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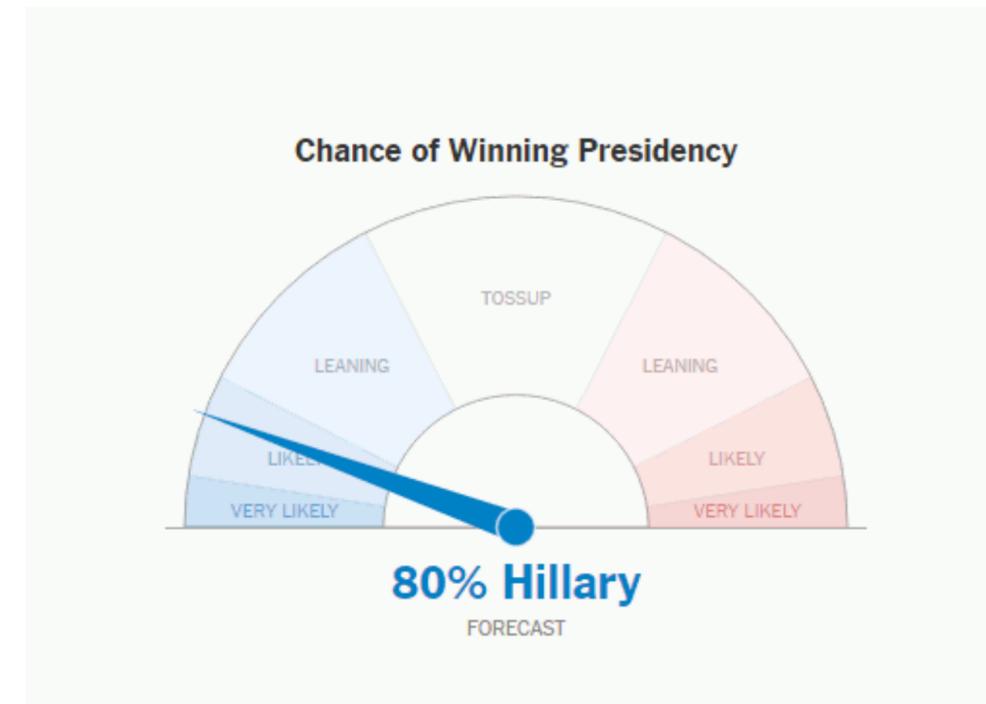
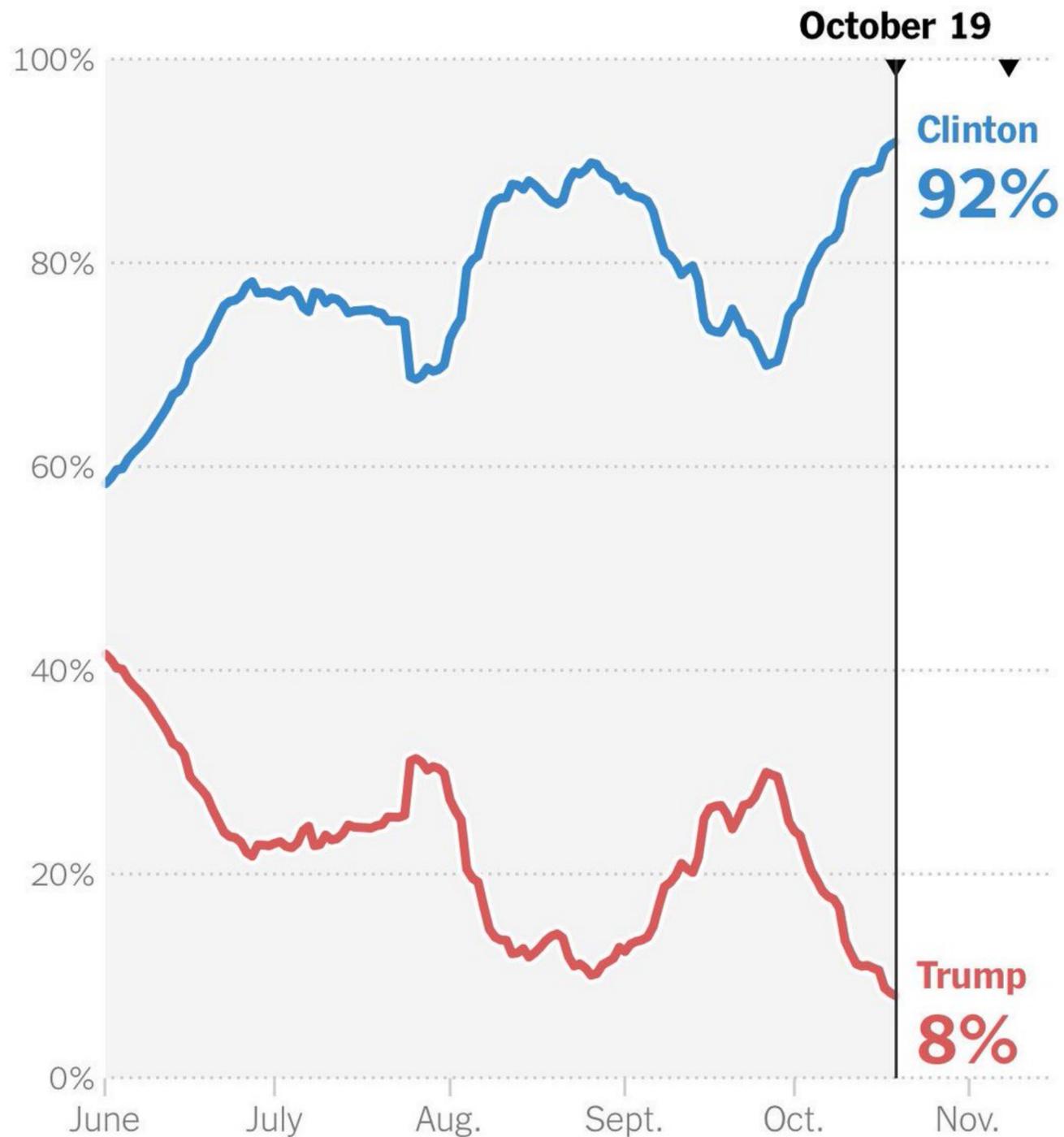
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Gráficos que omitem, iludem e mentem

Tecnologias serviços e ferramentas



Quando transmitem confiança excessiva



Gráficos não incentivam o **questionamento** de **dados e metodologias**.
Pessoas **confiam** mais em argumentos acompanhados de gráficos.

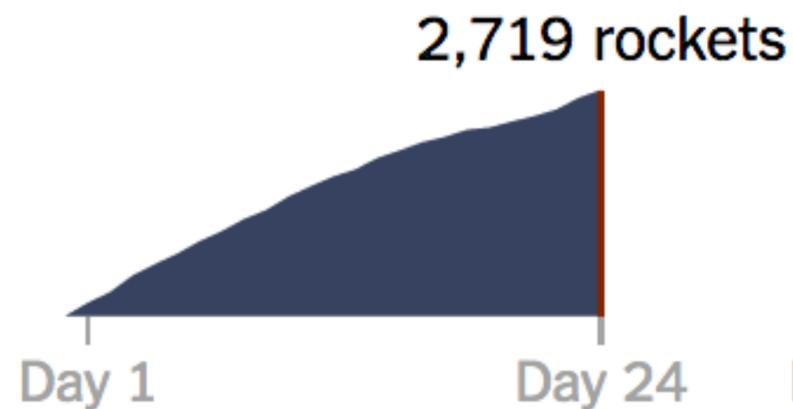
A. Tal, B. Wansink "Blinded with science: Trivial graphs and formulas increase ad persuasiveness and belief in product efficacy"
(Oct 15, 2014)



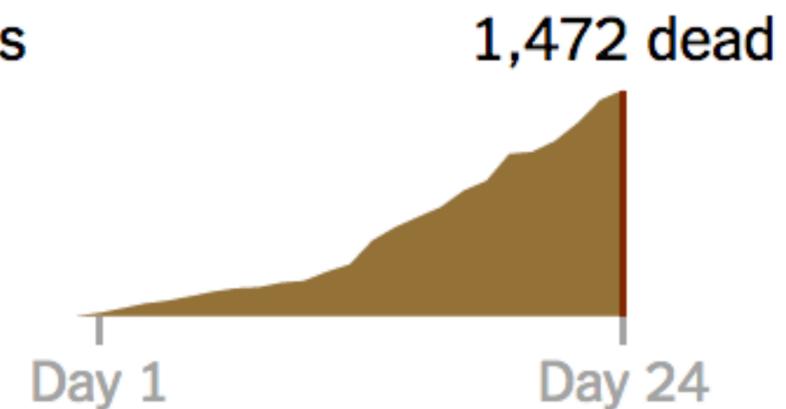
Quando omitem dados

Reportagem interativa de J. Ashkenas, A. Tse, K. Yourish, 31/07/2014, NYTimes
www.nytimes.com/interactive/2014/07/31/world/middleeast/in-gaza-a-pattern-of-conflict.html

Total cumulativo de foguetes atirados contra Israel a partir de Gaza



Total cumulativo de mortes no conflito



Fonte: Anna Flagg "Not fit to print: When good design goes bad"

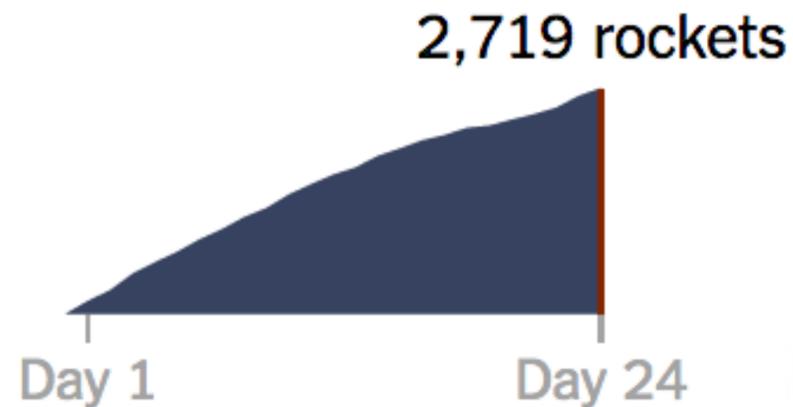
medium.com/aj-news/not-fit-to-print-when-good-design-goes-bad-cc52931a2ce0



Quando omitem dados

Reportagem interativa de J. Ashkenas, A. Tse, K. Yourish, 31/07/2014, NYTimes
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Gráfico corrigido

