

# VISUAL TRUMPERY (#visualTrumpery)

data visualization and the challenge of truthful communication

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@albertocairo • [www.thefunctionalart.com](http://www.thefunctionalart.com) • [www.albertocairo.com](http://www.albertocairo.com)

# trumpery

**trump·er·y**

/trəmp(ə)rē/

*archaic*

*noun*

noun: **trumpery**; plural noun: **trumperies**

1 attractive articles of little value or use.

- practices or beliefs that are superficially or visually appealing but have little real value or worth.

*adjective*

adjective: **trumpery**

1 showy but worthless

- delusive or shallow

late Middle English (denoting trickery): from Old French **tromperie**, from **tromper** ‘deceive.’

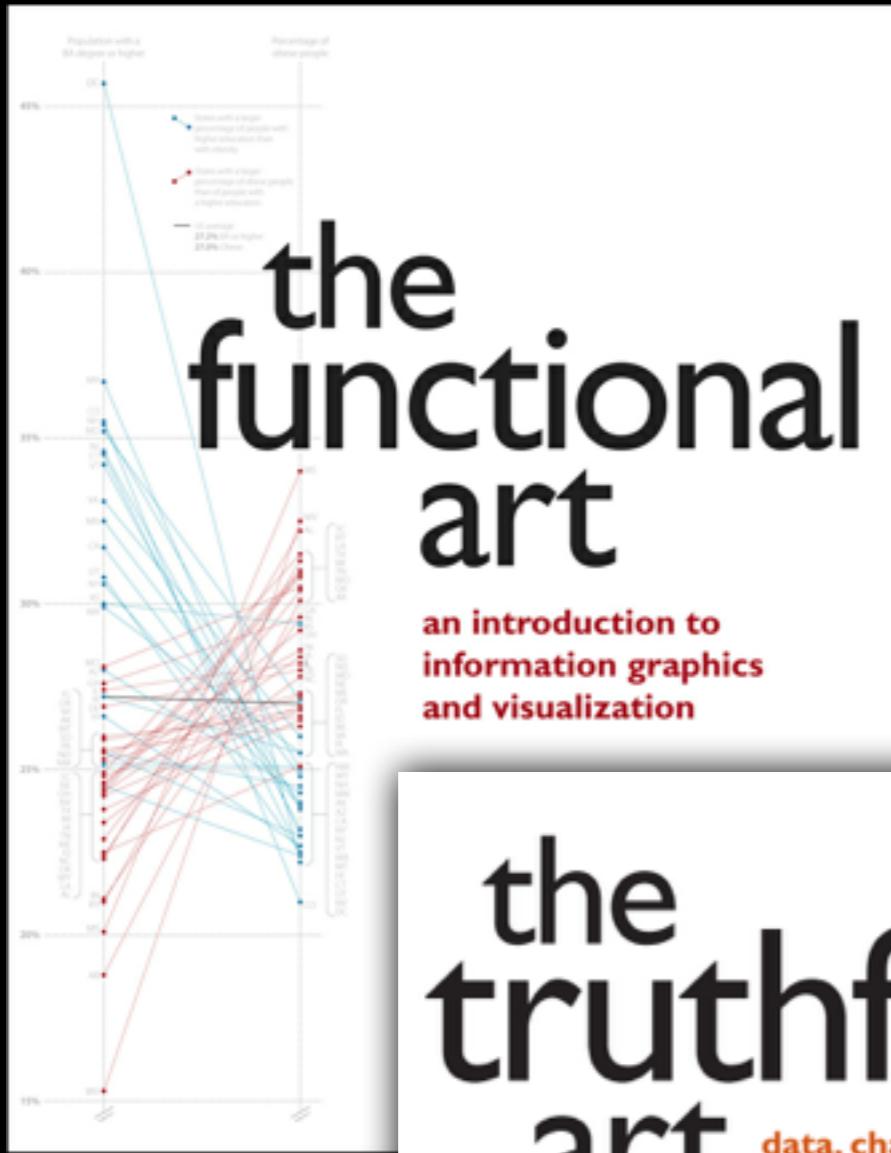
OLD FRENCH

OLD FRENCH

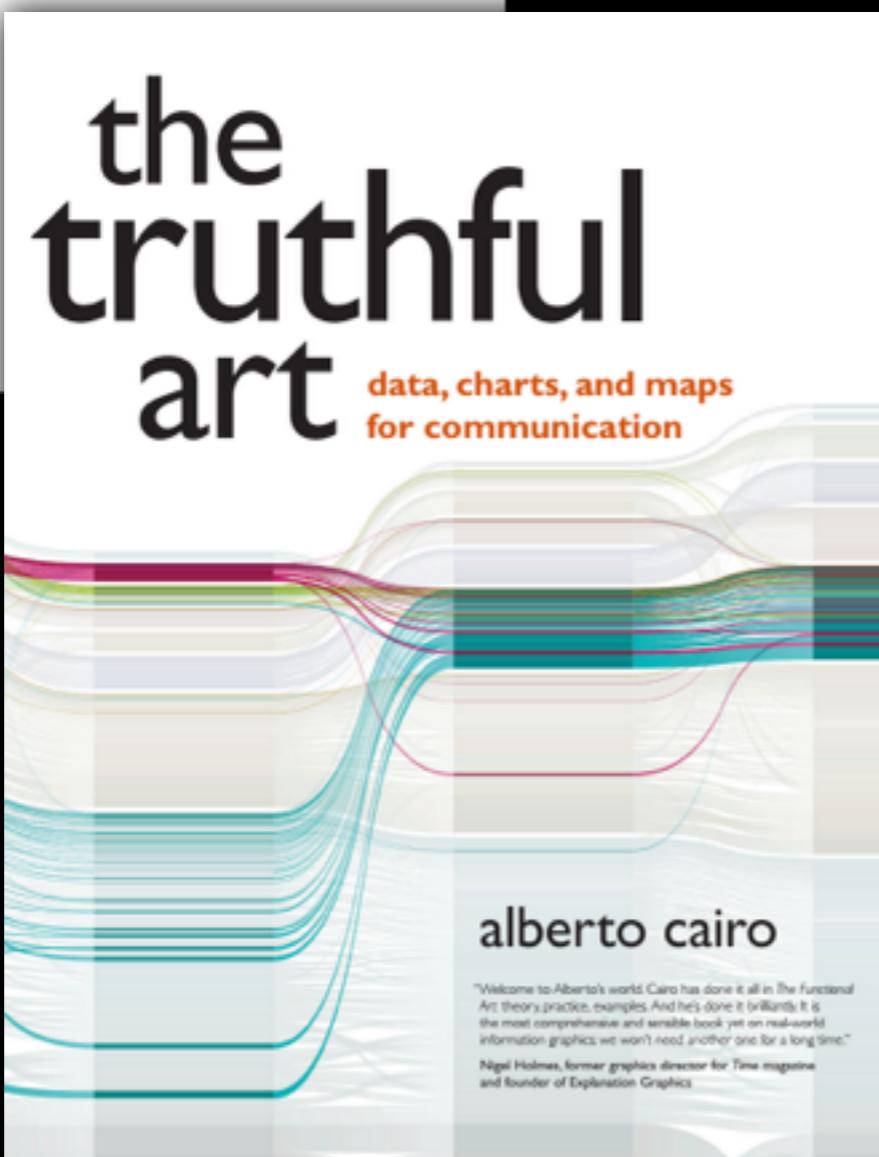
tromper  
deceive

tromperie  
*late Middle English*

trumpery



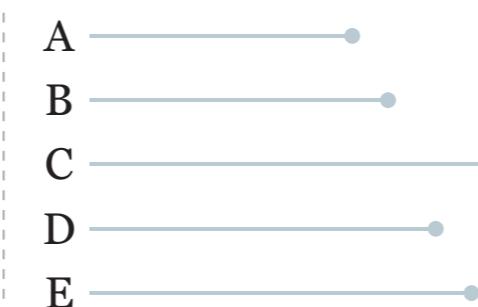
2012



2016

I've always believed in the power of data visualization (the representation of information by means of charts, diagrams, maps, etc.) to enable understanding.

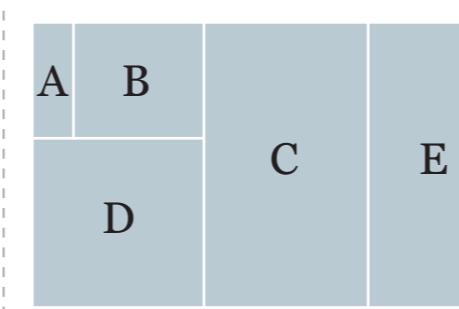
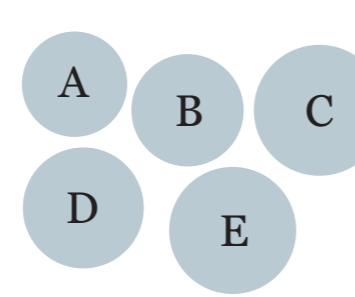
## *Length or height*