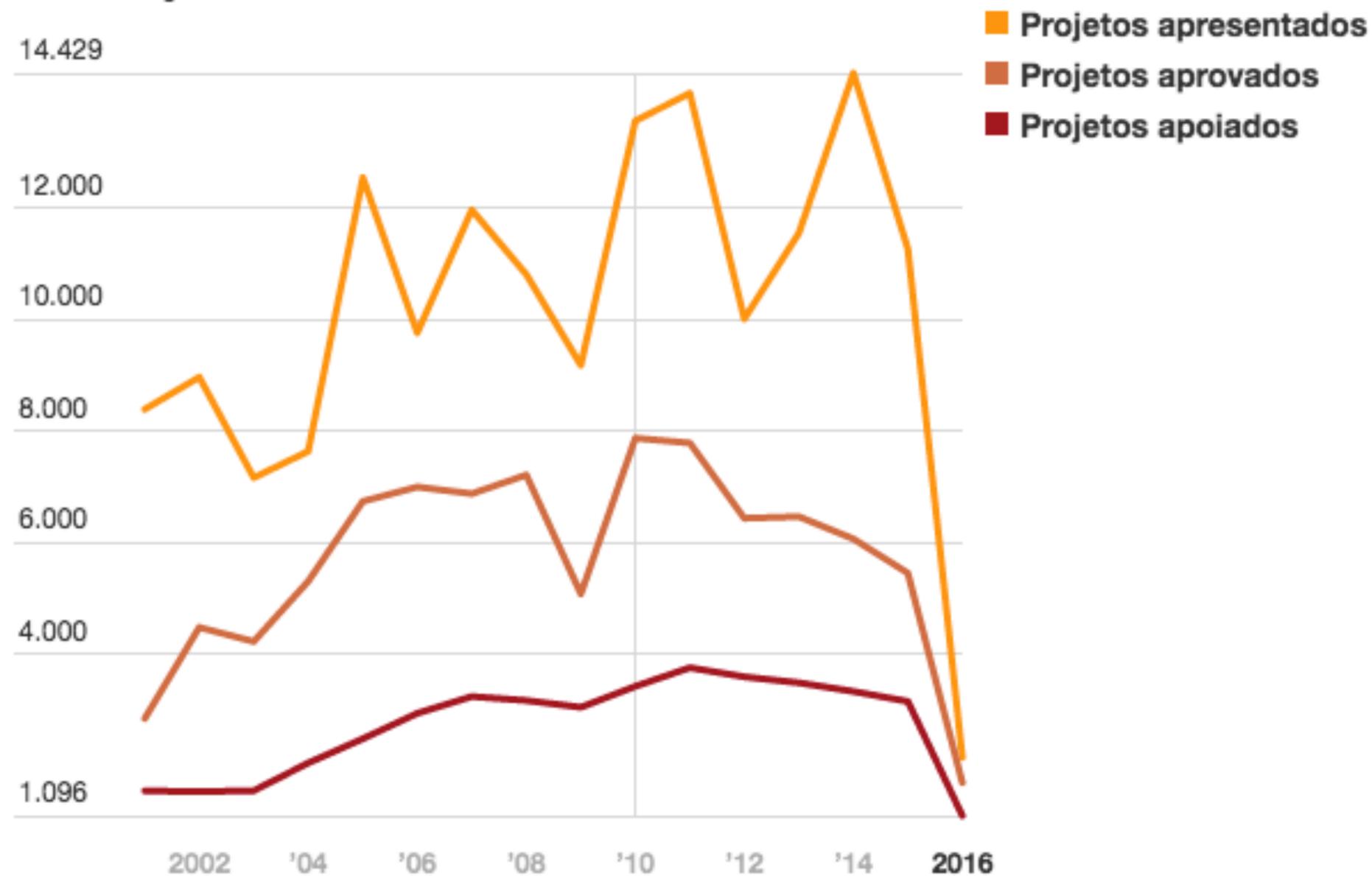
Fonte: Anna Flagg "Not fit to print: When good design goes bad"

medium.com/aj-news/not-fit-to-print-when-good-design-goes-bad-cc52931a2ce0



Quando omitem dados

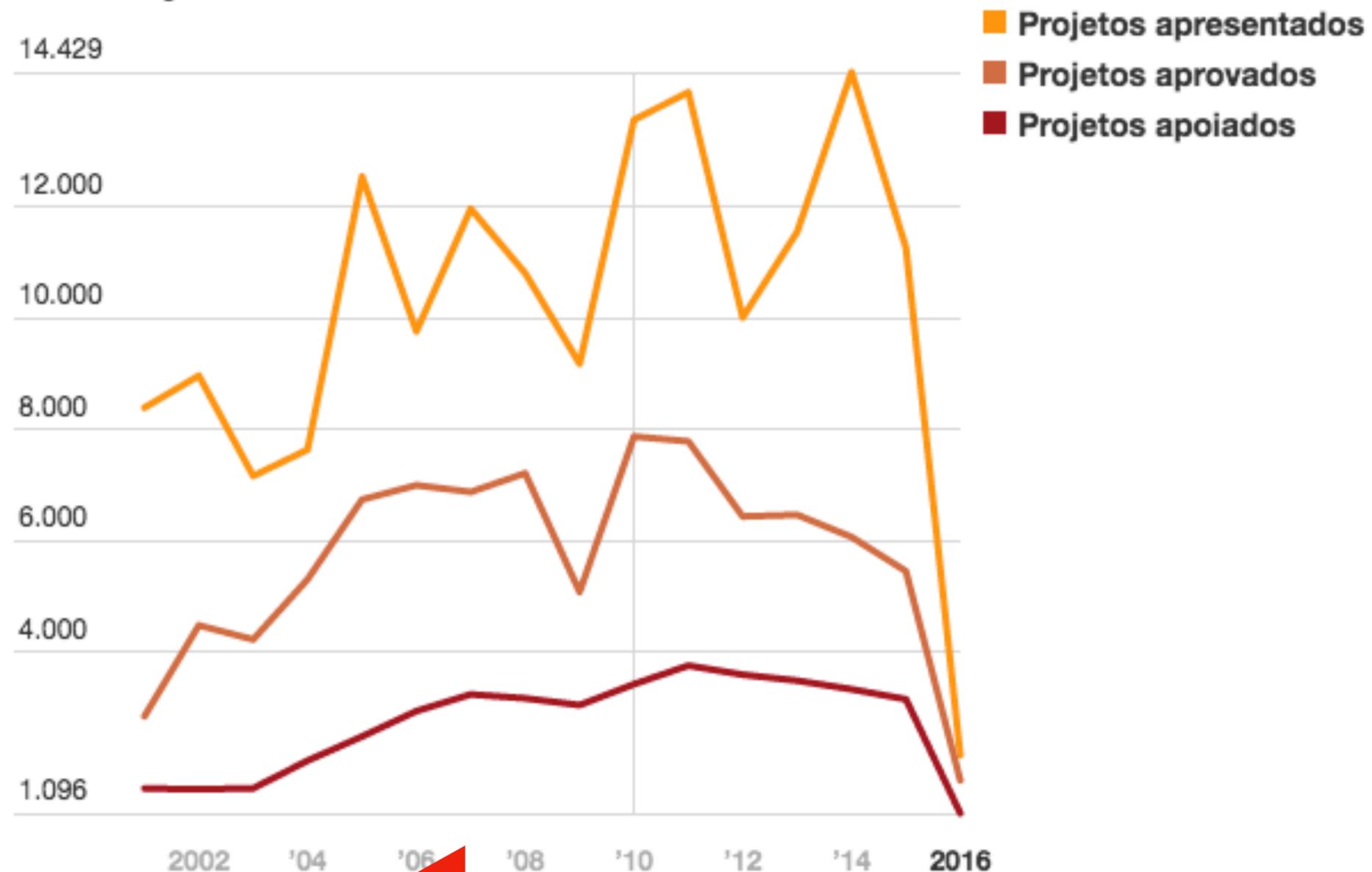
EVOLUÇÃO DOS GASTOS DA ROUANET



Dados de 2016 até o momento
Confira mais infográficos da [Folha](#)

Quando omitem dados

EVOLUÇÃO DOS GASTOS DA ROUANET

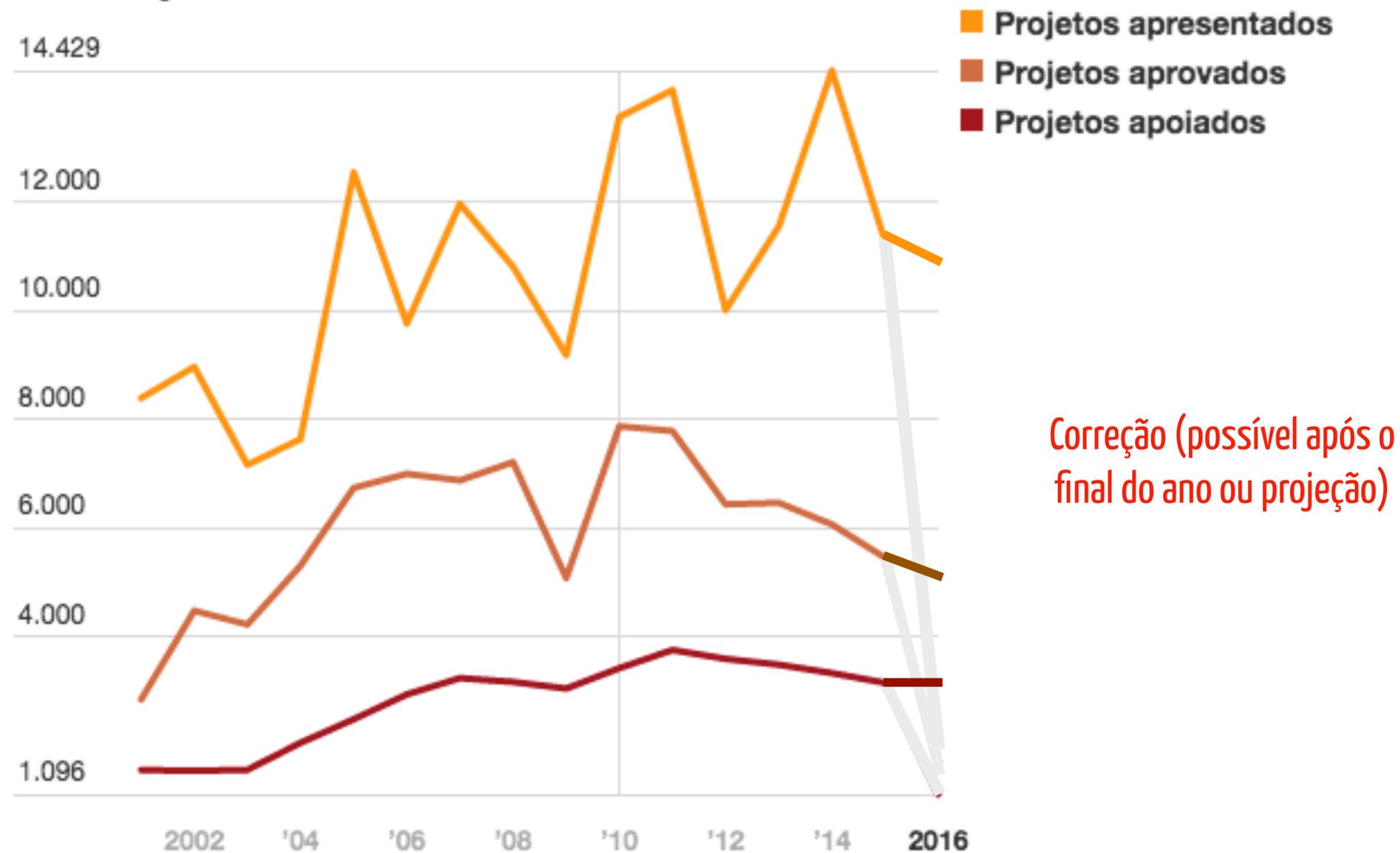


Dados de 2016 até o momento
Confira mais infográficos da [Folha](#)

← Mas o ano ainda não terminou (junho/2016)

Quando omitem dados

EVOLUÇÃO DOS GASTOS DA ROUANET



Dados de 2016 até o momento
Confira mais infográficos da [Folha](#)

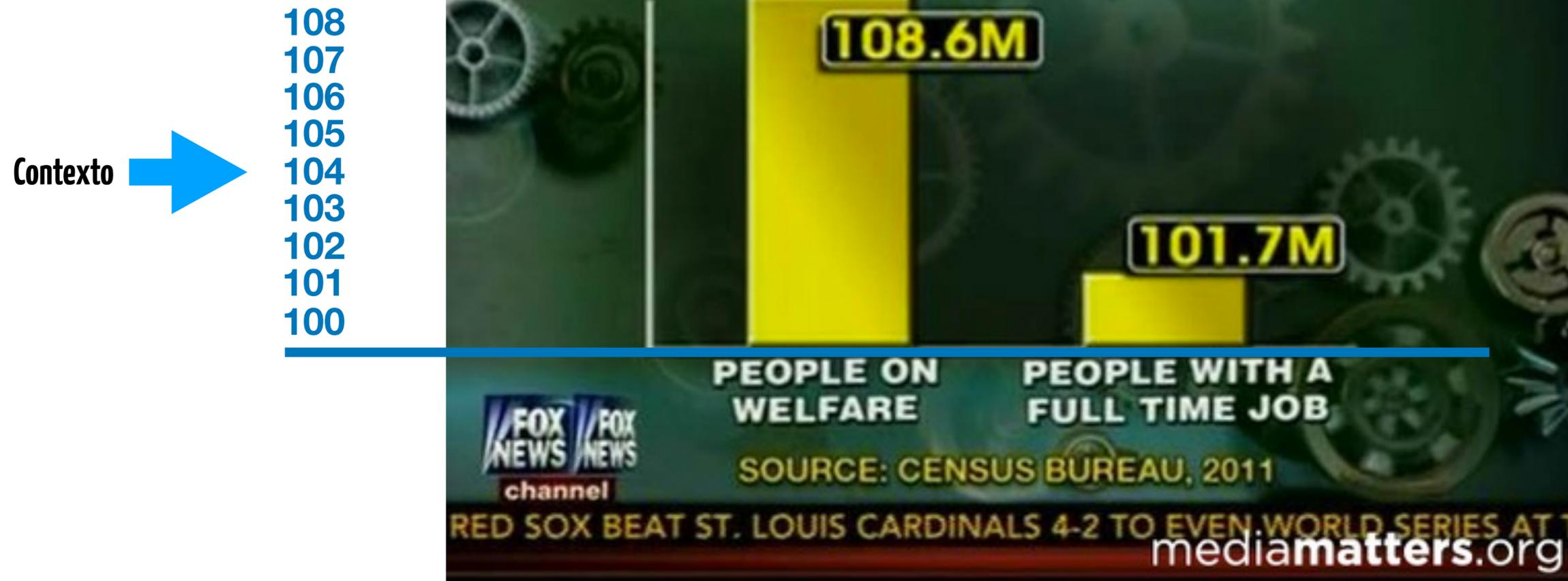
Quando erram a escala: falta de contexto



<https://www.datapine.com/blog/misleading-data-visualization-examples/>



Quando erram a escala: falta de contexto



<https://www.datapine.com/blog/misleading-data-visualization-examples/>



Quando erram a escala: falta de contexto

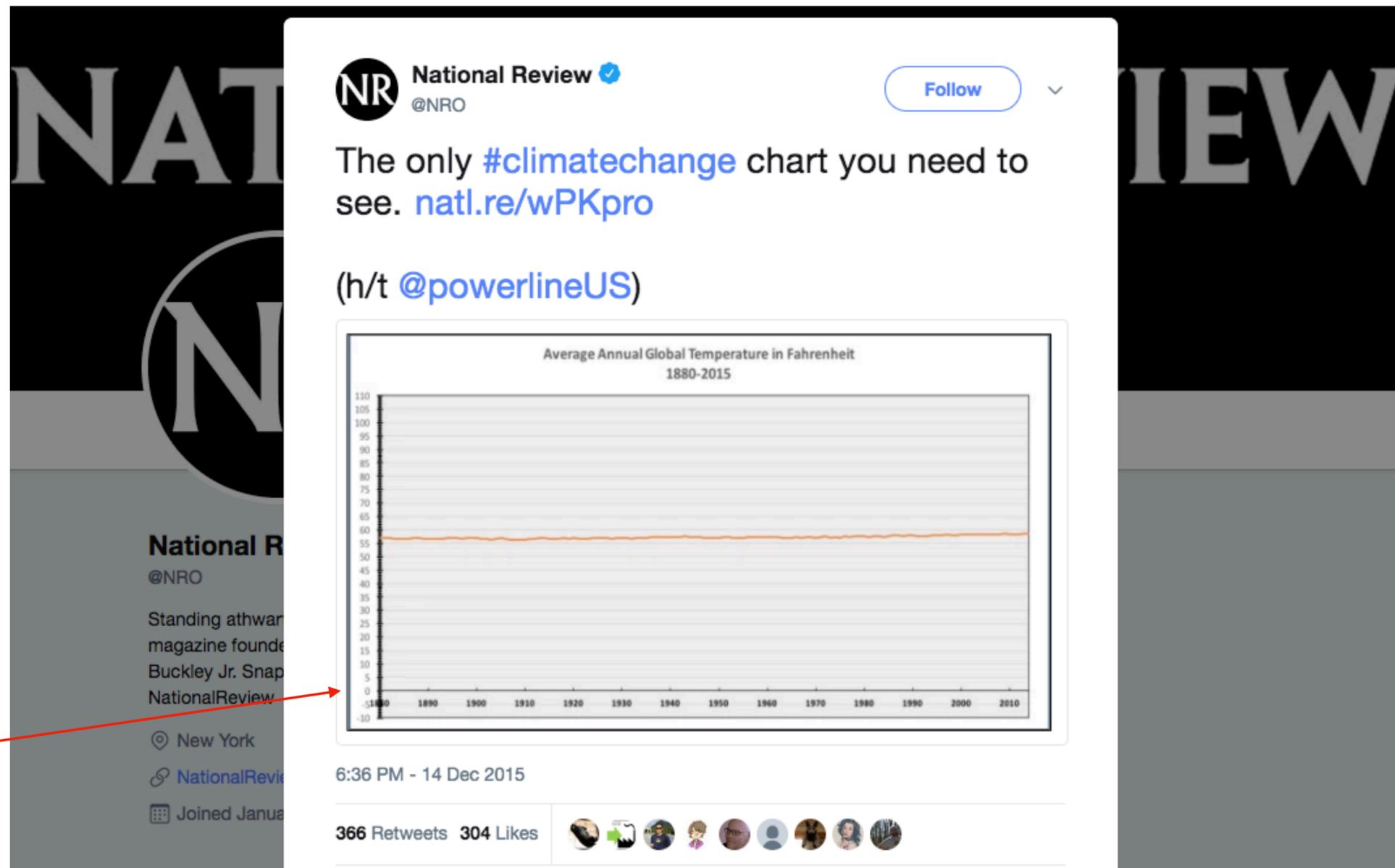


<https://www.datapine.com/blog/misleading-data-visualization-examples/>



Quando erram a escala: contextos irrelevantes

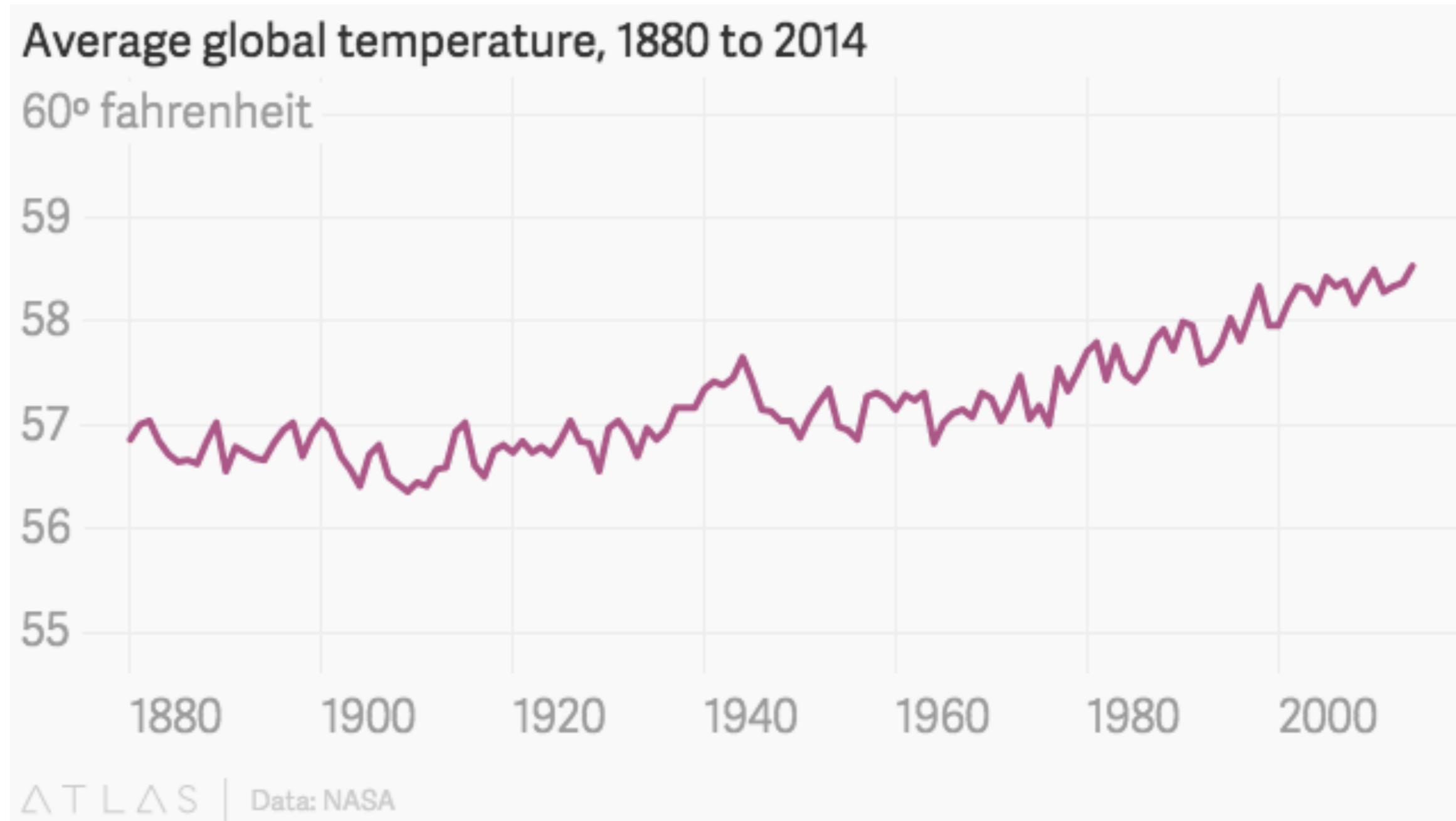
A média
nunca é zero



Fonte: K. Collins. "The most misleading charts of 2015, fixed", Dec 23, 2015.
qz.com/580859/the-most-misleading-charts-of-2015-fixed/