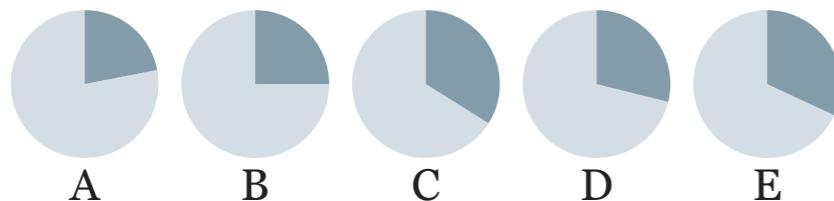
## *Position*



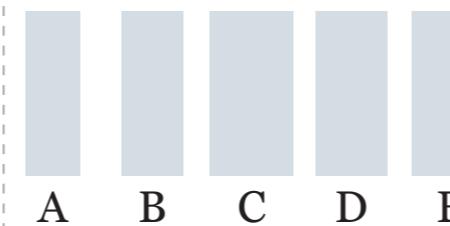
## *Area*



## *Angle/area*



## *Line weight*



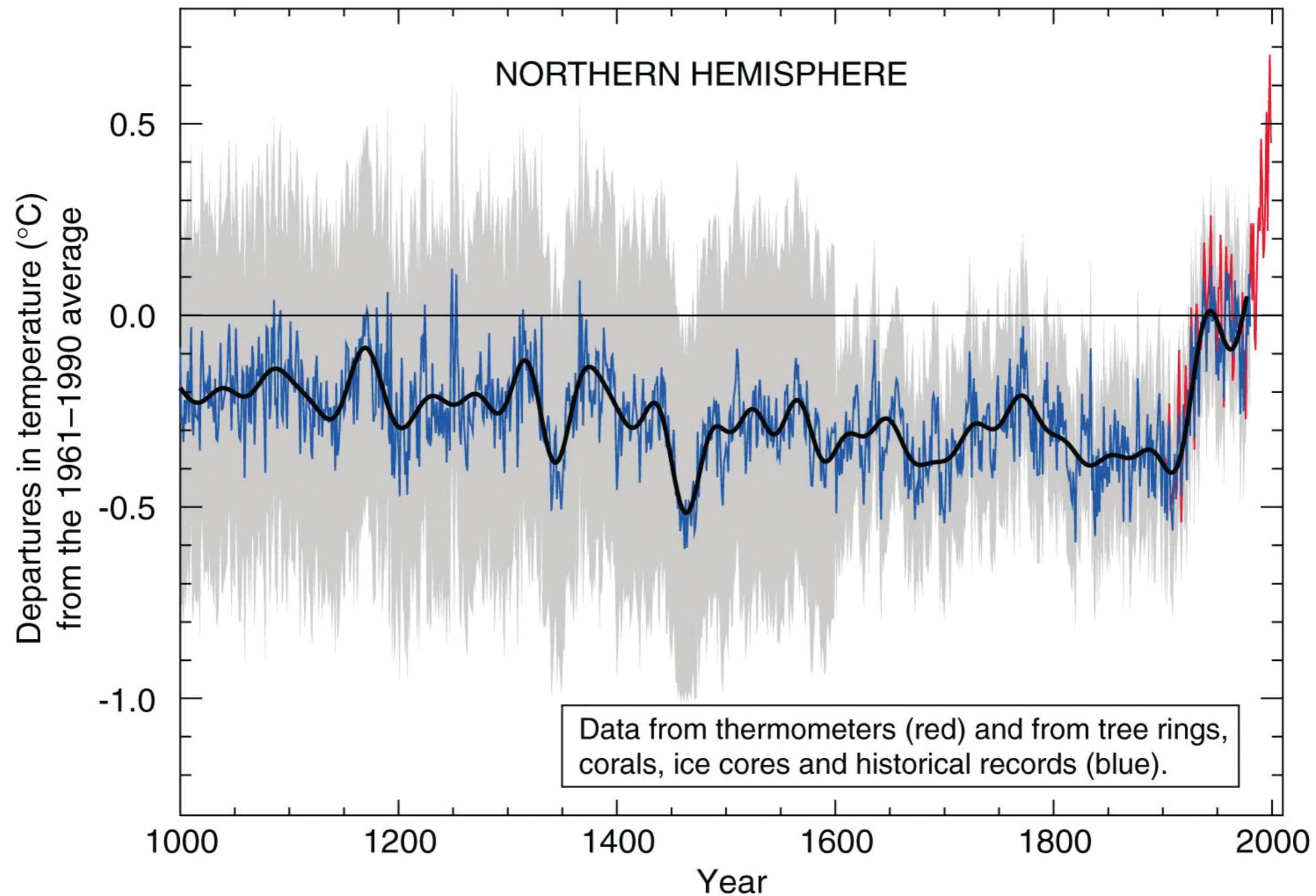
## *Hue and shade*



Figures represented  
in all these graphics:  
22%, 25%, 34%, 29%, 32%

Data visualization  
and visual encoding

	A	B	C	D	E	F	G	
1	YEAR	TEMP	YEAR	1 SIGMA	2 SIGMA			
2	1000	0.0659	1000	0.240346	0.480693	0.206137	0.123588	
3	1001	-0.1241	1001	0	0	0	0	
4	1002	-0.1208	1002	0	0	0	0	
5	1003	-0.1801	1003	0	0	0	0	
6	1004	-0.0711	1004	0	0	0	0	
7	1005	-0.1334	1005	0	0	0	0	
8	1006	-0.0644	1006	0	0	0	0	
9	1007	0.0042	1007	0	0	0	0	
10	1008	-0.1288	1008	0	0	0	0	
11	1009	-0.0296	1009	0	0	0	0	
12	1010	0.1187	1010	0	0	0	0	
13	1011	-0.1252	1011	0	0	0	0	
14	1012	-0.1634	1012	0	0	0	0	
15	1013	-0.0791	1013	0	0	0	0	
16	1014	-0.1120	1014	0	0	0	0	
17	1015	-0.1146	1015	0	0	0	0	
18	1016	-0.1206	1016	0	0	0	0	
19	1017	-0.0815	1017	0	0	0	0	
20	1018	-0.2031	1018	0	0	0	0	
21	1019	0.0305	1019	0	0	0	0	
22	1020	0.1098	1020	0	0	0	0	
23	1021	0.0244	1021	0	0	0	0	
24	1022	-0.0743	1022	0	0	0	0	
25	1023	-0.0323	1023	0	0	0	0	
26	1024	-0.0434	1024	0	0	0	0	
	878	1876	-0.1891	1876	0.113228	0.226456	8.25297E-02	7.75207E-02
	879	1877	-0.0140	1877	0.113228	0.226457	8.25299E-02	7.75209E-02
	880	1878	-0.0873	1878	0.113228	0.226457	8.25298E-02	7.75209E-02
	881	1879	-0.2959	1879	0.113229	0.226458	8.25302E-02	7.75212E-02
	882	1880	-0.2368	1880	0.113229	0.226457	8.25300E-02	7.75210E-02
	883	1881	-0.1977	1881	0.113229	0.226458	8.25302E-02	7.75212E-02
	884	1882	-0.2036	1882	0.113229	0.226457	8.25300E-02	7.75210E-02
	885	1883	-0.2489	1883	0.113228	0.226455	8.25293E-02	7.75204E-02
	886	1884	-0.2125	1884	0.113229	0.226457	8.25301E-02	7.75211E-02
	887	1885	-0.1896	1885	0.113228	0.226457	8.25299E-02	7.75210E-02
	888	1886	-0.1084	1886	0.113228	0.226456	8.25298E-02	7.75208E-02
	889	1887	-0.3265	1887	0.113228	0.226456	8.25296E-02	7.75206E-02
	890	1888	-0.1694	1888	0.113228	0.226457	8.25298E-02	7.75209E-02
	891	1889	-0.1339	1889	0.113228	0.226456	8.25298E-02	7.75208E-02
	892	1890	-0.3107	1890	0.113229	0.226457	8.25301E-02	7.75211E-02
	893	1891	-0.1754	1891	0.113229	0.226457	8.25300E-02	7.75210E-02
	894	1892	-0.3186	1892	0.113228	0.226456	8.25295E-02	7.75205E-02
	895	1893	-0.3236	1893	0.113228	0.226456	8.25297E-02	7.75207E-02
	896	1894	-0.1970	1894	0.113228	0.226456	8.25295E-02	7.75205E-02
	897	1895	-0.1578	1895	0.113228	0.226456	8.25297E-02	7.75207E-02
	898	1896	-0.0804	1896	0.113228	0.226456	8.25298E-02	7.75208E-02
	899	1897	-0.0537	1897	0.113228	0.226456	8.25298E-02	7.75208E-02
	900	1898	-0.2195	1898	0.113229	0.226457	8.25301E-02	7.75211E-02
	901	1899	-0.3486	1899	0.113228	0.226456	8.25297E-02	7.75207E-02
	902	1900	-0.1253	1900	0.113229	0.226457	8.25300E-02	7.75210E-02
	903	1901	-0.1575	1901	0.113228	0.226456	8.25296E-02	7.75206E-02



Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes  
Intergovernmental Panel on Climate Change (IPCC), Third Report, 2001

# Battling Infectious Diseases in the 20th Century: The Impact of Vaccines

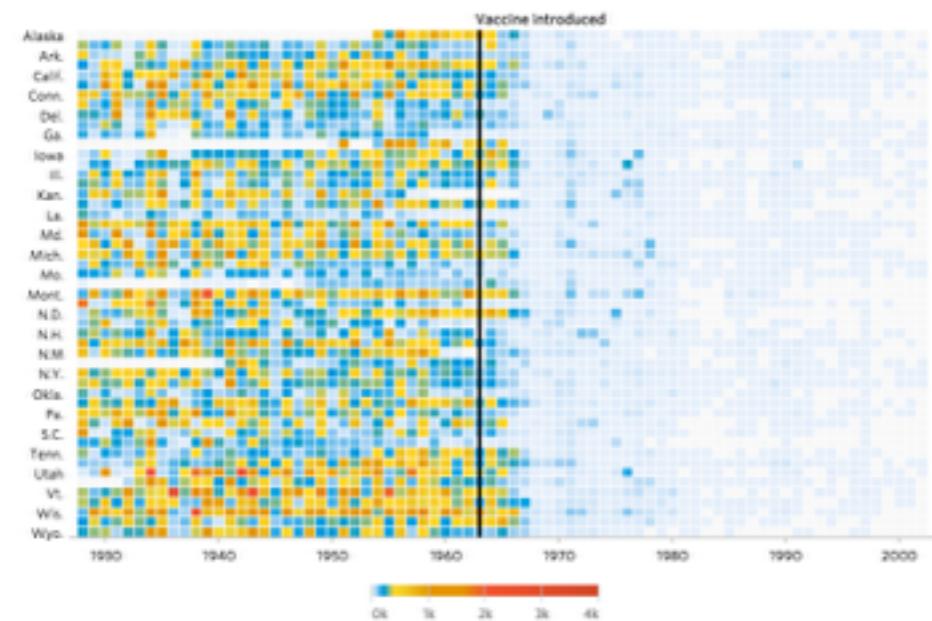
By Tynan DeBold and Dev Friedman

Published Feb. 11, 2015 at 3:45 p.m. ET

The number of infected people, measured over 70-some years and across all 50 states and the District of Columbia, generally declined after vaccines were introduced.

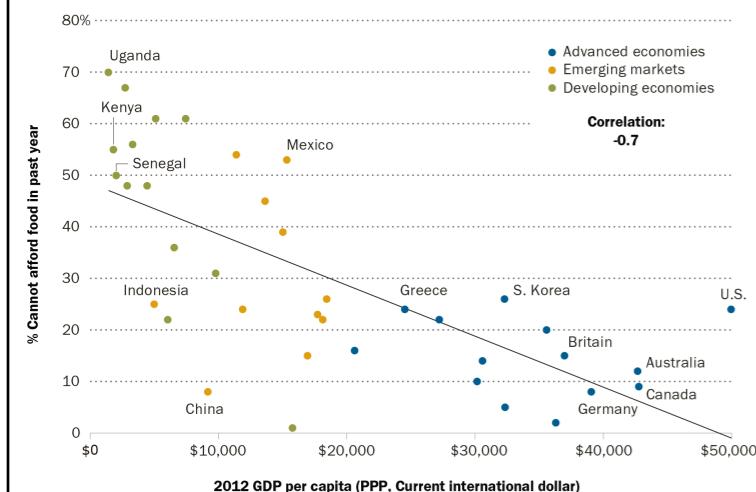
The heat maps below show number of cases per 100,000 people.

## Measles



WSJ

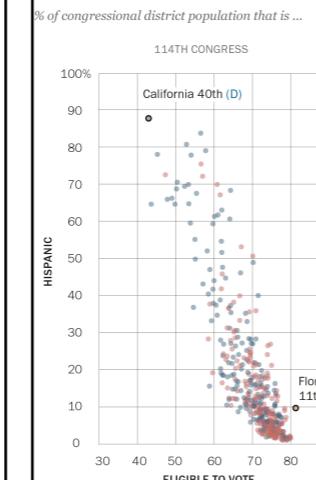
## Many in Developing Nations Struggle to Afford Food



Source: GDP per capita (PPP) from IMF World Economic Outlook Database, April 2013. Data not available for Palestinian territories.

PEW RESEARCH CENTER

## Districts with Fewest Eligible Voters Have Large Hispanic Populations and Are Represented by Democrats



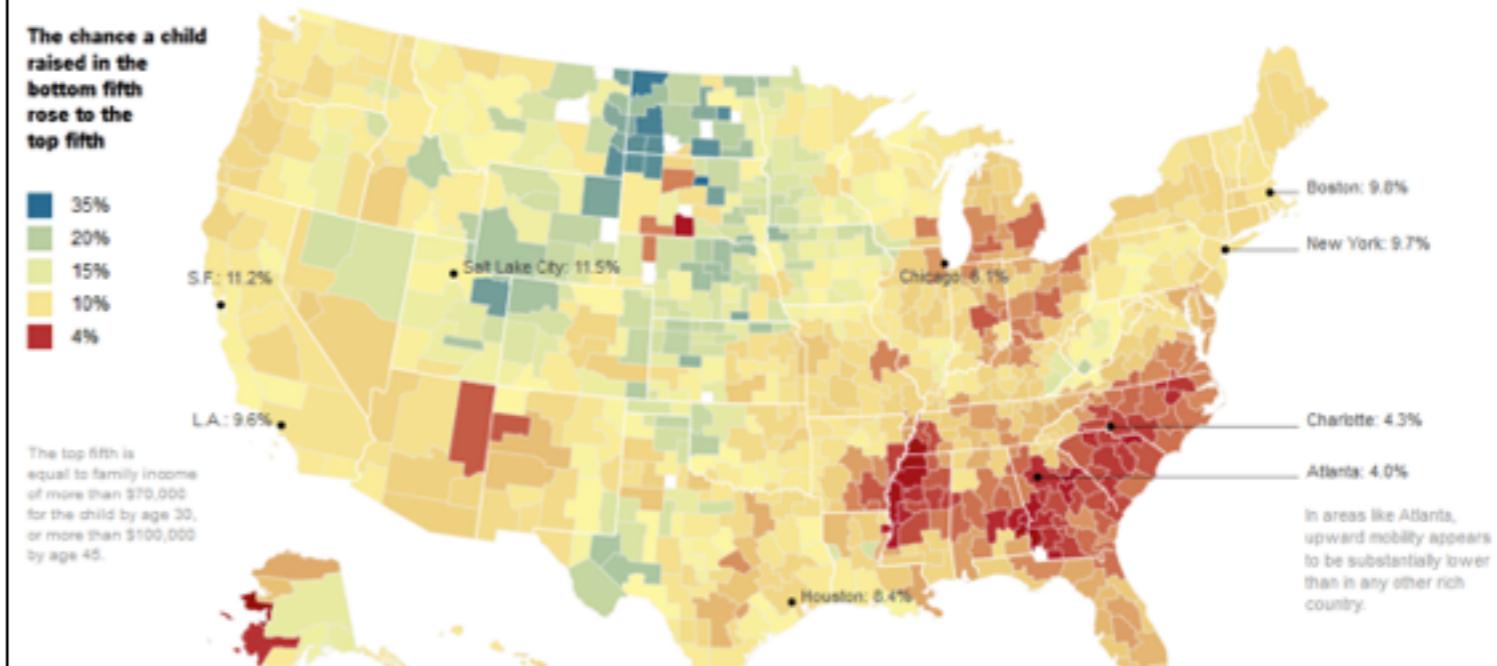
Note: Eligible voters are defined as U.S. citizens, ages 18+.  
Source: Pew Research Center analysis of U.S. Census Bureau's 2013 American Community Survey

PEW RESEARCH CENTER

# Thanks to its power, visualization is becoming widespread and mainstream

## In Climbing Income Ladder, Location Matters

A study finds the odds of rising to another income level are notably low in certain cities, like Atlanta and Charlotte, and much higher in New York and Boston.



Pew Research Center

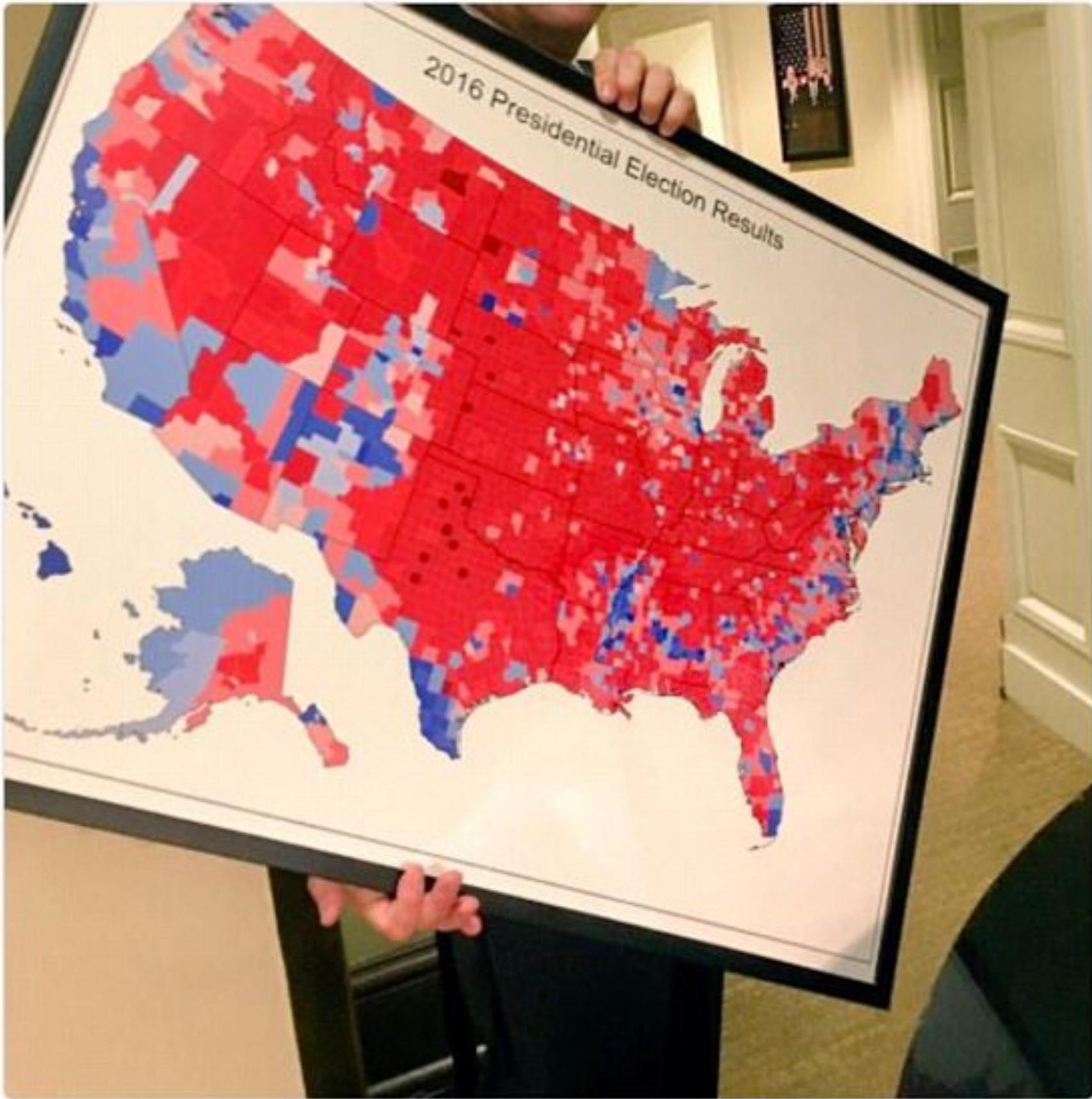
NYT

But then I started reading about how  
some people use and interpret visualizations



Trey Yingst @TreyYingst · May 11

Spotted: A map to be hung somewhere in the West Wing





**Gideon Resnick** @GideonResnick • 32m

here's a pic from reuters of Trump with the electoral maps he showed to reporters yesterday





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## TRUMP'S 'LANDSLIDE': 2,623 TO 489 AMONG U.S. COUNTIES