Quando erram a escala: contextos irrelevantes

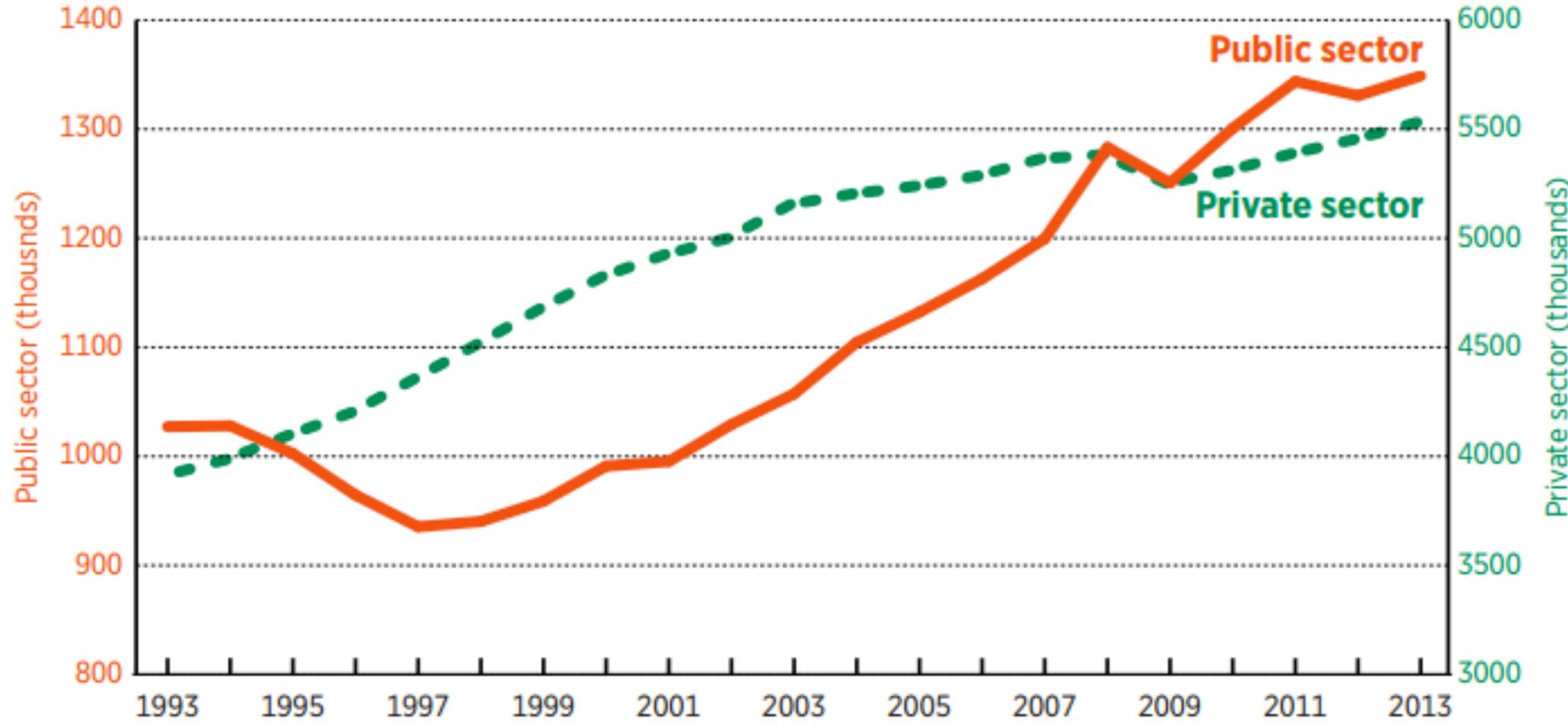


Fonte: K. Collins. "The most misleading charts of 2015, fixed", Dec 23, 2015.
qz.com/580859/the-most-misleading-charts-of-2015-fixed/



Quando misturam escalas diferentes

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



Source: Statistics Canada, CANSIM Table 282-0089: employment by class of worker and sex, seasonally adjusted and unadjusted; Ontario; Public sector and private sector employees; Both sexes; Seasonally adjusted (x 1,000).



Quando misturam escalas diferentes

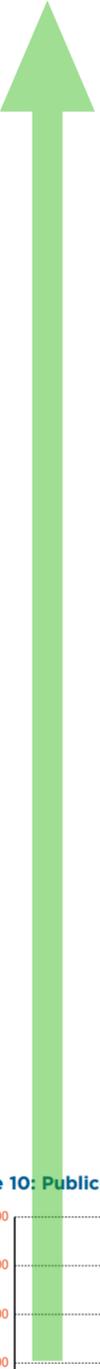
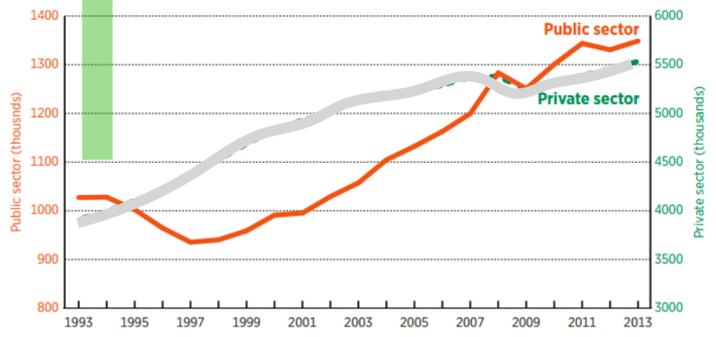


Figure 10: Public- and private-sector jobs (000s) in Ontario, 1993-2013

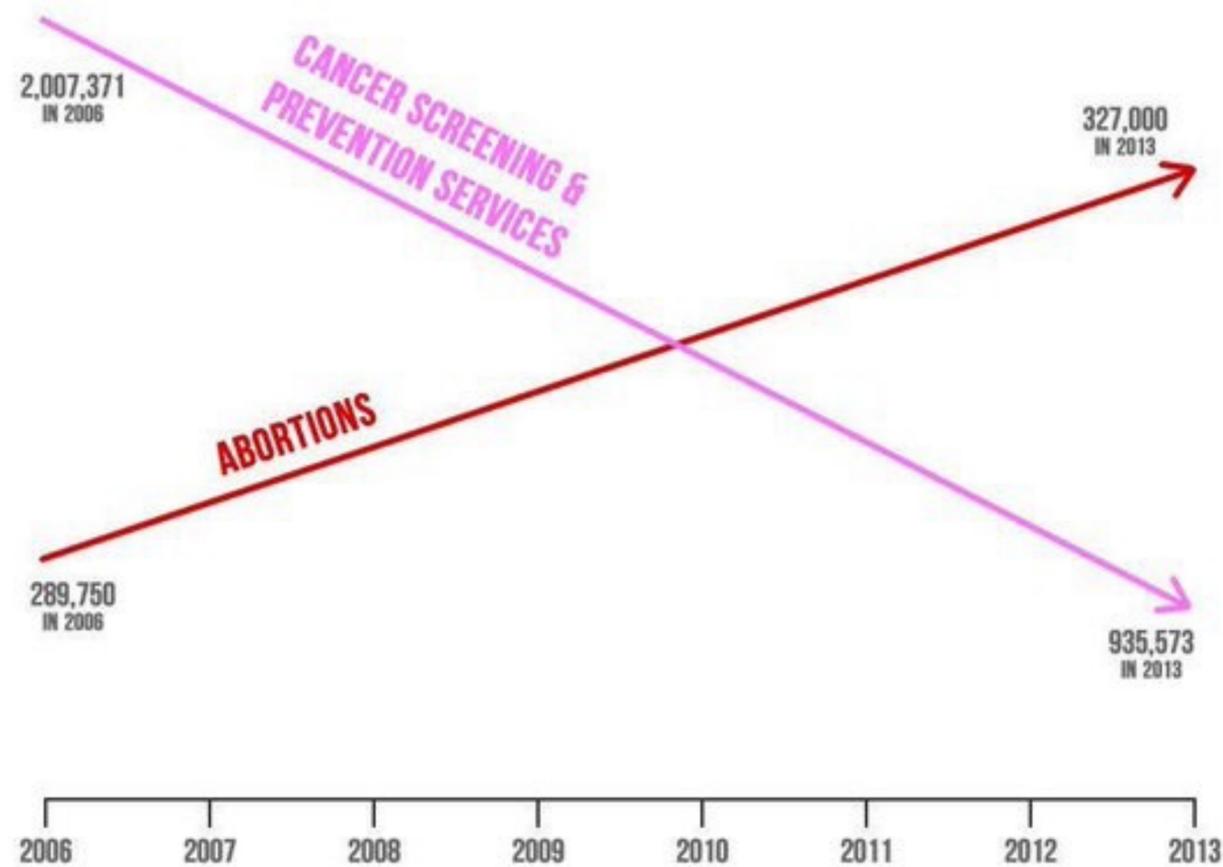


Source: Statistics Canada, CANSIM Table 282-0089: employment by class of worker and sex, seasonally adjusted and unadjusted; Ontario; Public sector and private sector employees; Both sexes; Seasonally adjusted (x 1,000).



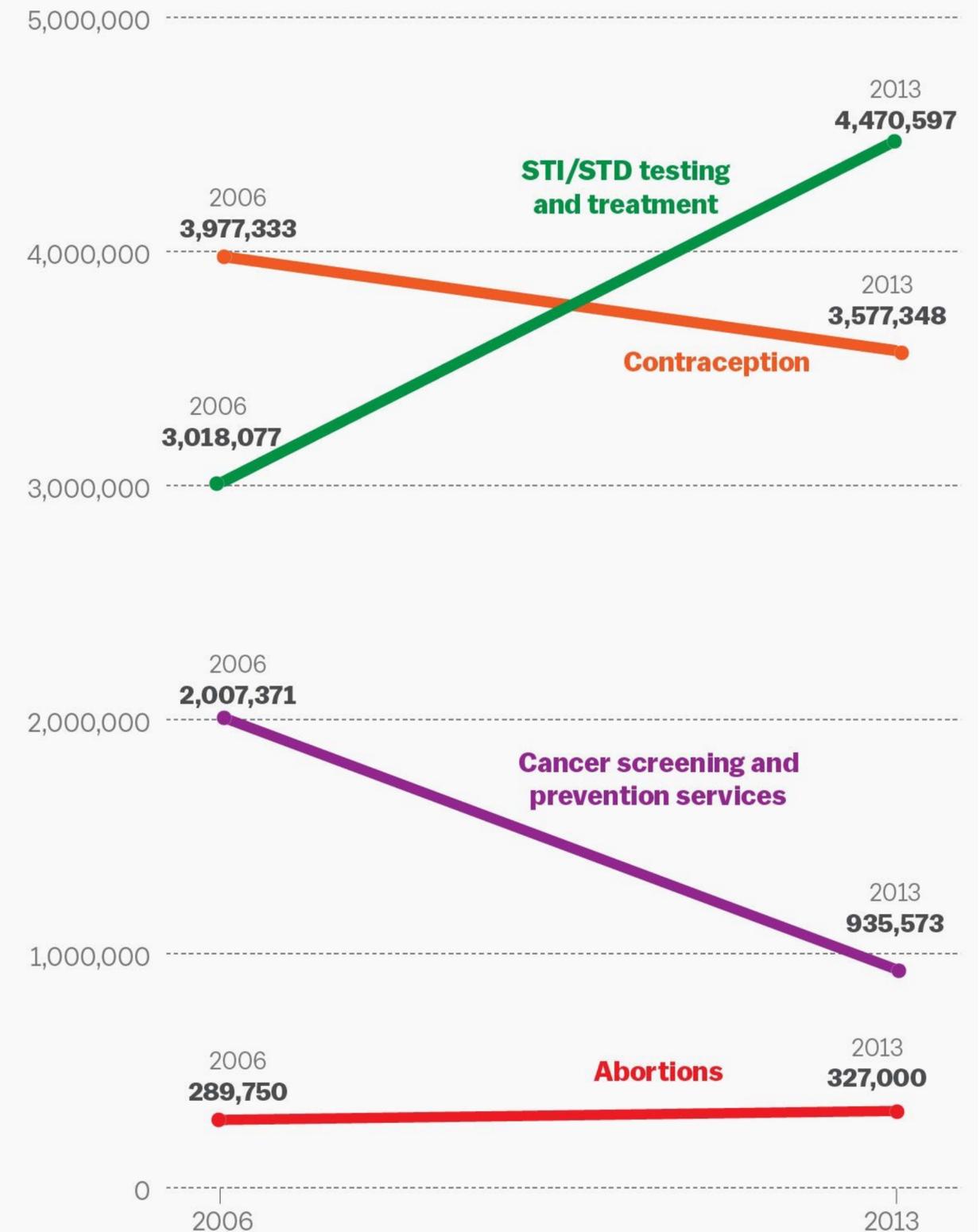
Quando mentem descaradamente

PLANNED PARENTHOOD FEDERATION OF AMERICA:
ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN



SOURCE: AMERICANS UNITED FOR LIFE

Services provided by Planned Parenthood

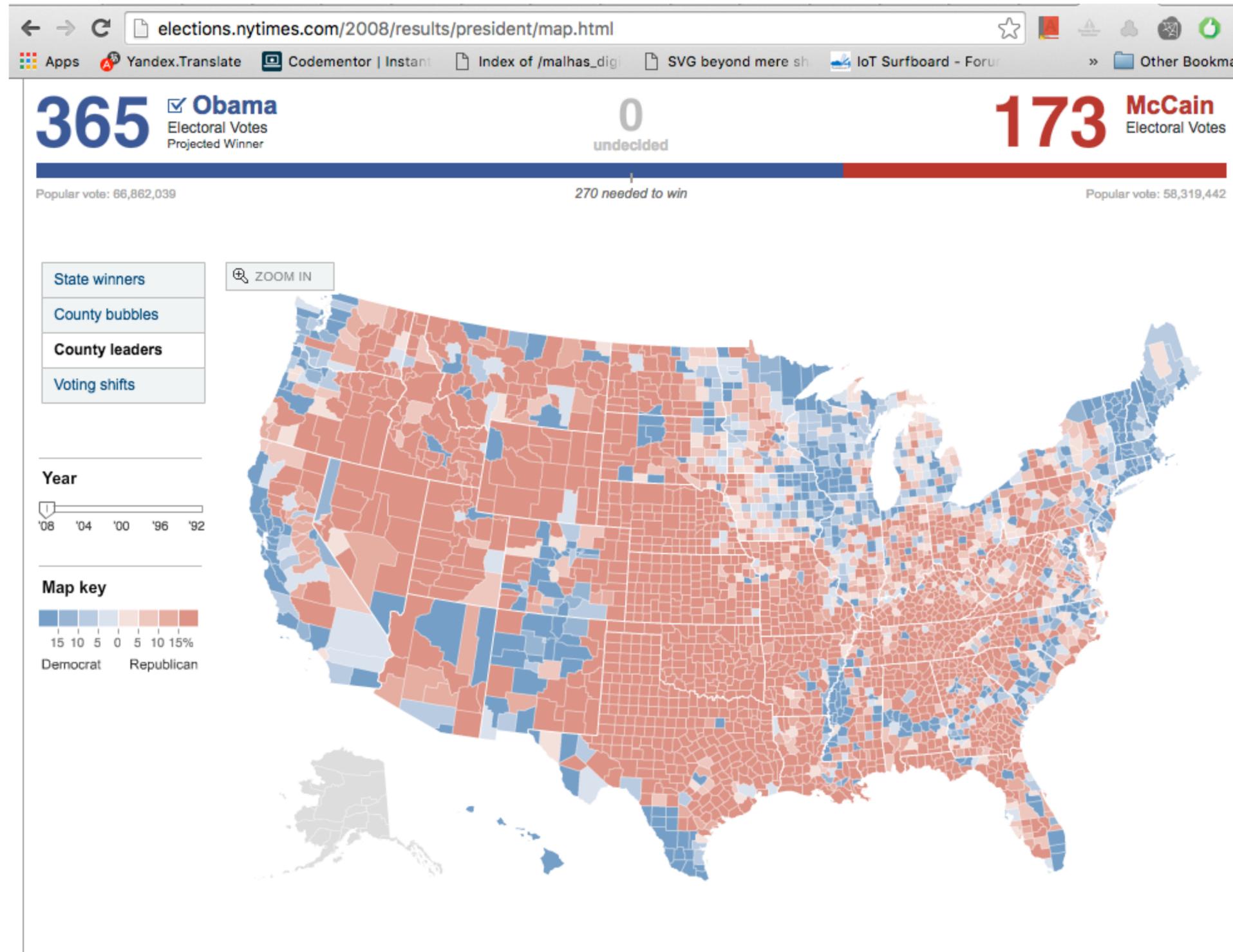