But popular-vote fans say nation should abandon Electoral College

Published: 12/25/2016 at 3:37 PM

BOB UNRUH [About](#) | [Email](#) | [Archive](#)[Subscribe to feed](#)

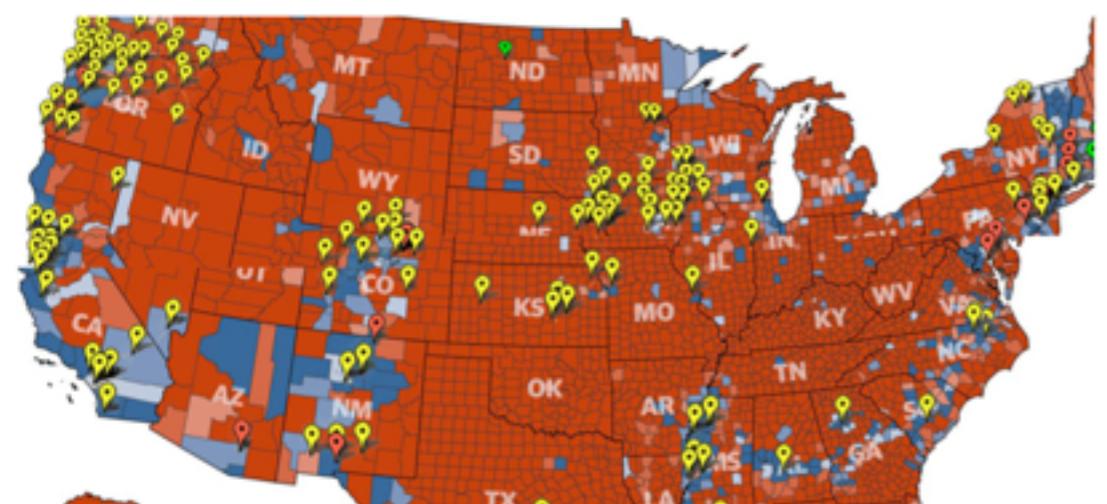
# INFOWARS

RADIO SHOW NEWS VIDEOS STORE TOP STORIES BREAKING NEWS CONTACT

## MAP SHOWS SANCTUARY CITY ISLANDS OF BLUE IN SEA OF RED

Democrats take advantage of immigrants to vote blue

Adan Salazar | Infowars.com - NOVEMBER 10, 2016 | 592 Comments



### WND RELATED STORIES

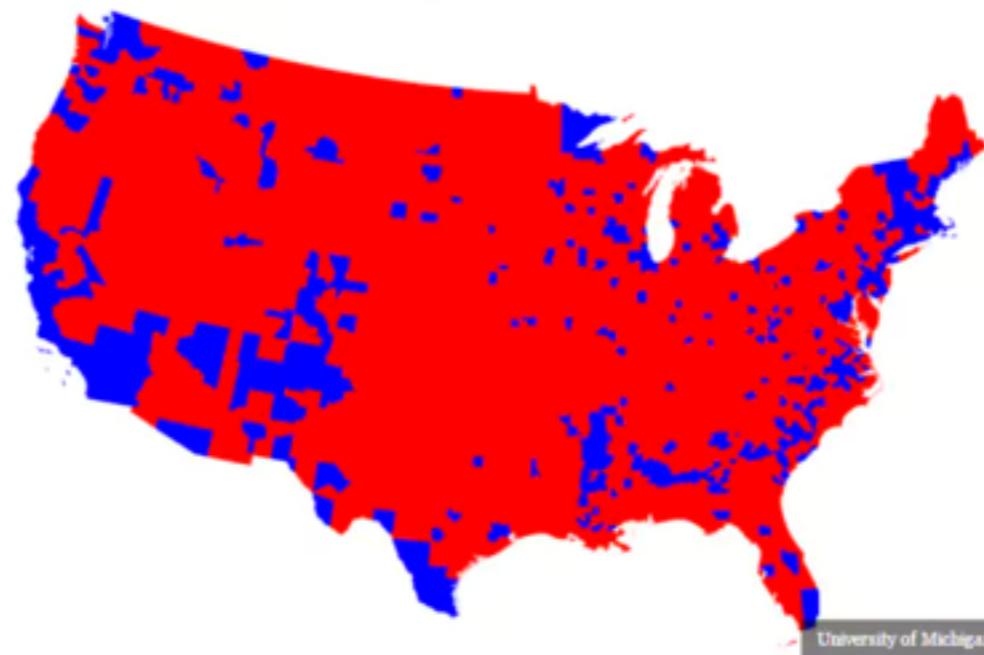
Obama 'punishes' Russian cyber hacks, winks at China

Newspaper bleeds: Not forgiven for endorsing

## DONALD TRUMP WON 7.5 MILLION POPULAR VOTE LANDSLIDE IN HEARTLAND

[SHARE](#)[EMAIL](#)[G+ SHARE](#)

27

[TWEET](#)

by MICHAEL PATRICK LEAHY | 15 Nov 2016 | 477

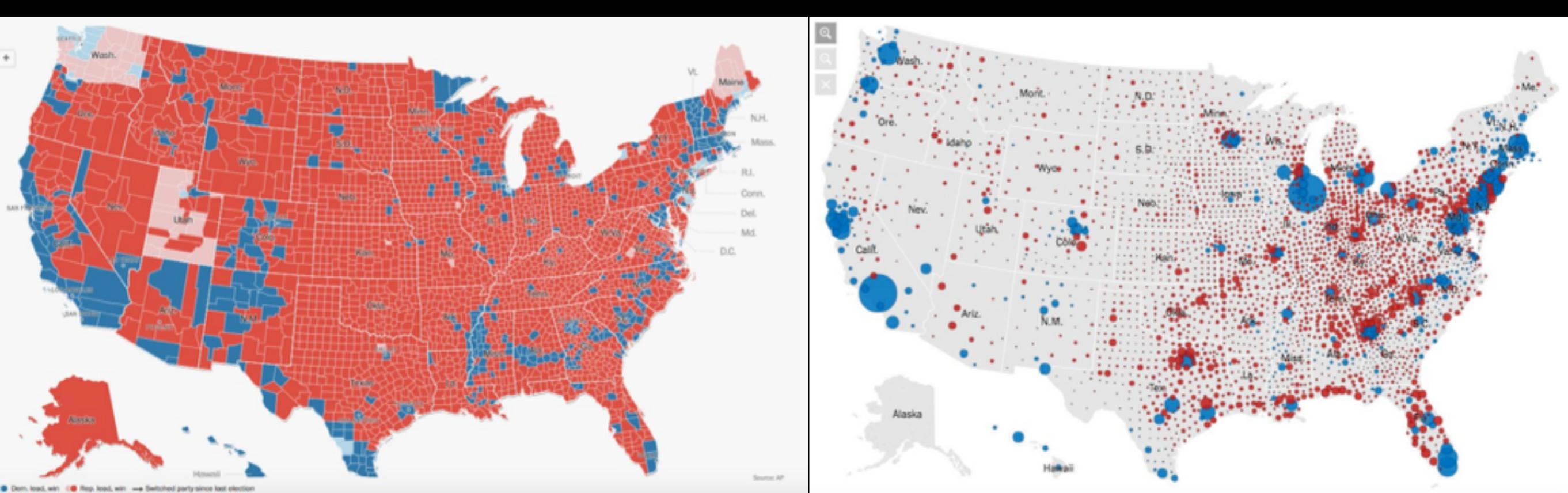
BIO-TRUE SODIUM SURVIVAL SHIELD  
**30% OFF**  
 THE ULTIMATE SURVIVOR PACK

TODAY ON THE ALEX JONES SHOW

Did Trump win on a landslide?  
 It depends on what you count







## US Presidential Election 2016

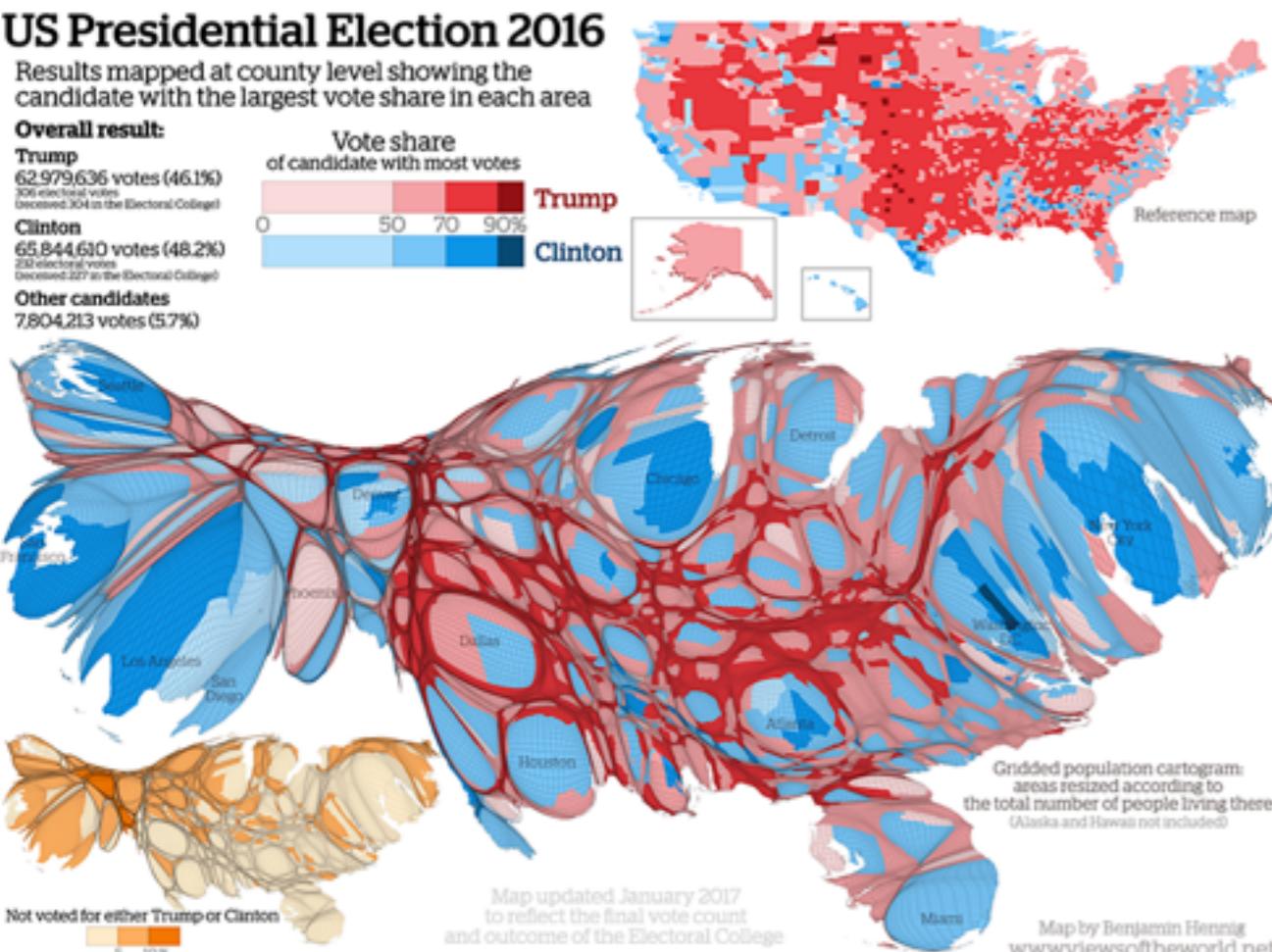
Results mapped at county level showing the candidate with the largest vote share in each area

### Overall result:

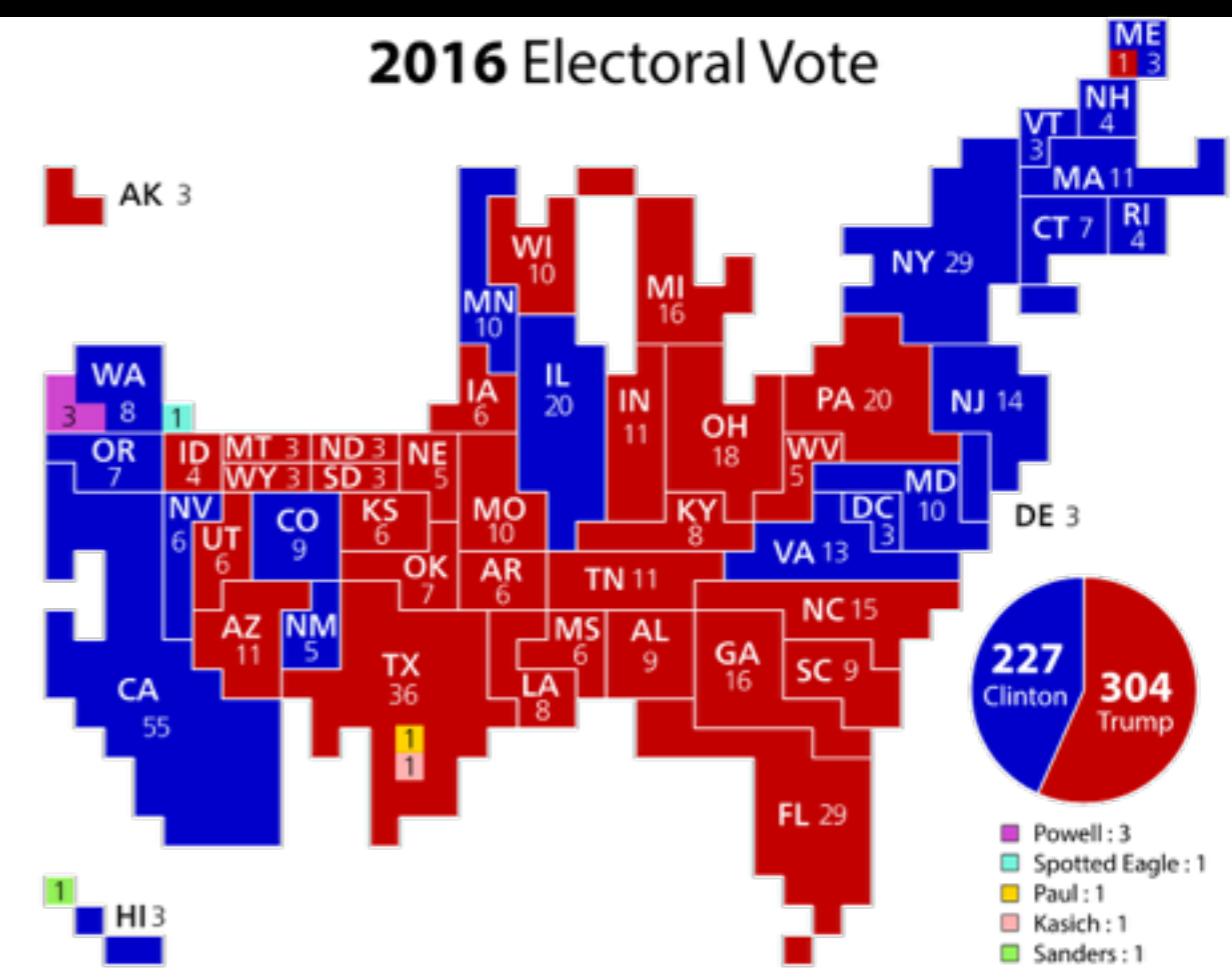
**Trump**  
62,979,636 votes (46.19%)  
(Received 304 in the Electoral College)