SOURCE: Planned Parenthood

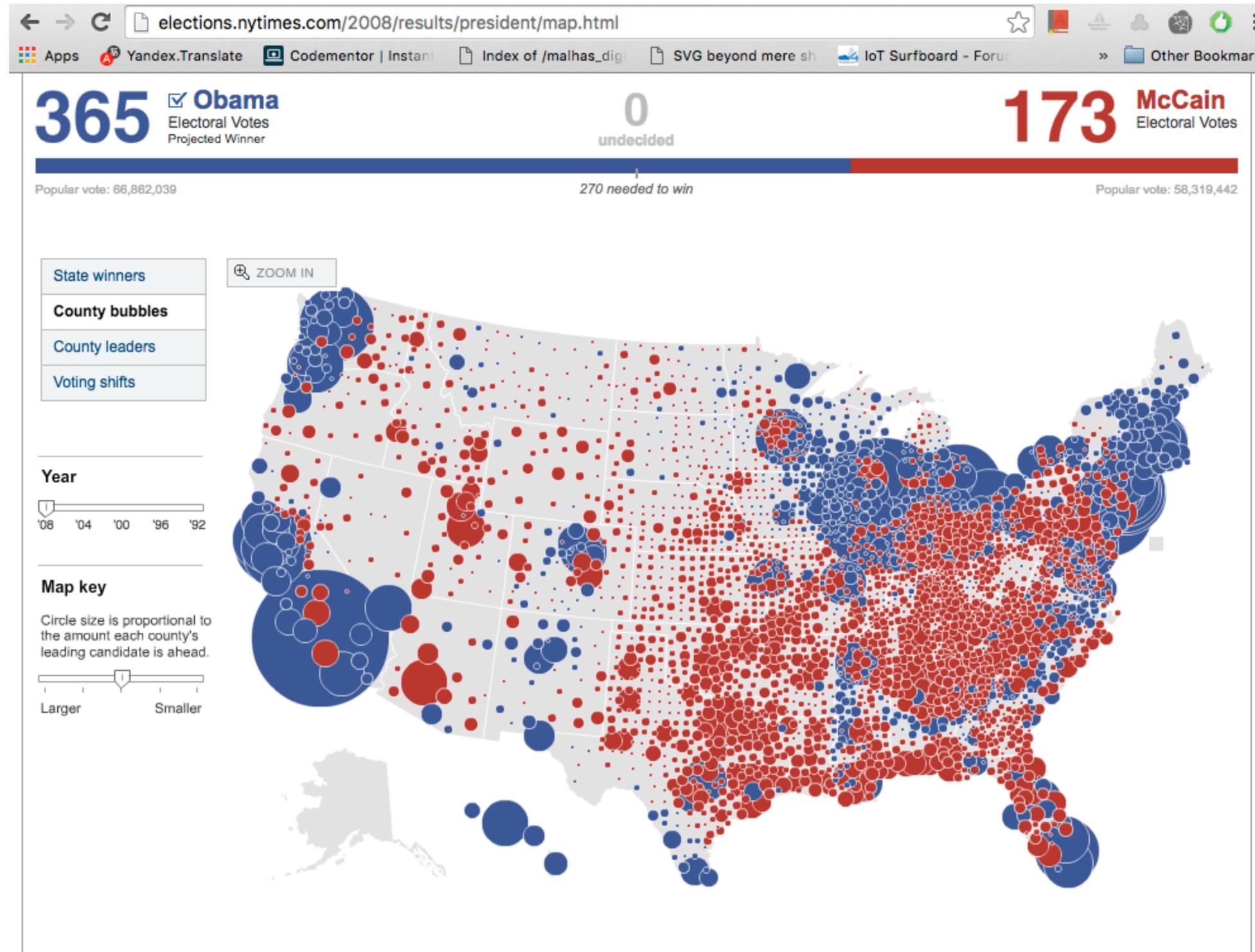
Vox



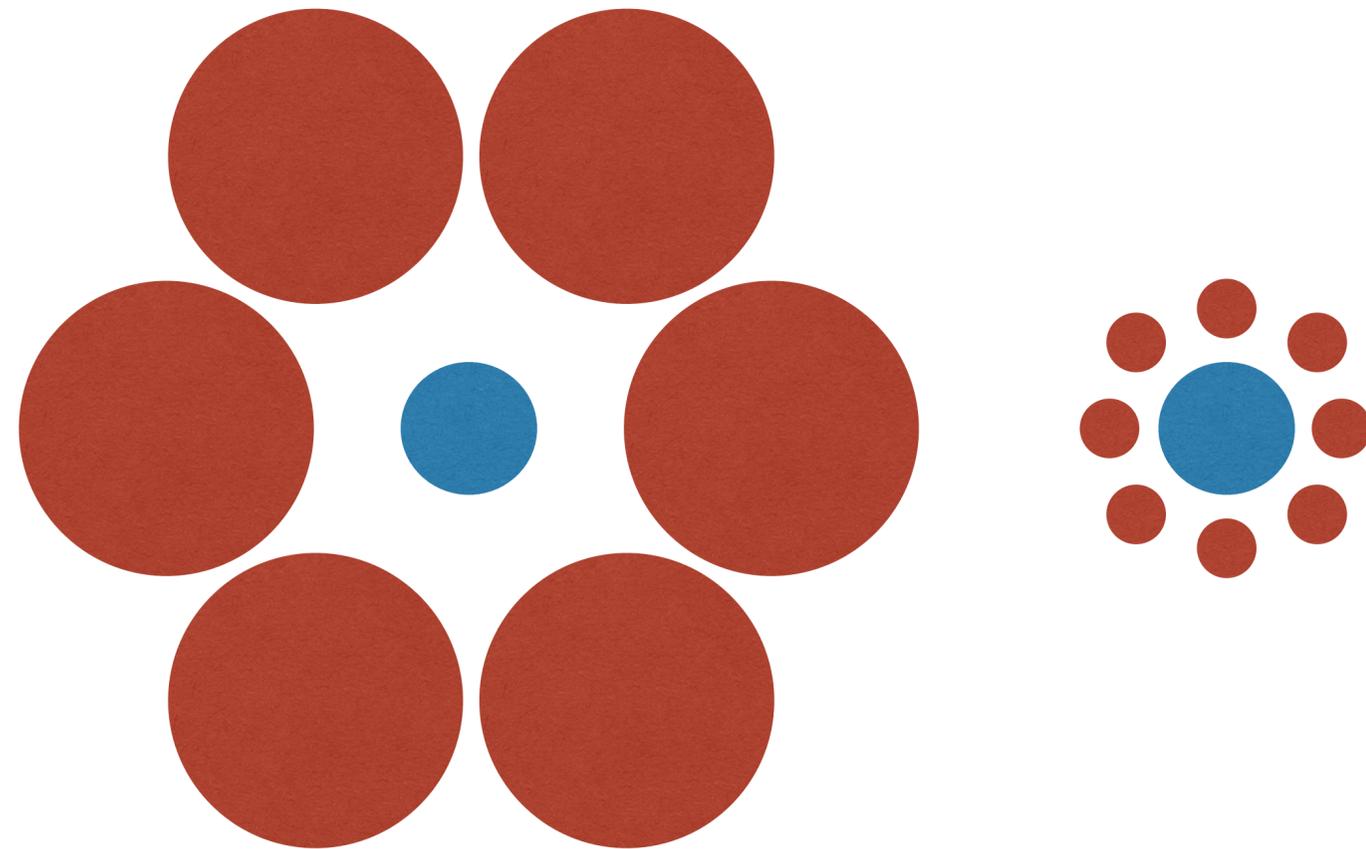
Ilusão de área



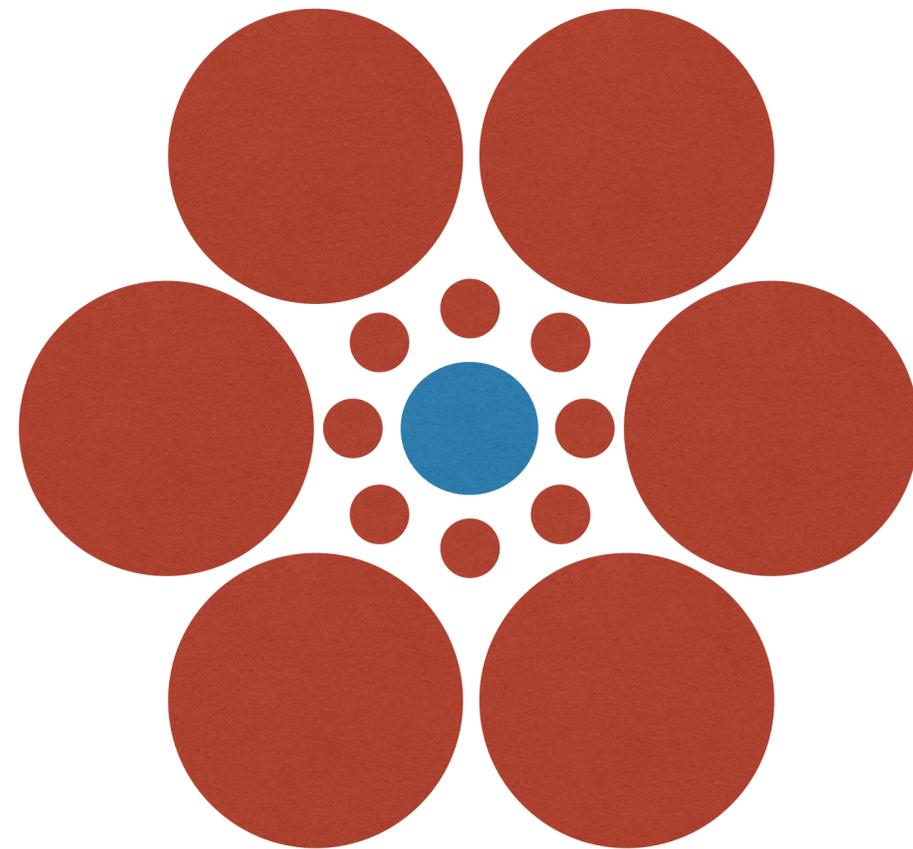
Ilusão de área



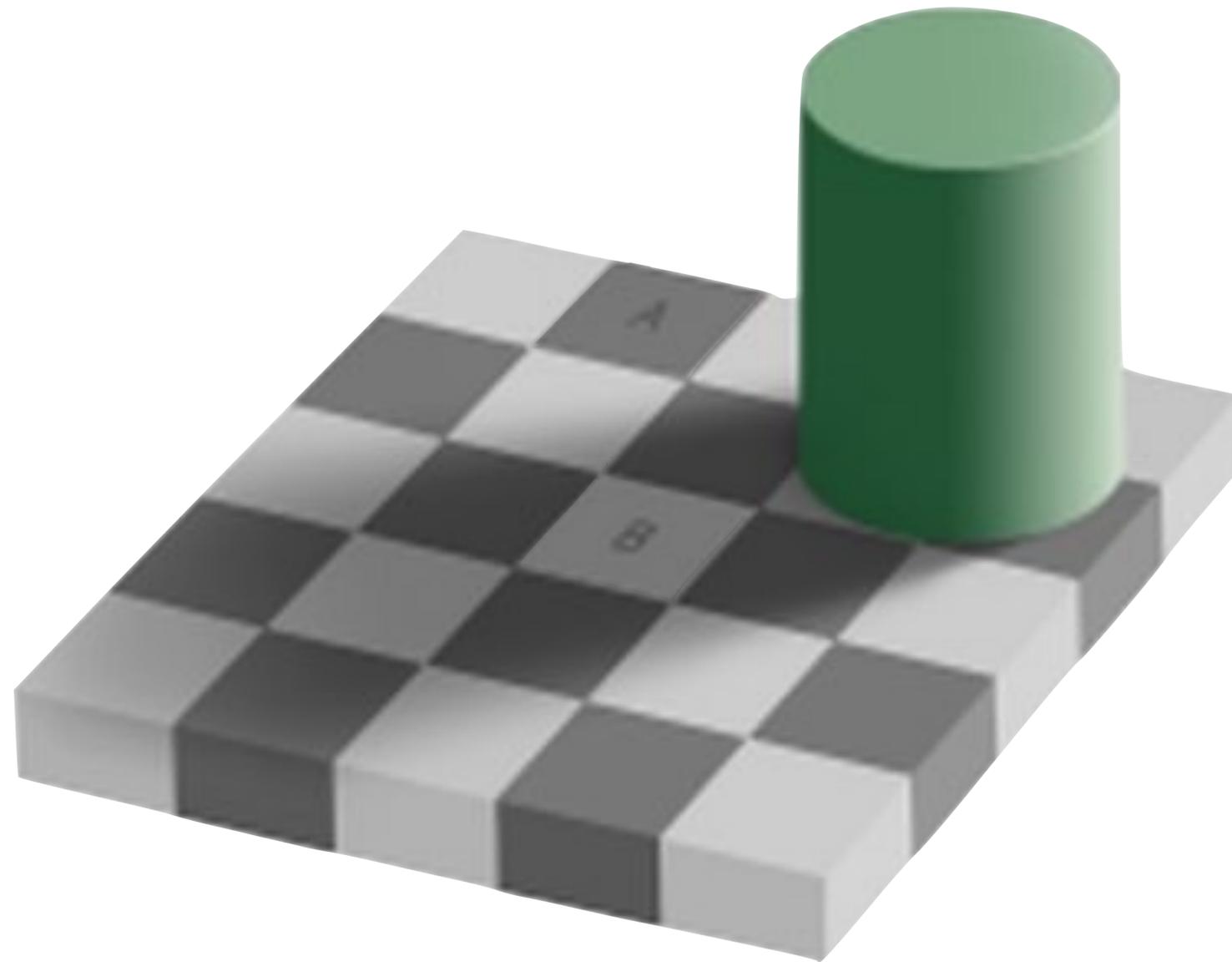
Ilusão de área



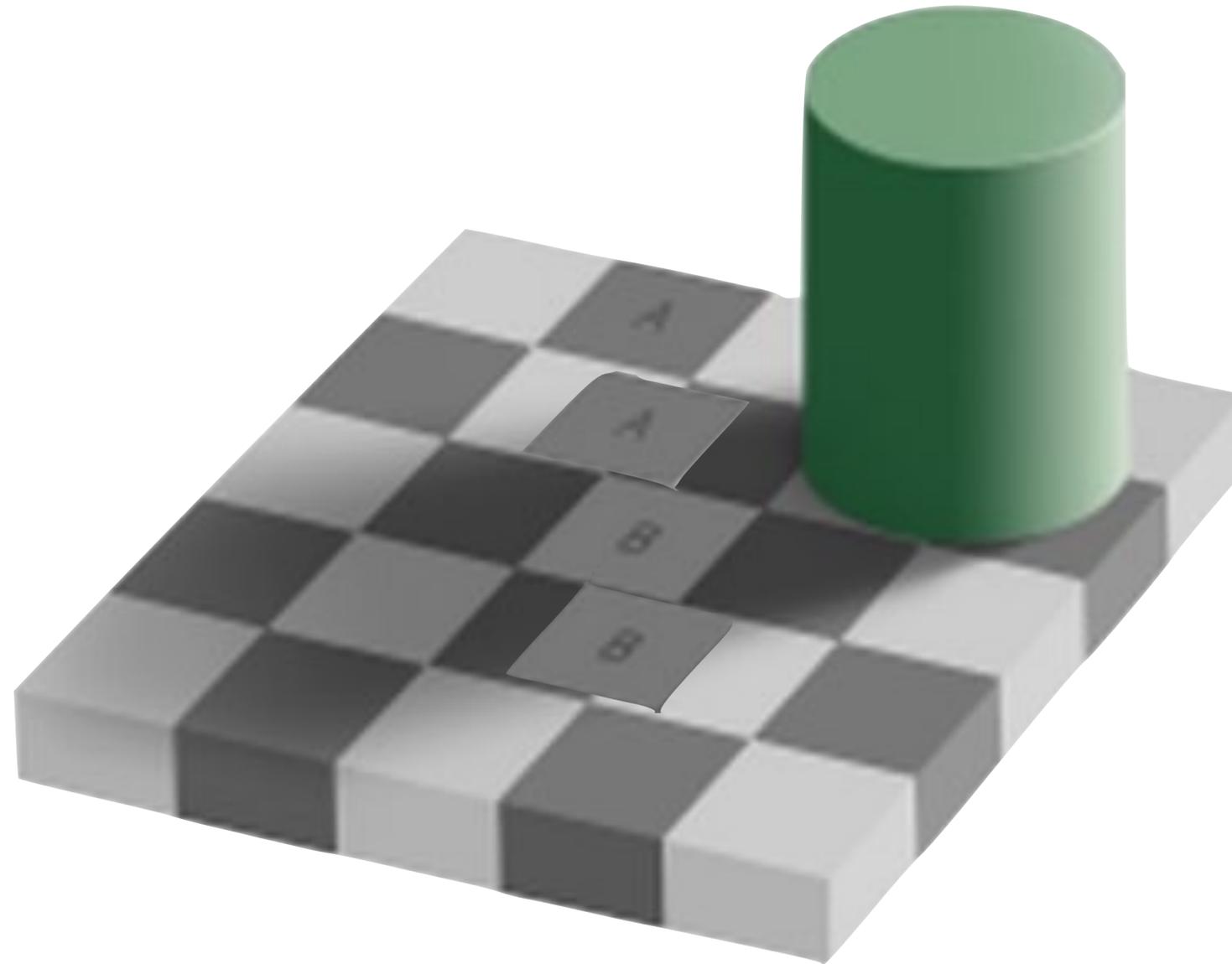
Ilusão de área



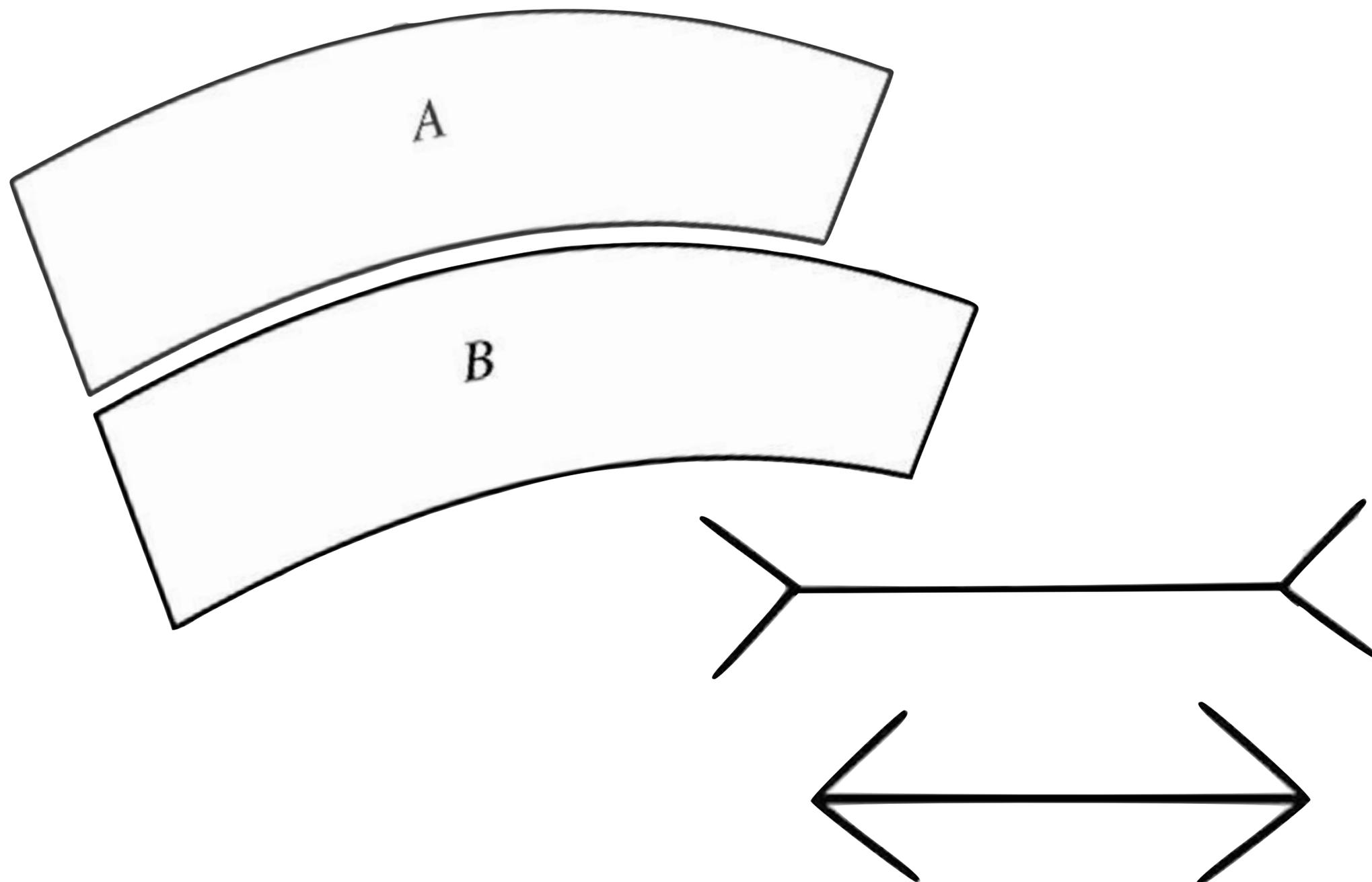
Ilusão de cor



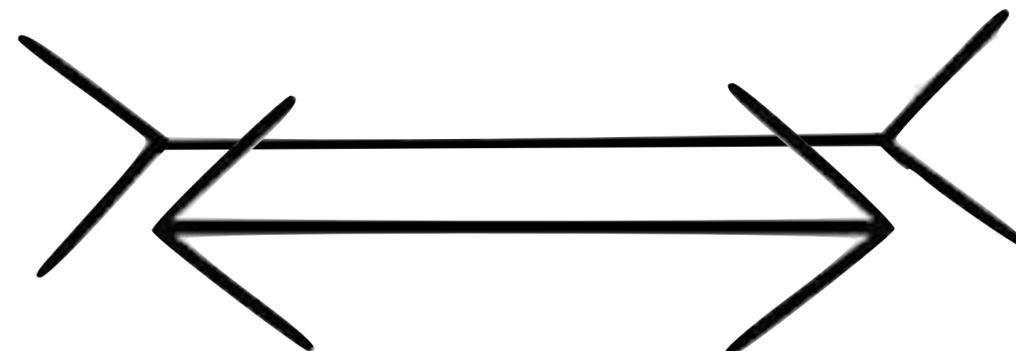
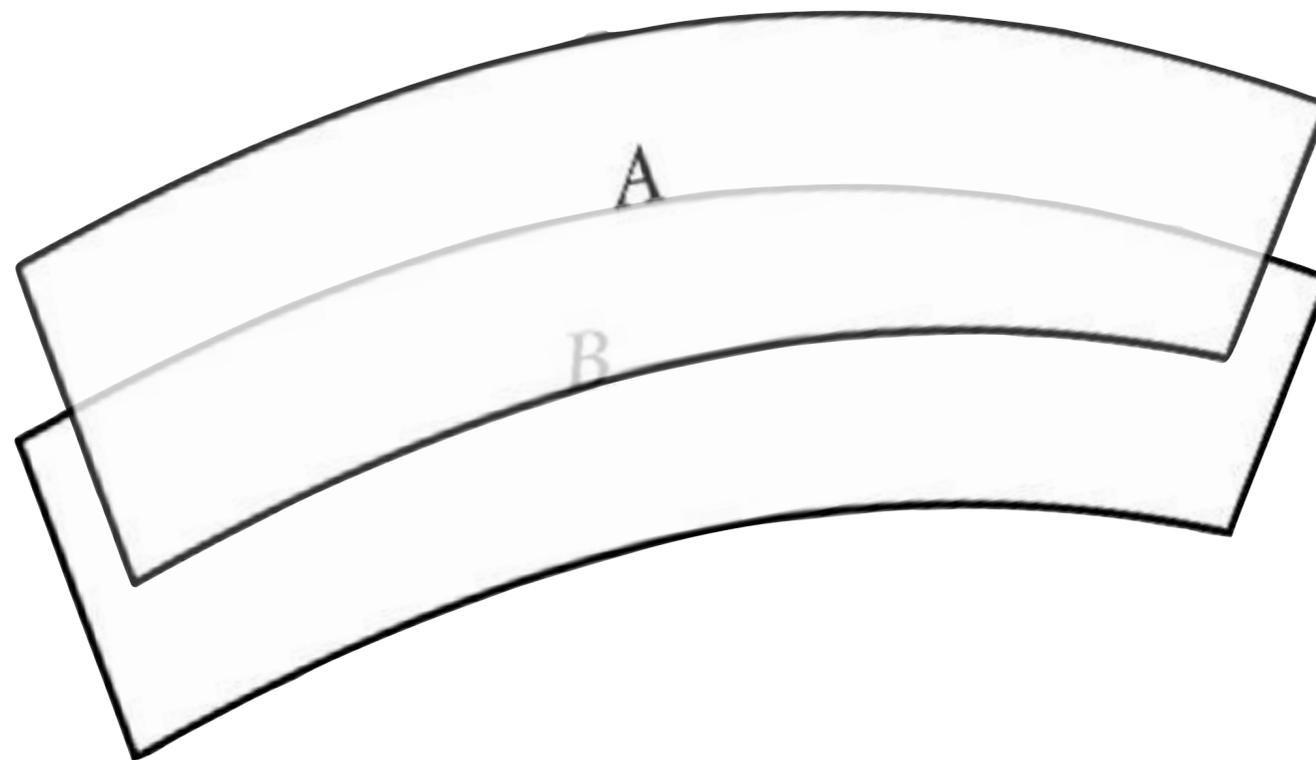
Ilusão de cor



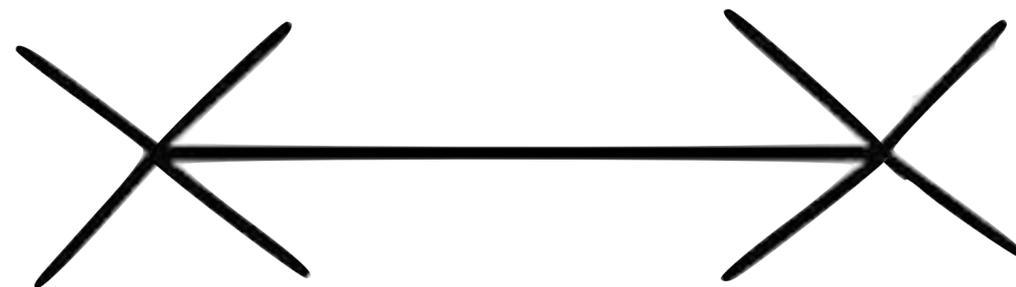
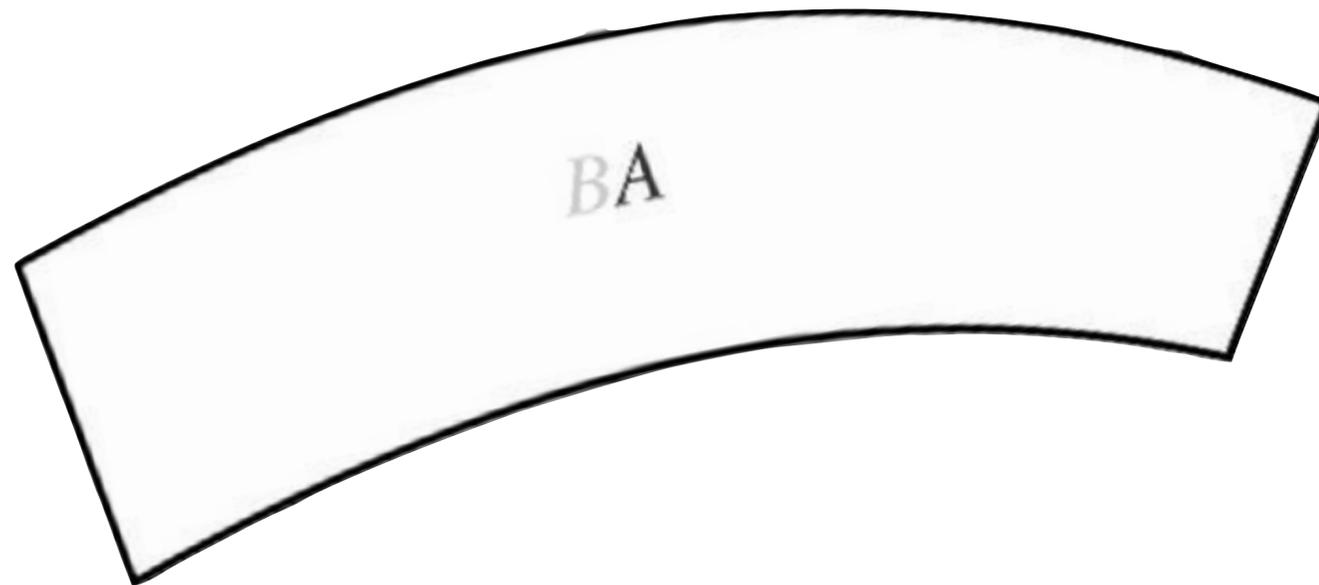
Ilusão de comprimento