**Clinton**  
65,844,610 votes (48.2%)  
(Received 232 in the Electoral College)

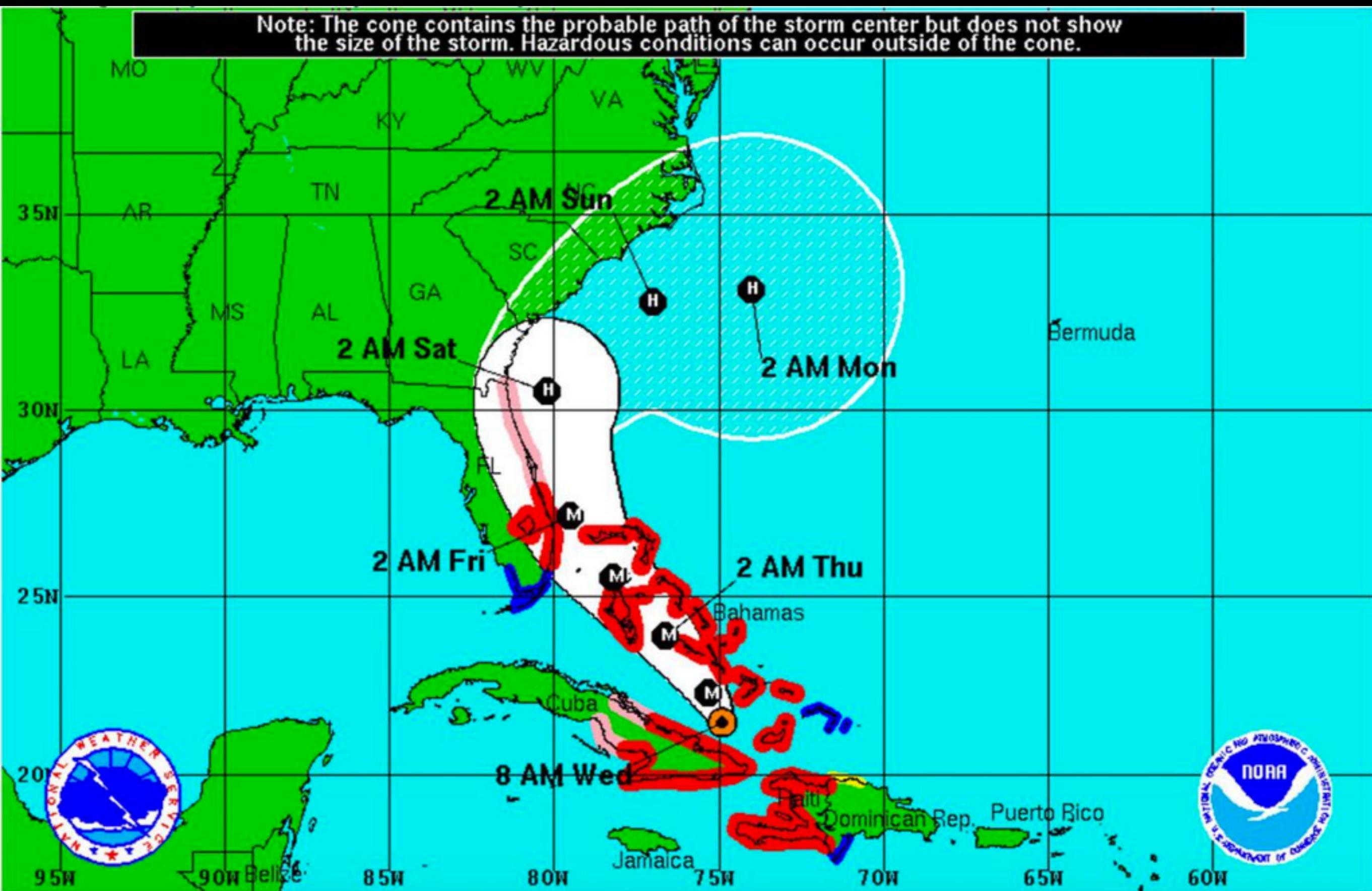
**Other candidates**  
7,804,213 votes (5.7%)



## 2016 Electoral Vote



Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.



# Hurricane **CAIRO** (category 5)



What you show

# Hurricane **CAIRO** (category 5)



What the cone is based on

# Hurricane **CAIRO** (category 5)



What some people really see

# Hurricane **CAIRO** (category 5)

2/3

1/3

8PM Tuesday

8PM Monday

8PM Sunday

8PM Saturday

What non-scientists are not aware of (cone is just 66% probability)

# Hurricane **CAIRO** (category 5)



What we could be showing instead

# Hurricane **CAIRO** (category 5)

What all this means

**GETTHEFUCKOUTOFHERE!!!**

Hurricane  
**CAIRO**  
(category 5)



What you may think of showing if you are in a rush

I also began noticing individuals and organizations using visualization to deceive and push agendas

(Not a new phenomenon, but made worse by digital technologies, including **social media**)



Fox News  
@FoxNews

Following

Jobless rate after first 3 months: Trump vs. Obama vs. Bush vs. Clinton.

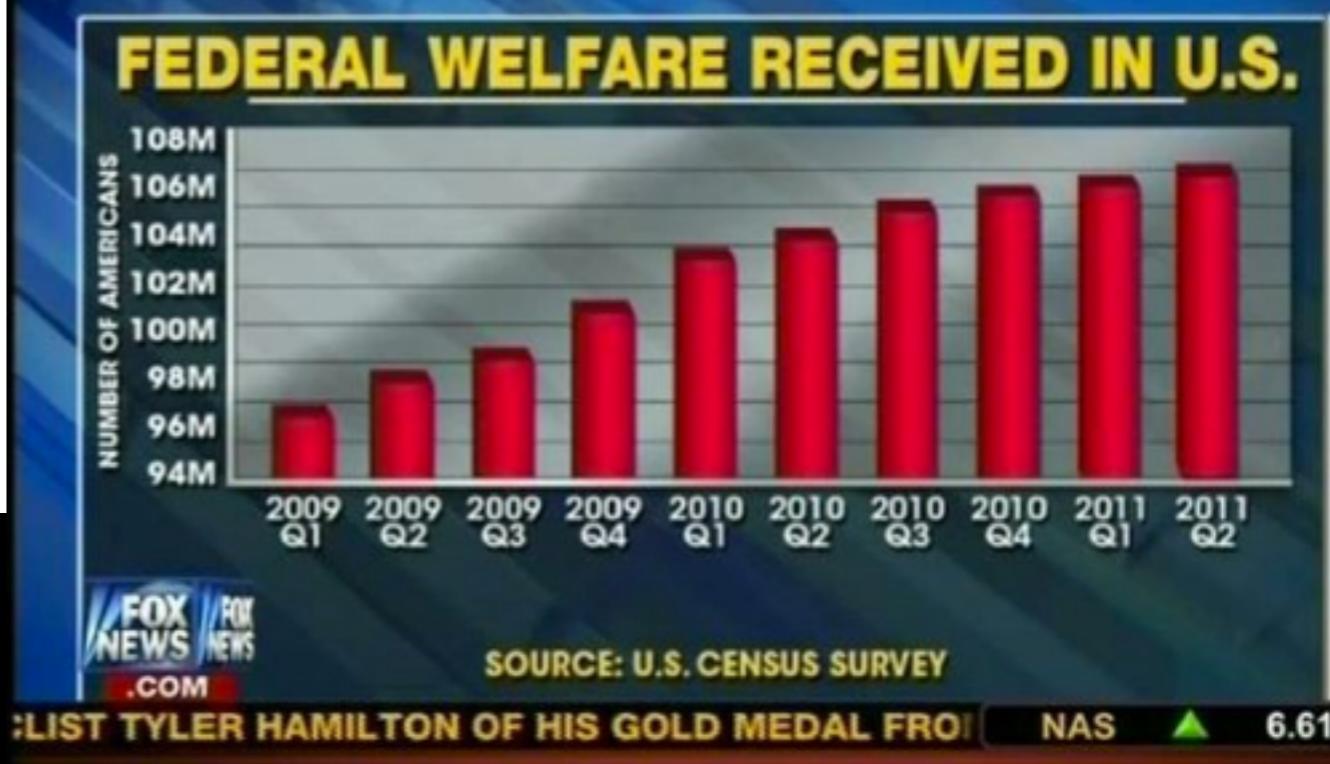
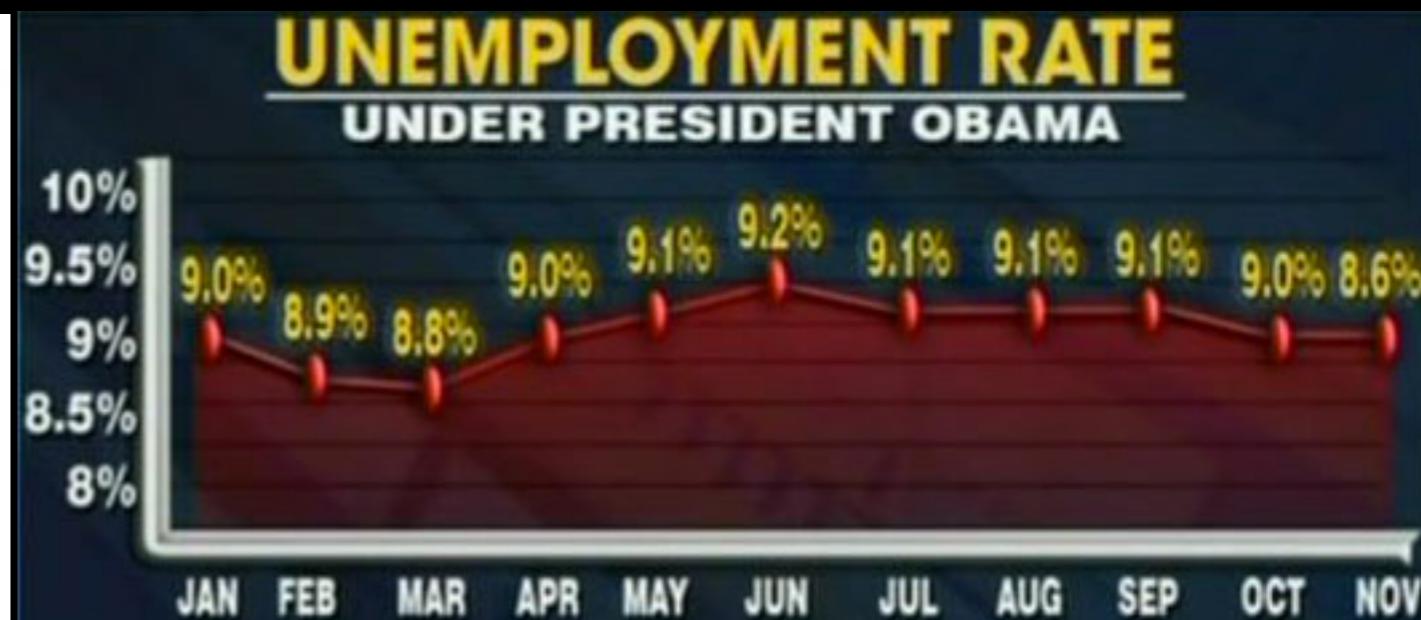


RETWEETS 1,135 LIKES 2,322



10:34 PM - 29 Apr 2017

3.3K 1.1K 2.3K I





Fox News  
@FoxNews

Following

Jobless rate after first 3 months: Trump vs. Obama vs. Bush vs. Clinton.



RETWEETS LIKES  
1,135 2,322



10:34 PM - 29 Apr 2017

3.3K 1.1K 2.3K I

	Beginning of presidency	End of presidency	Difference
Clinton	7.3%	4.2%	-3.1
Bush	4.2%	7.8%	+3.6
Obama	7.8%	4.8%	-3.0
Trump	4.8%	?	?

**Problem: Is the public educated enough to deal with this?  
What does it mean to be “educated” nowadays?**

**Problem: Is the public educated enough to deal with this?  
What does it mean to be “educated” nowadays?**

## I. Literacy

**Problem: Is the public educated enough to deal with this?  
What does it mean to be “educated” nowadays?**

1. Literacy
2. Articulacy

**Problem: Is the public educated enough to deal with this?  
What does it mean to be “educated” nowadays?**

1. Literacy
2. Articulacy
3. Numeracy

**Problem: Is the public educated enough to deal with this?  
What does it mean to be “educated” nowadays?**

1. Literacy
2. Articulacy
3. Numeracy
4. Graphicacy

# The scope of the problem:

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## **The scope of the problem:**

1. In general, we are illiterate when it comes to data reasoning and visualization.
2. We tend to believe what we want to believe.
3. Data and visualizations are very persuasive.
4. Crooks and liars know about all of the above.
5. As a consequence, Trumpery thrives.

## **What can we do?**

# SELF-TRUMPERY

Protecting yourself from seeing just what you want to see

# TRUMPERY

Protecting yourself from other people

# SELF-TRUMPERY

Protecting yourself from seeing just what you want to see

# TRUMPERY

Protecting yourself from other people



"You know the very powerful and the very stupid have one thing in common. They don't alter their views to fit the facts. They alter the facts to fit the views."

(In journalism this means that you'd begin with your headline, and then you look for the data to confirm it, not to refute it)

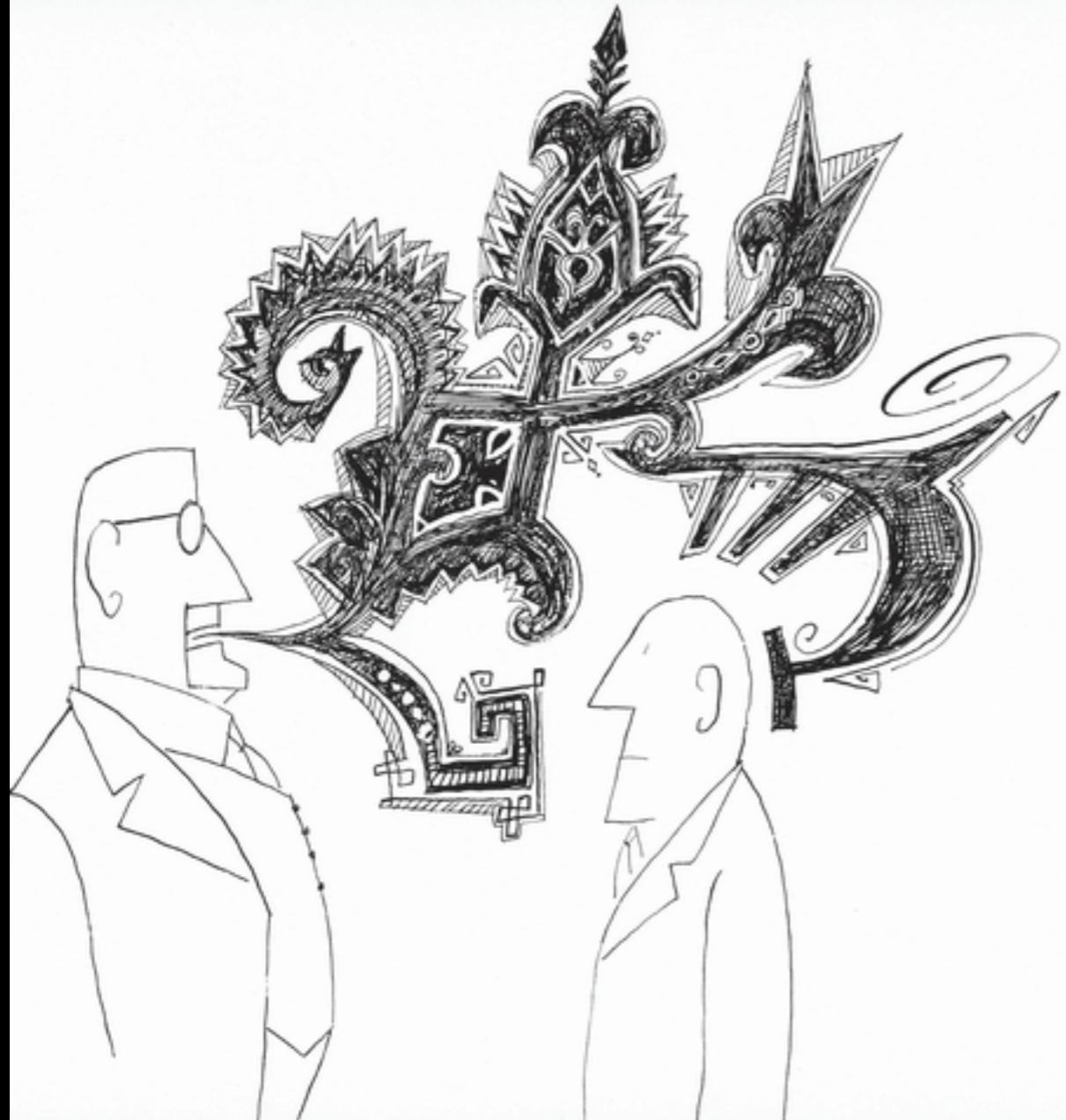


***everybody***  
"You know the very  
powerful and the very  
~~stupid~~ have one thing ***we***  
in common. ~~They~~ don't  
alter their views to fit  
the facts. ~~They~~ alter the  
facts to fit the views."

(In journalism this means that you'd begin with your headline, and then you look for the data to confirm it, not to refute it)

HUGO MERCIER • DAN SPERBER

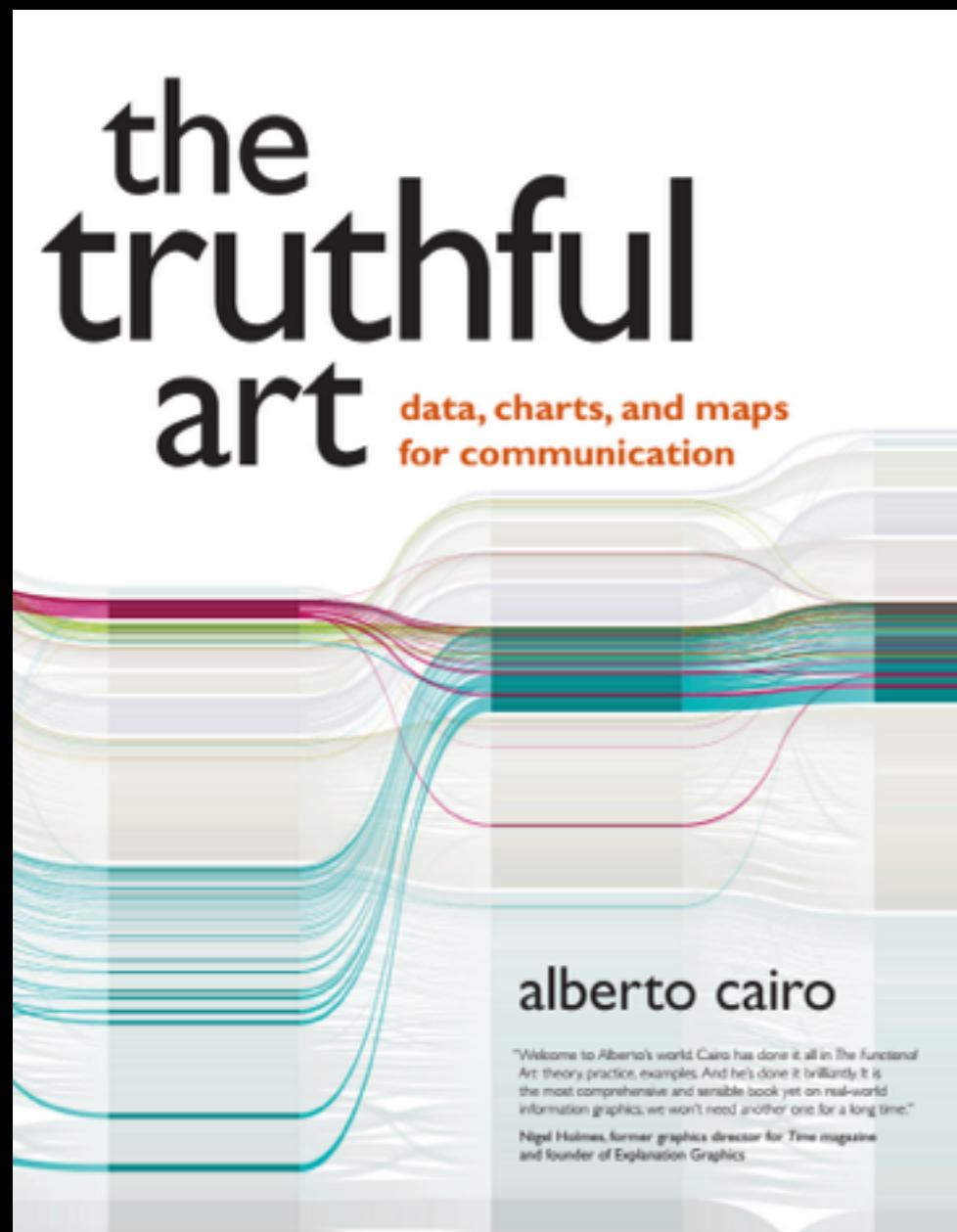
## *The Enigma of Reason*



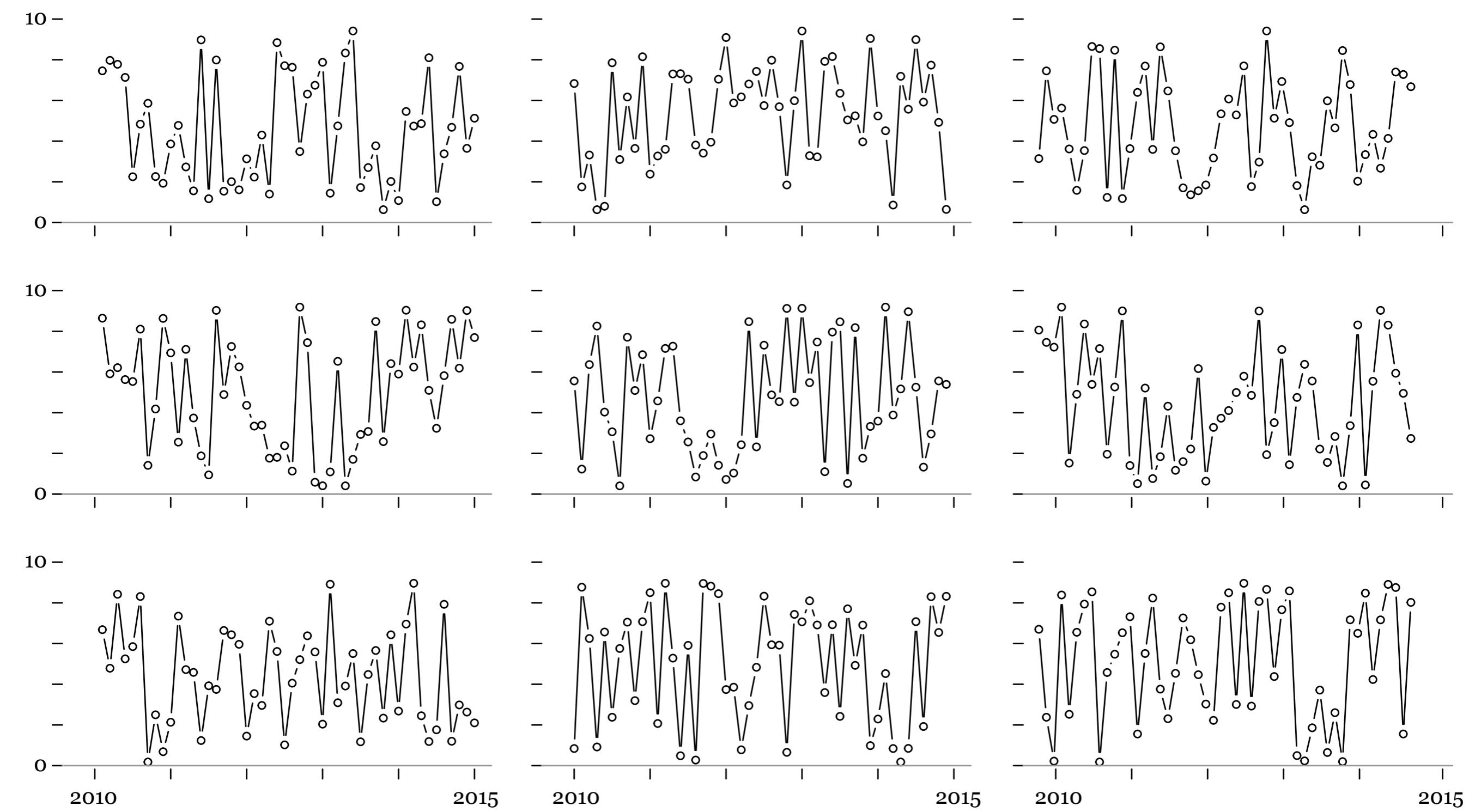
### **The argumentative theory of reason**

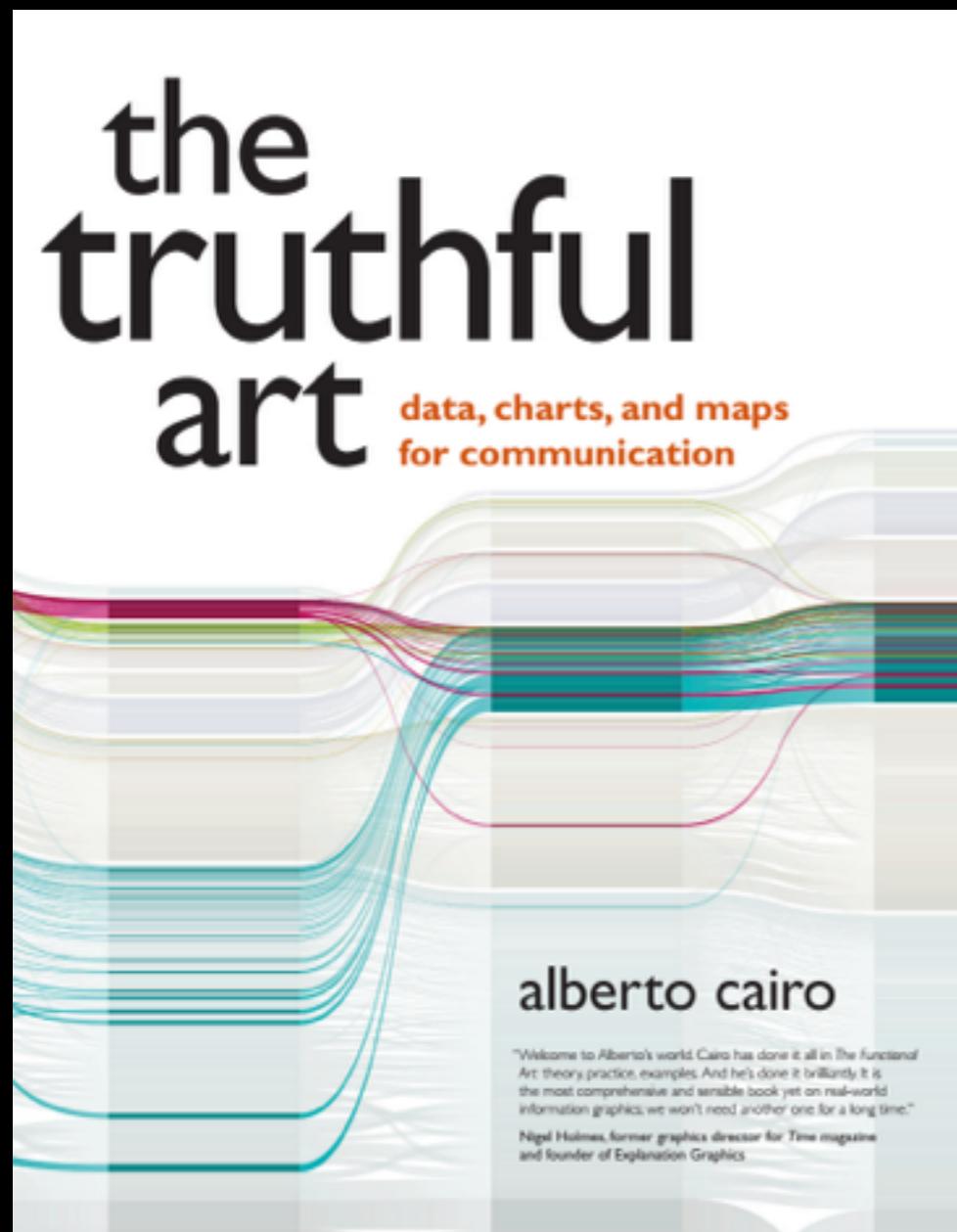
Reason didn't evolve to discover and explain how the world truly works. It evolved so we can justify our own opinions and then persuade other people to believe us.

**We first manipulate ourselves into strengthening our own thoughts, and then we manipulate others**



We notice patterns, even if no true patterns exists  
**Patternicity bias**

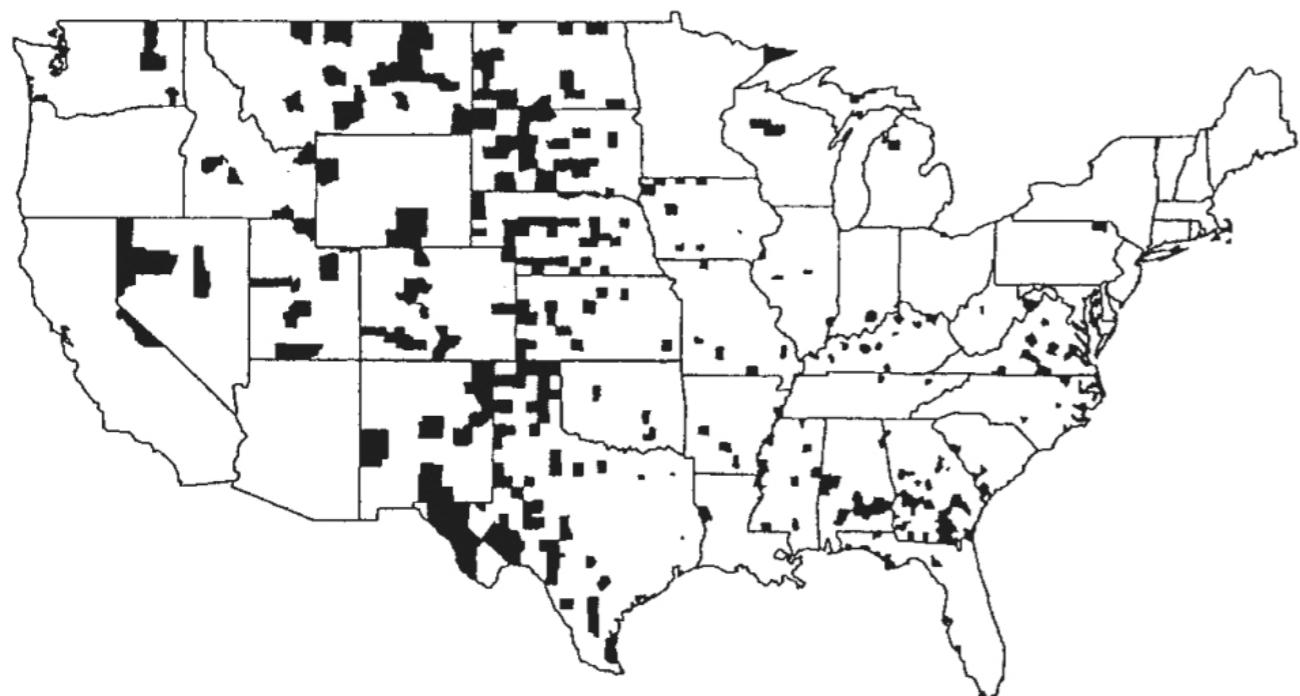




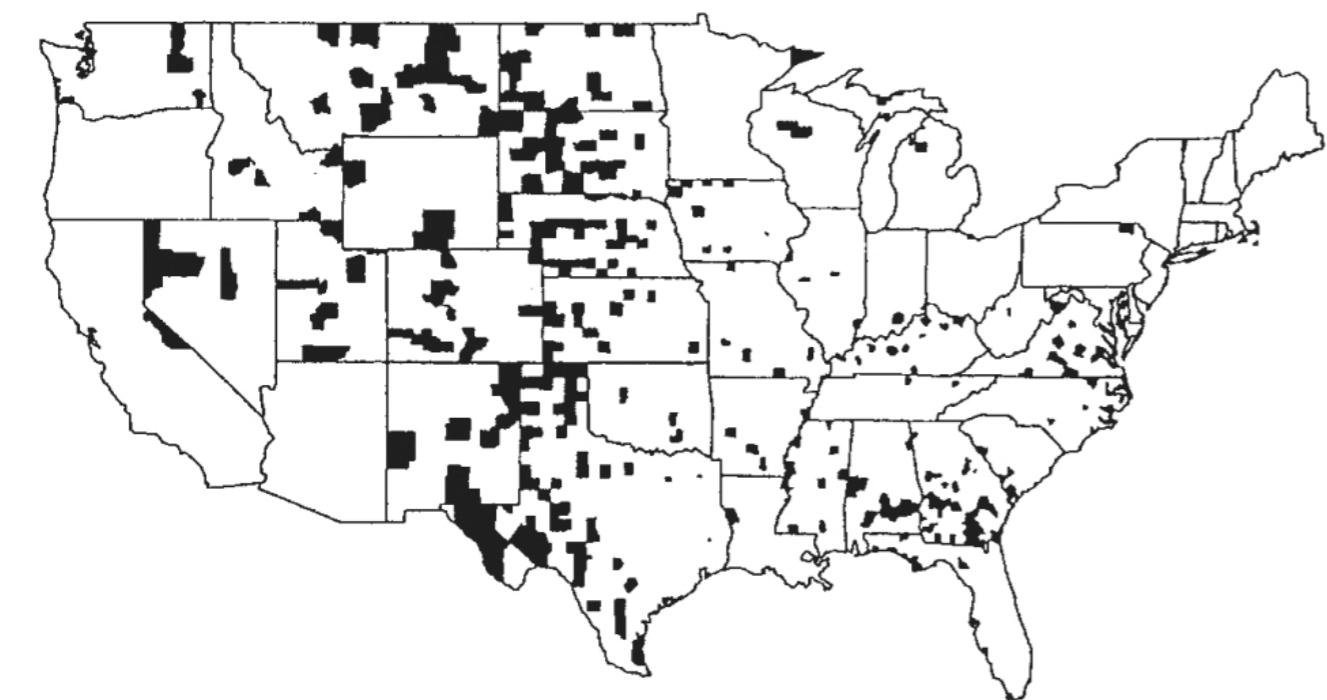
We notice patterns, even if no true patterns exists  
**Patternicity bias**



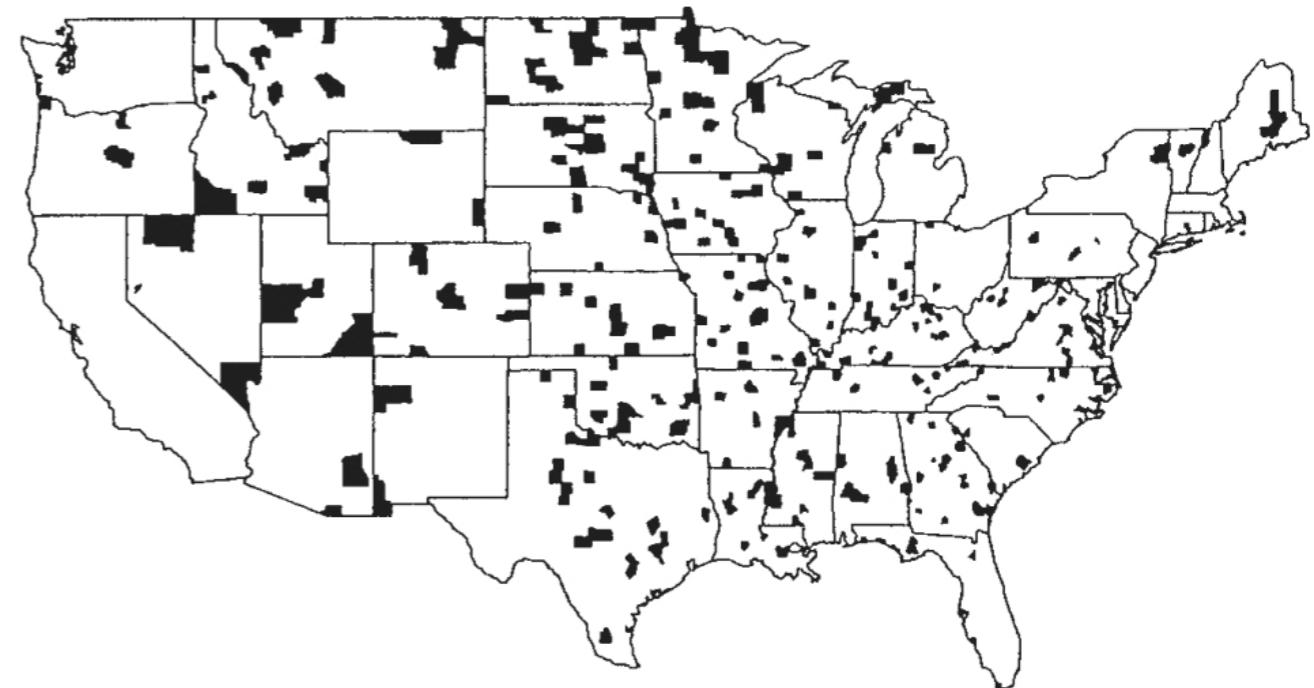
We come up with causal explanations for those patterns, even if they are unrelated causally  
**Storytelling bias**



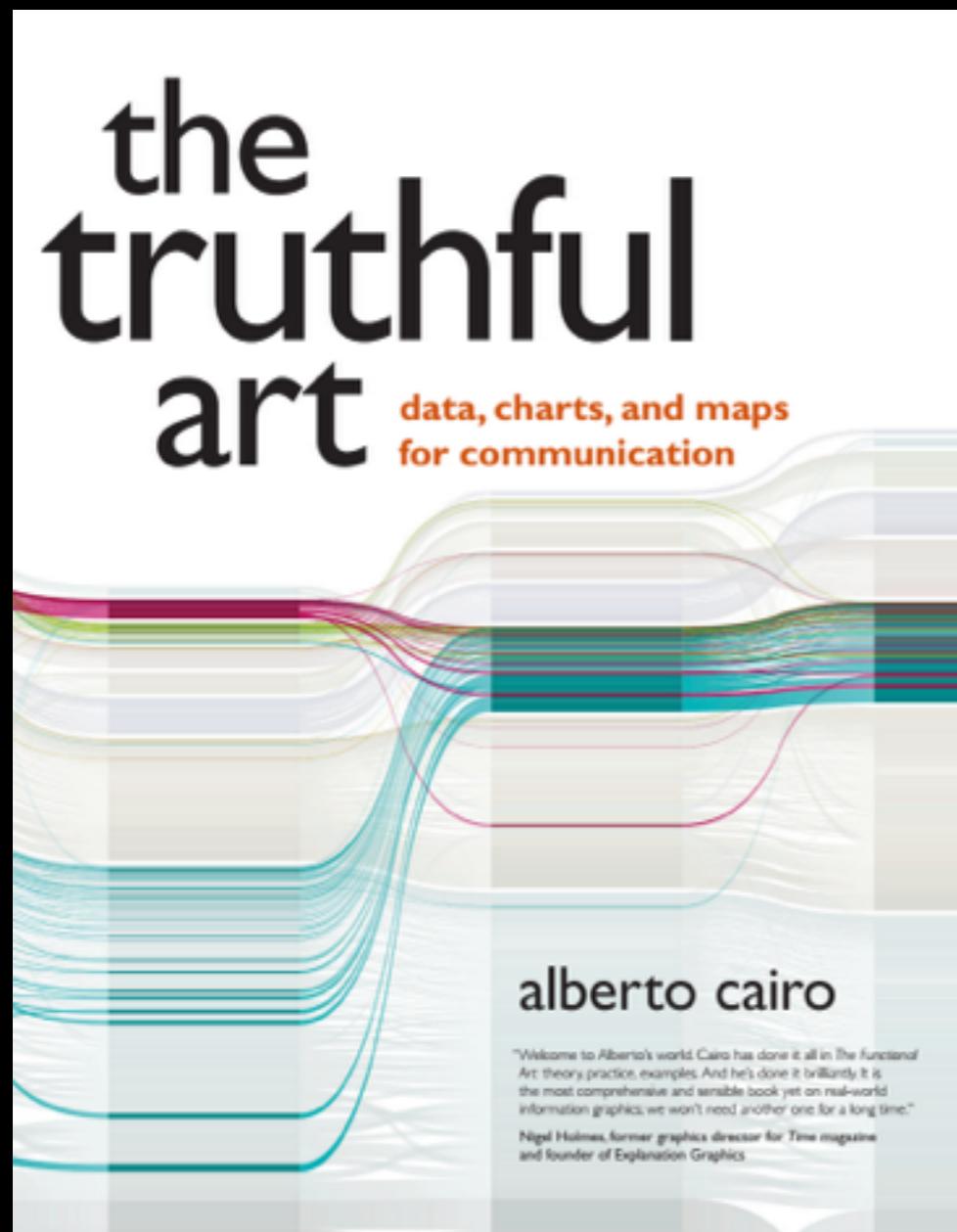
Counties with the LOWEST  
kidney cancer death rates  
(1980-1989)



Counties with the LOWEST  
kidney cancer death rates  
(1980-1989)



Counties with the HIGHEST  
kidney cancer death rates  
(1980-1989)



We notice patterns, even if no true patterns exists

### **Patternicity bias**



We come up with causal explanations for those patterns, even if they are unrelated causally

### **Storytelling bias**



We stick to the stories we create and become resistant to refuting evidence, particularly if the topic is emotionally charged

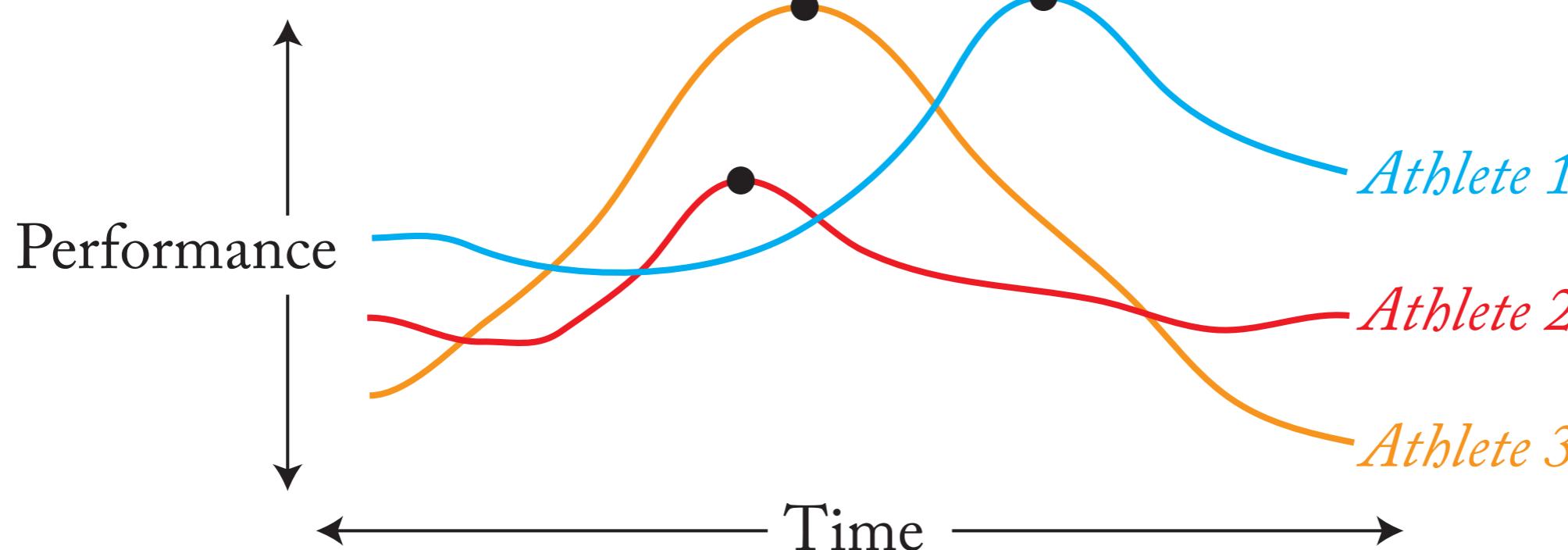
### **Confirmation bias**



The Sports  
Illustrated  
cover jinx

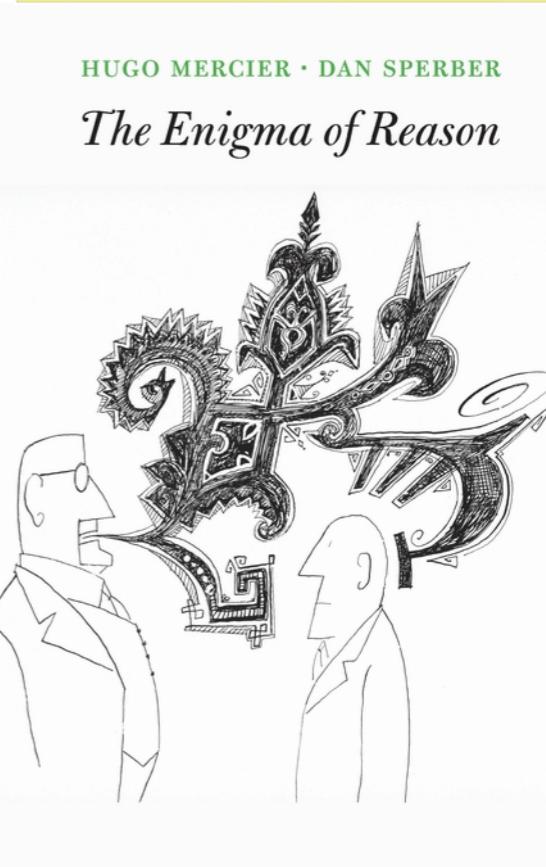
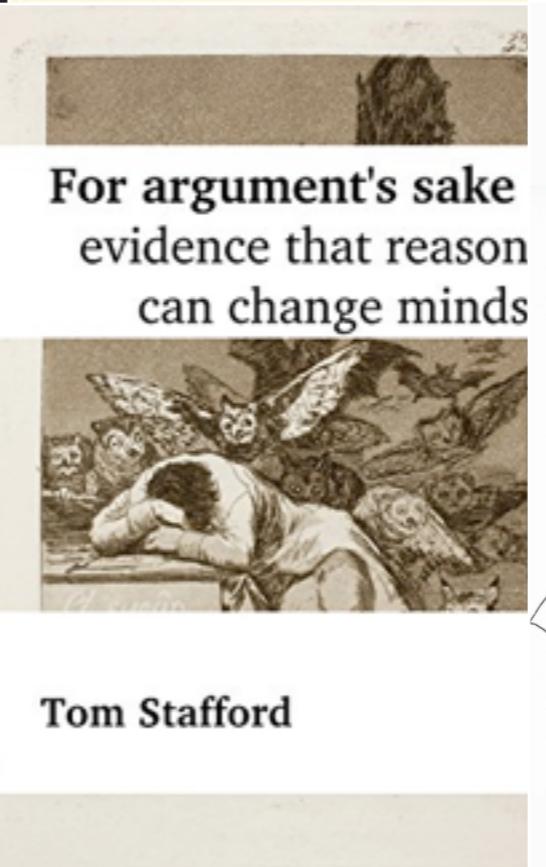
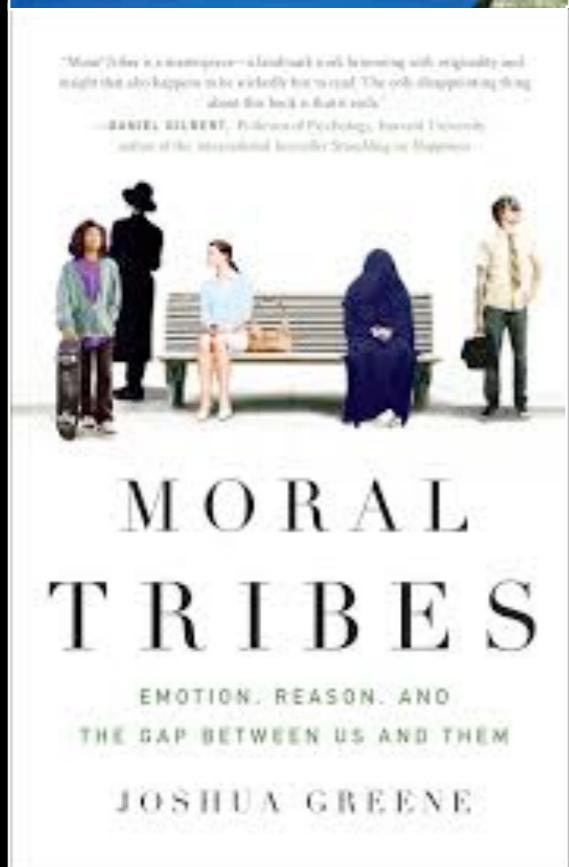
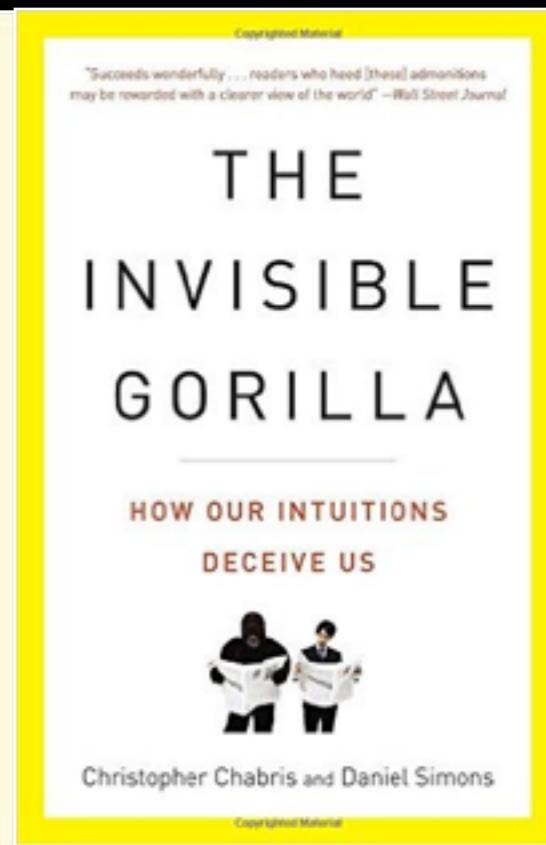
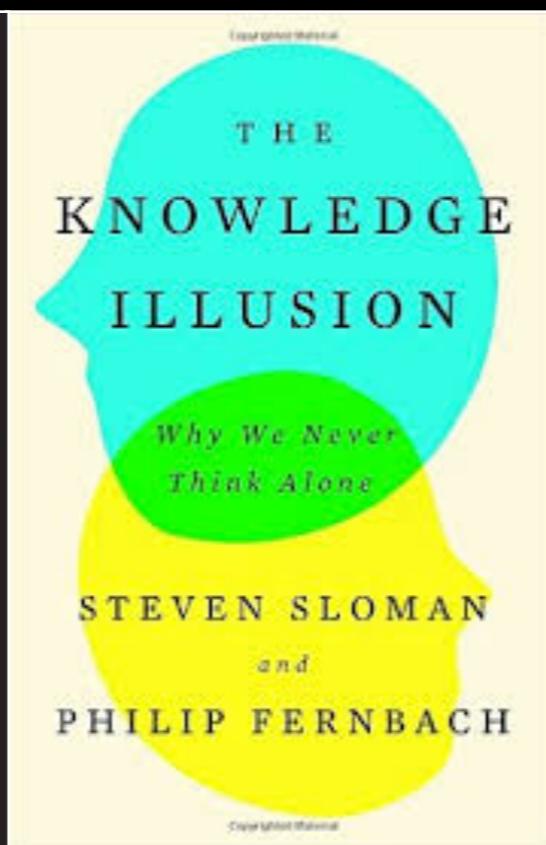
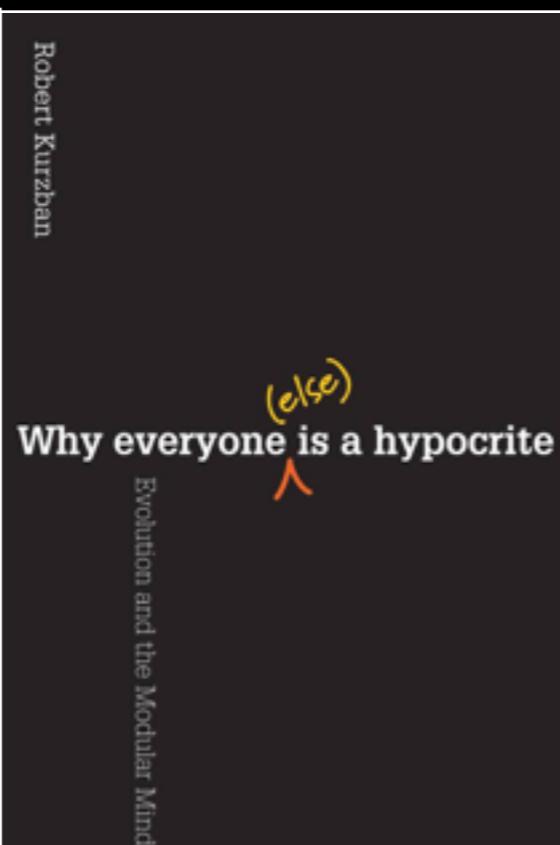
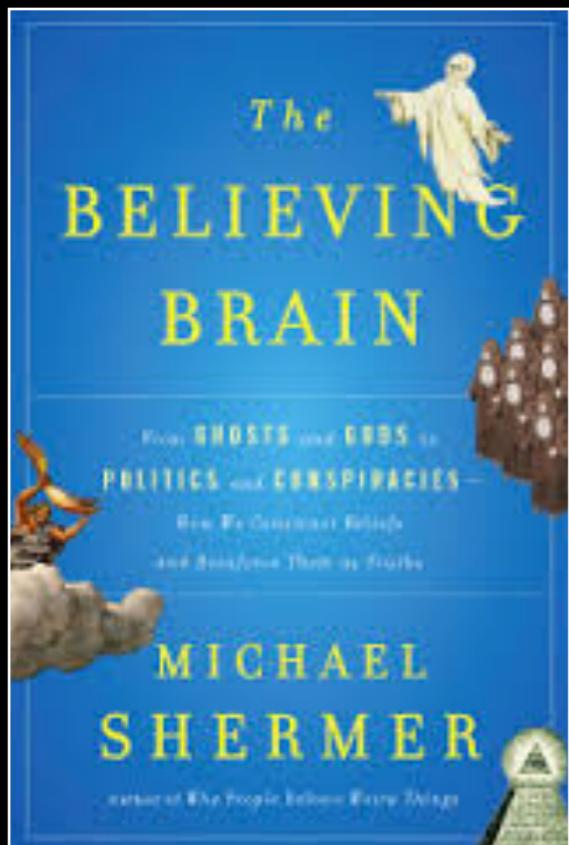


The Sports Illustrated cover jinx



- Made the cover of Sports Illustrated

# Recommendations:



# SELF-TRUMPERY

Protecting yourself from seeing just what you want to see

# TRUMPERY

Protecting yourself from other people

# How graphics lie

Showing the data incorrectly

Not including the right amount of data

Not taking uncertainty into account

(or interpreting it incorrectly)

# How graphics lie

Showing the data incorrectly

Not including the right amount of data

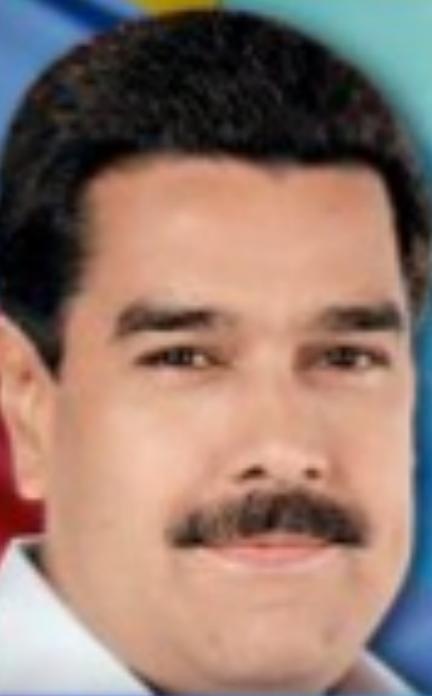
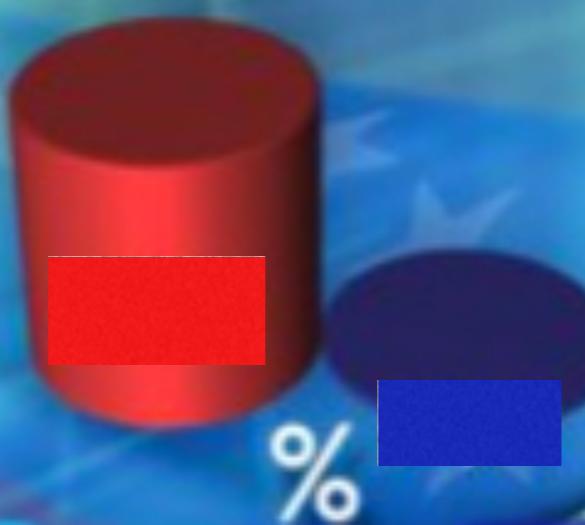
Not taking uncertainty into account

(or interpreting it incorrectly)



## ELECCIÓN PRESIDENCIAL 2013

PORCENTAJES



Nicolás Maduro: Ministro



Ganó el hijo de Chávez: Nicolás Maduro es el Presidente Electo de Venezuela (+Video)



Nicolás Maduro rechazó "Pacto" que le propuso Capriles antes de conocerse resultados oficiales



Hackeadas cuentas Twitter del Presidente Nicolás Maduro y del Psuv



Nicolás Maduro: Hoy es un día de historia, vamos con Cristo Redentor (+Fotos)

**Ganó el hijo de Chávez: Nicolás Maduro es el Presidente Electo de Venezuela (+Video)**

ELECCIONES

La tendencia es irreversible, señaló Tibisay Lucena, presidenta del ente comicial / Maduro obtuvo 50.66% y Capriles 49.07%

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PORCENTAJES



Nicolás Maduro: Ministro

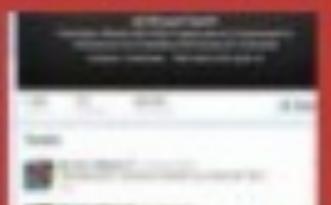
Henrique Capriles Radonski



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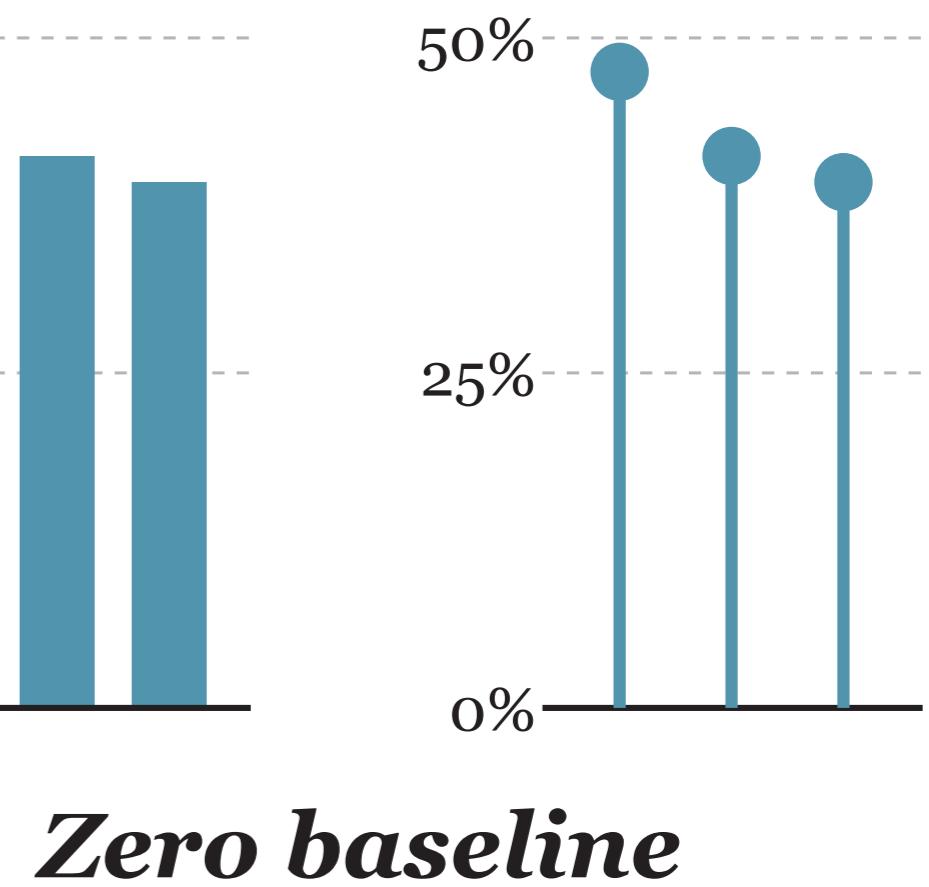
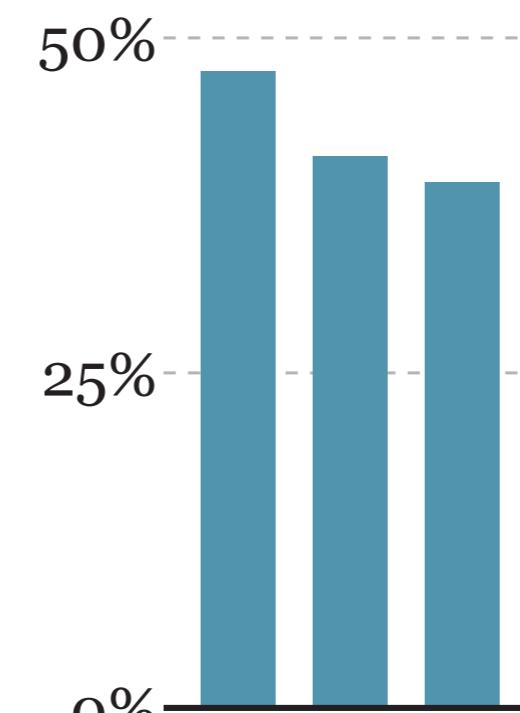
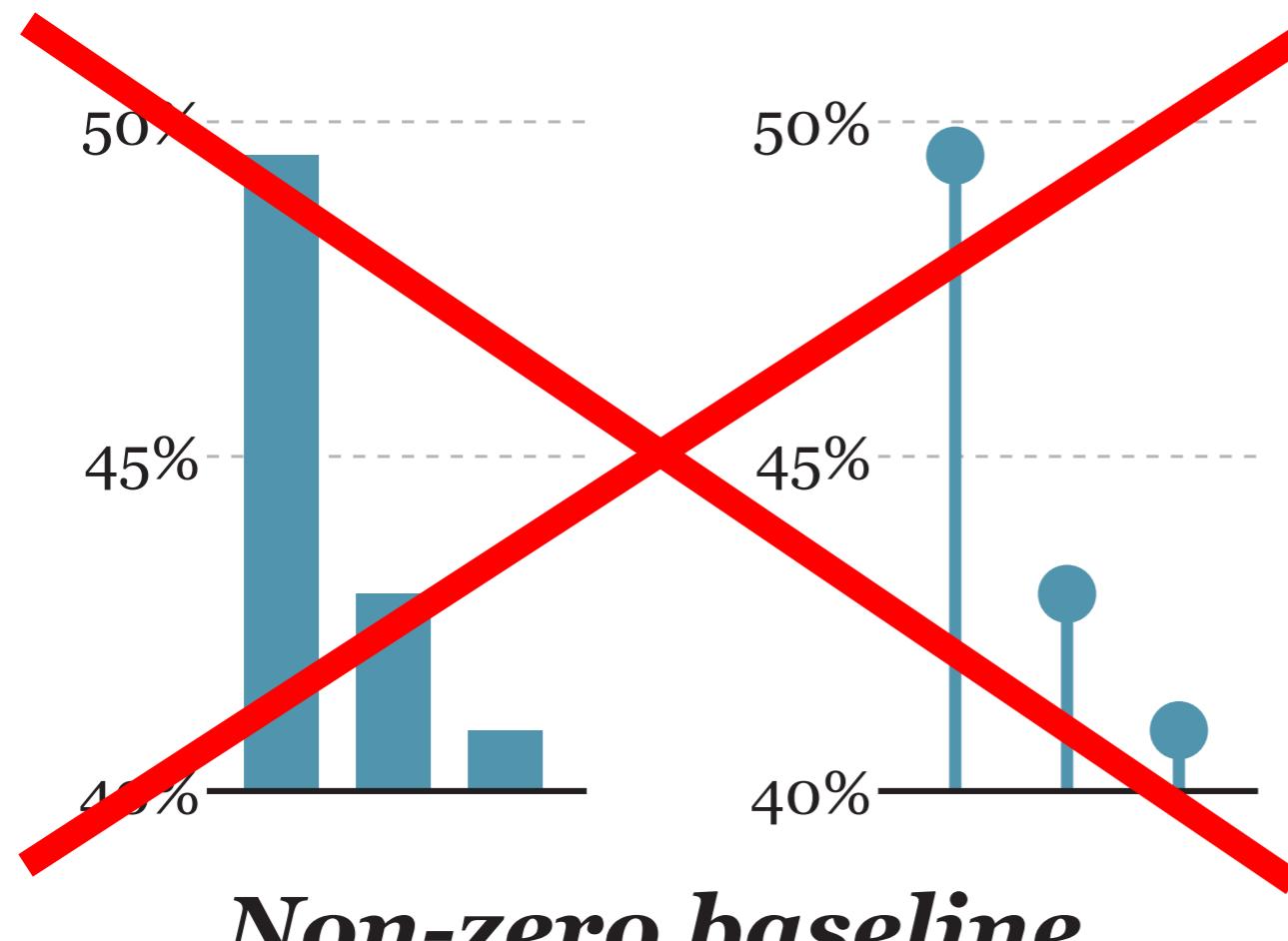
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# Scales



# How graphics lie

Showing the data incorrectly

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5.040.222

4.698.783

Febrero

Agosto

Paro registrado 2013

15:33

24h

5.040.222

4.698.783

Febrero

Agosto

Paro registrado 2013

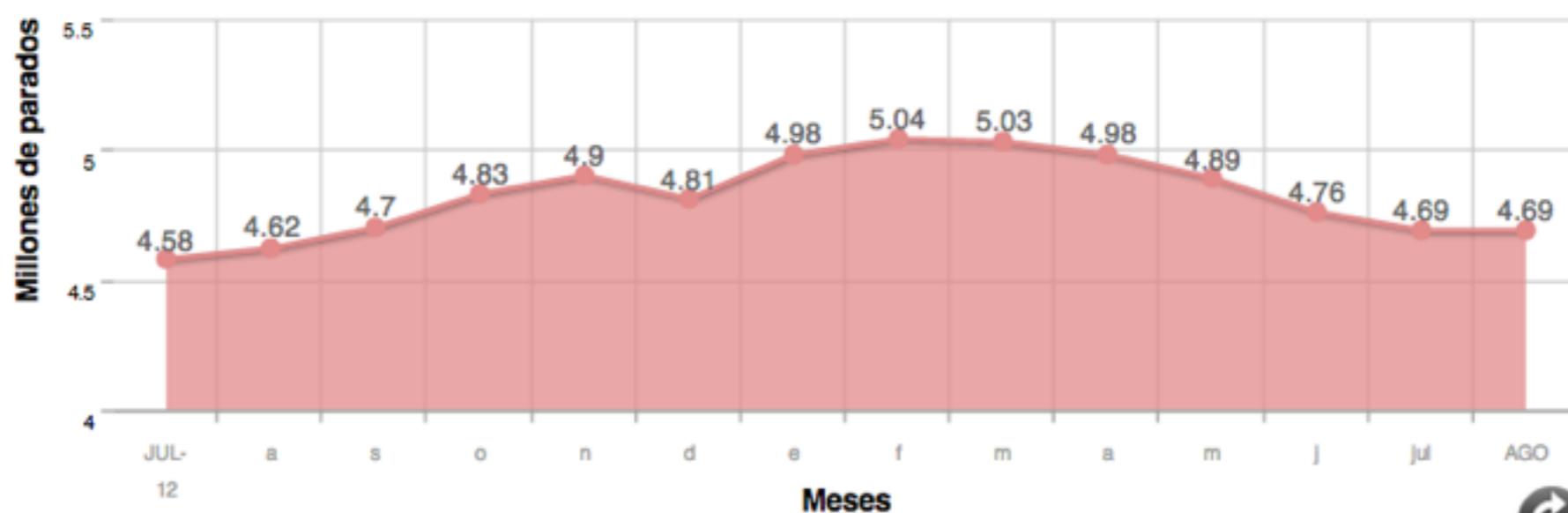
15:33

24h



Evolución del número de parados

Datos: Ministerio de Empleo (AGO 2013)



Paro Registrado



porcentual.es

# Whether Crime Is Up or Down Depends on Data Being Used

By TIMOTHY WILLIAMS SEPT. 27, 2016



The news from the [F.B.I.](#) crime data was alarming: The murder rate rose sharply last year, driven by jumps in several major cities.

Four urban areas — Baltimore, Chicago, Milwaukee and Washington — accounted for about a fifth of the increase in homicides in 2015. Those cities, however, make up only about 1 percent of the nation's population.

But whether crime is up or down depends on what data is being looked at — and who is doing the looking.

The F.B.I. data showed that violent crime rose about 4 percent last year from 2014, and homicides increased 10.8 percent. Yet crime over all fell in 2015 for the 14th consecutive year.

And the total number of homicides last year was fewer than 20 years ago even as the country's population increased, criminologists said. There were 19,645 homicides in 1996 in a nation of 265 million; in 2015, there were 15,696 in a population of 321 million.

What that data means, criminologists and police officials said, is that the decline in homicides has been so significant in the last quarter century that sudden increases in the number of killings in just a few cities can skew the entire national picture, even as the country has one of its safest periods on record.

## RELATED COVERAGE



[U.S. Murders Surged in 2015, F.B.I. Finds](#)

SEPT. 26, 2016

**"It isn't a national trend, it's a city trend, and it's not even a city trend, but a problem in certain neighborhoods,"** said [Richard A. Berk](#), a professor of statistics and criminology at the University of Pennsylvania. "Certainly, people around the country should not be worried. People in Chicago shouldn't be worried. But people in certain neighborhoods might be."

Criminologists and police officials point out that homicides do not usually disrupt entire cities. Instead, they occur in particular neighborhoods — and on the same blocks — leaving much of the rest of the city relatively untouched.

Explanations for the increase in homicides in certain American cities are largely guesswork. Criminologists acknowledge that the required analysis has not been done in the neighborhoods where killings are occurring — or even an agreement of what such a study should include — to arrive at any but the broadest conclusions.

## Careful with amalgamation paradoxes and with outliers

<http://journal.frontiersin.org/article/10.3389/fpsyg.2013.00513/full>

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## The U.S. Murder Rate (per 100,000 people)



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ANDALUCÍA CATALUÑA C. VALENCIANA GALICIA MADRID PAÍS VASCO MÁS COMUNIDADES TITULARES »

DATOS DEL CENTRO DE ESTUDIOS DE OPINIÓN ›

# El no a la independencia de Cataluña gana al sí por primera vez desde 2012

El ‘CIS catalán’ constata que el apoyo a la secesión cae un 9% en los últimos dos meses



PERE RÍOS

Barcelona - 19 DIC 2014 - 21:51 CET

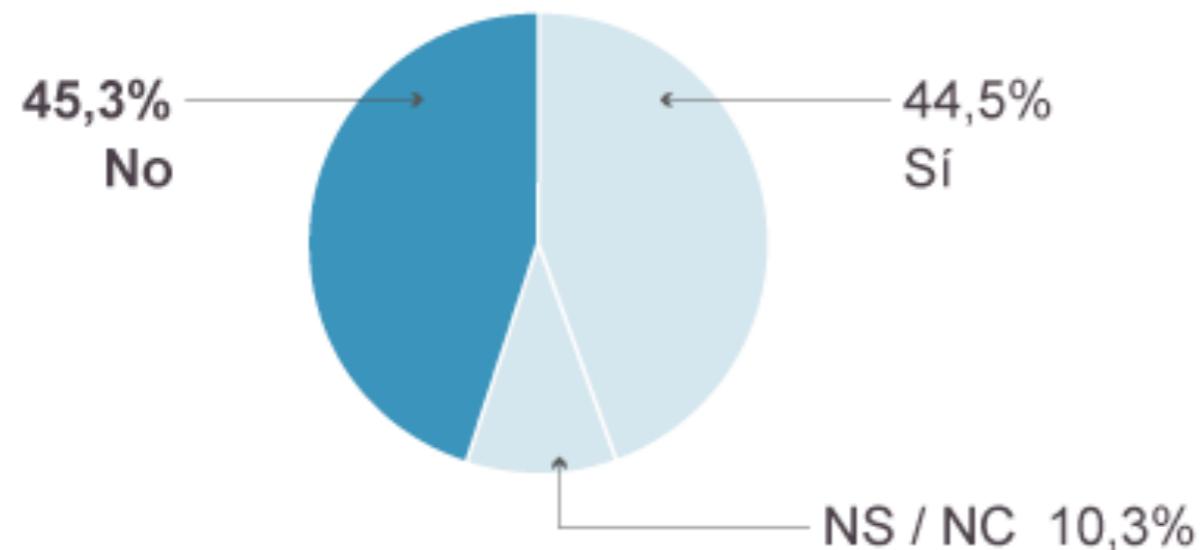
[http://ccaa.elpais.com/ccaa/2014/12/19/catalunya/1418984873\\_128596.html](http://ccaa.elpais.com/ccaa/2014/12/19/catalunya/1418984873_128596.html)

For the first time since Catalan leader Artur Mas began his ongoing independence drive in 2012, a survey shows that a majority in the region would reject secession if a referendum were held now.

<http://www.thefunctionalart.com/2014/12/adventures-in-margin-of-error.html>

The latest poll by the Catalan executive's Opinion