Ilusão de comprimento

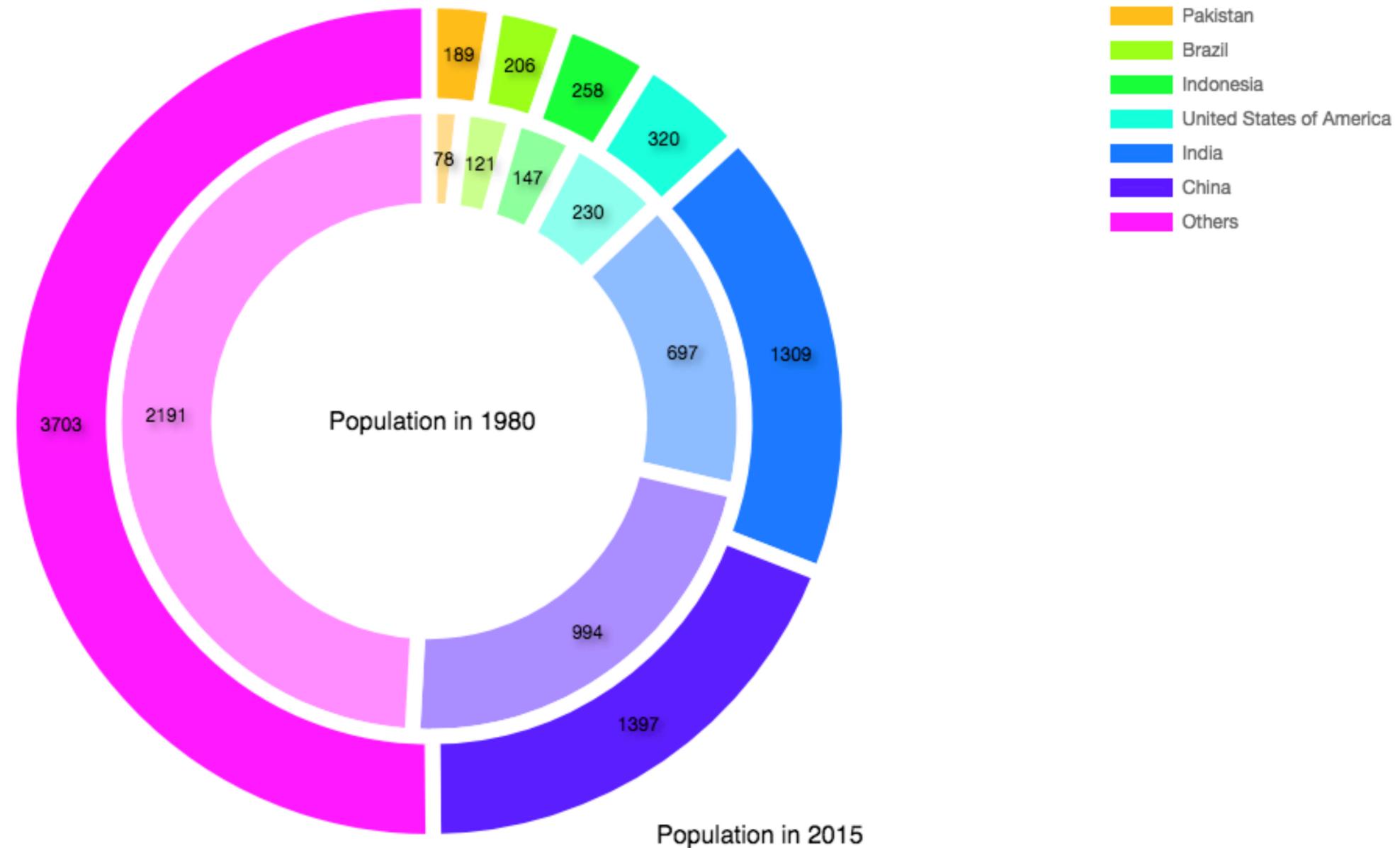


Ilusão de comprimento



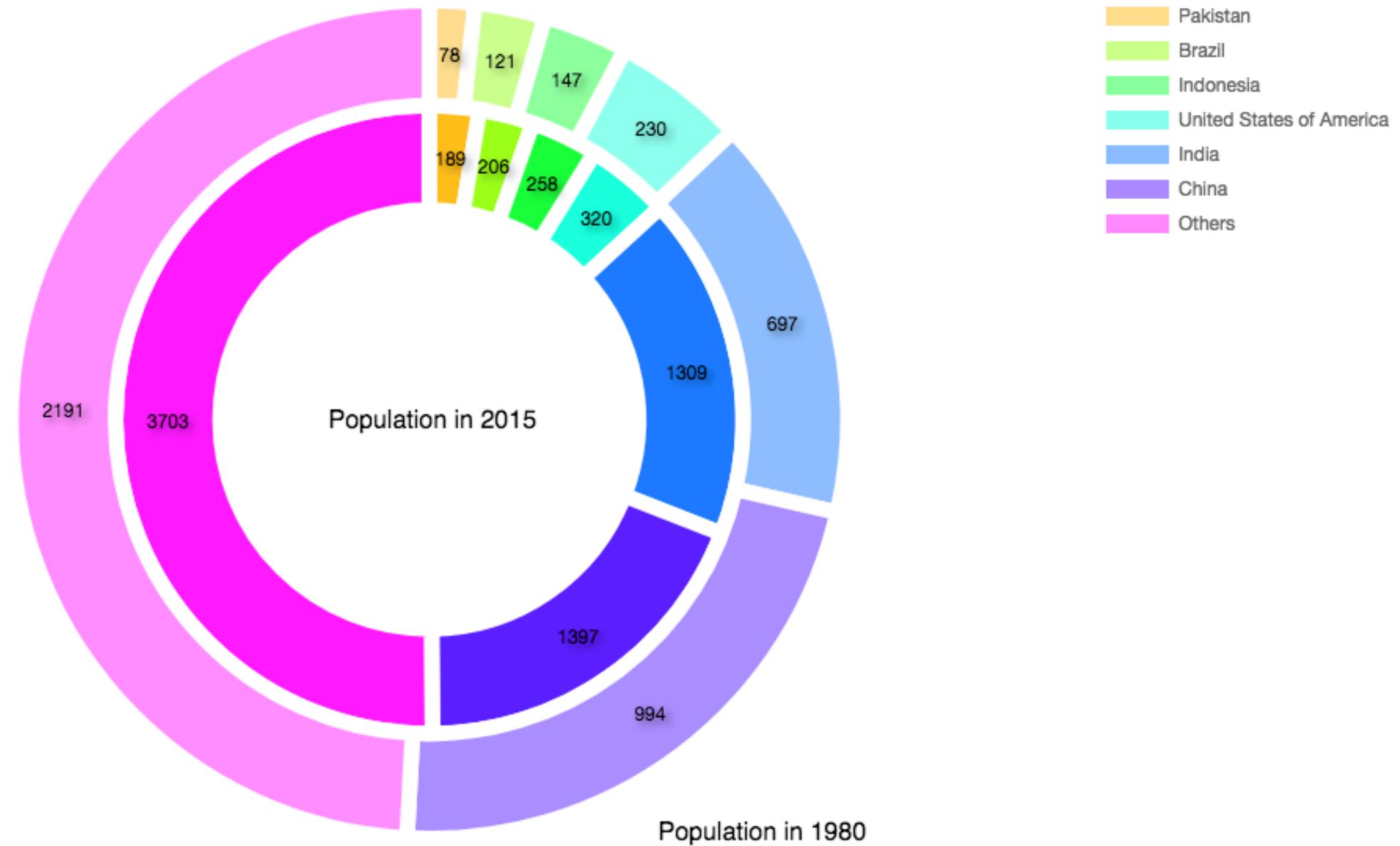
Ilusão de ângulo

População mundial em 1980 e 2015



Ilusão de ângulo

População mundial em 1980 e 2015



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Tecnologías abiertas

HTML

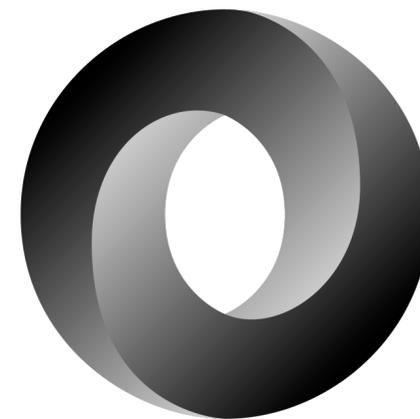


<Canvas>

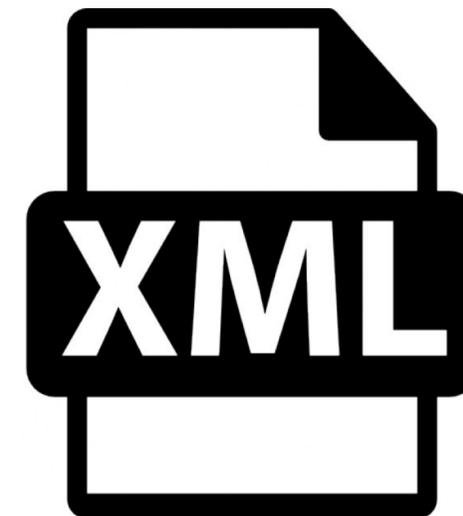
CSS



GeoJSON



JSON



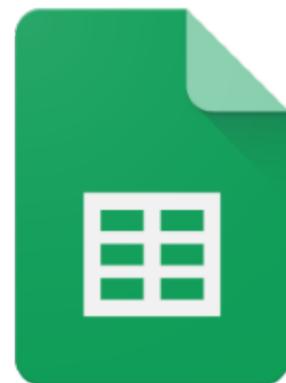
Serviços populares que geram gráficos



www.tableau.com



infogram.com



Google Sheets

docs.google.com



plotly

plot.ly



Ferramentas JavaScript (open-source)



chartjs.org

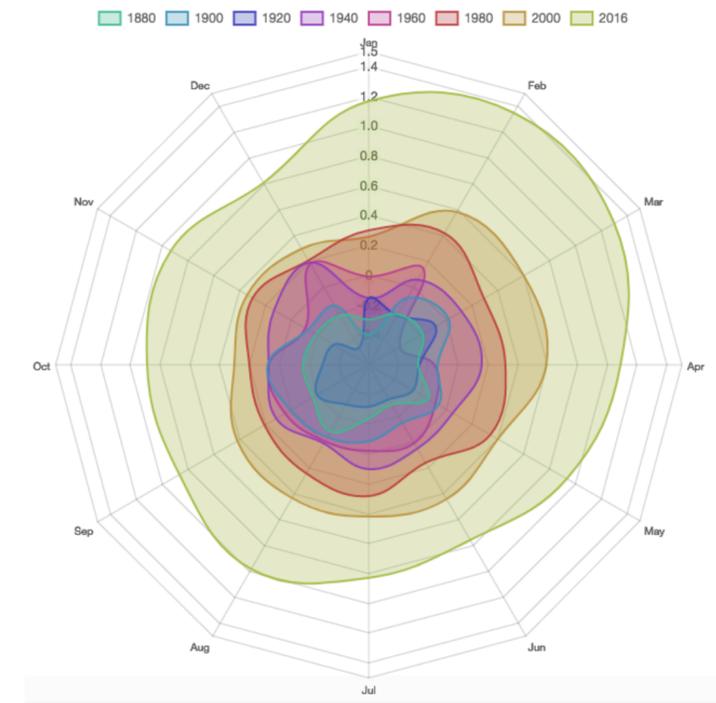
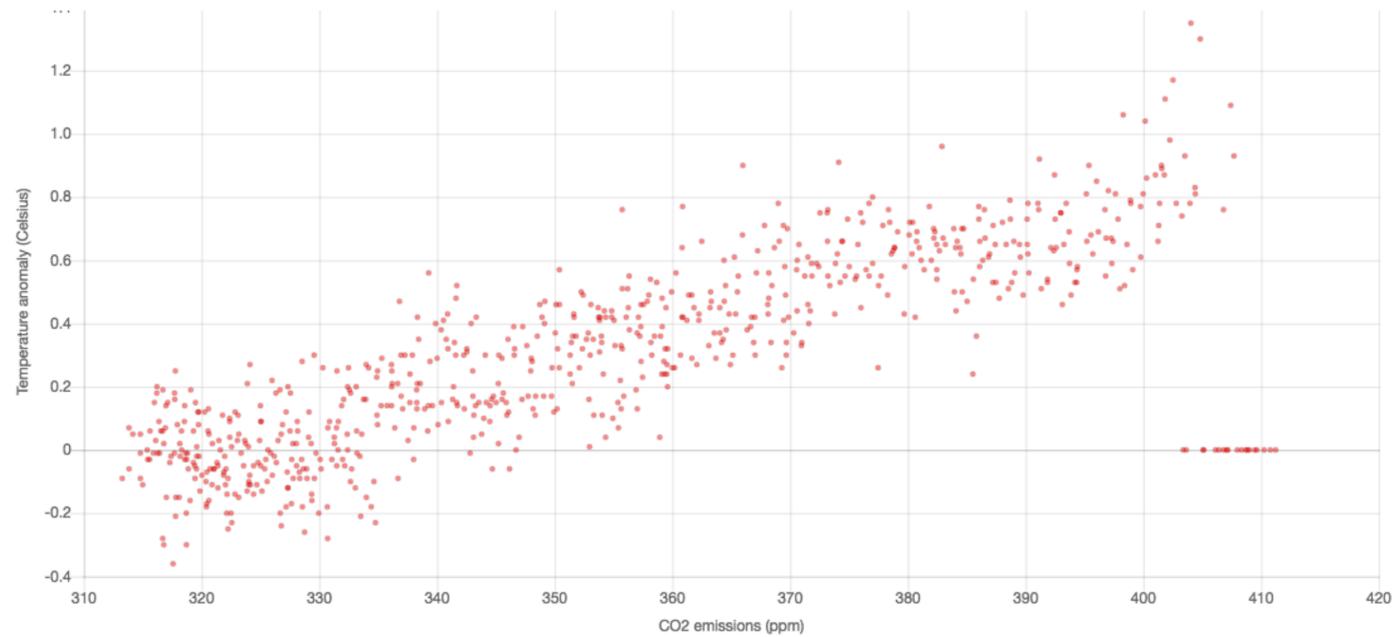


p5js.org



d3js.org





helder@argonavis.com.br

www.argonavis.com.br

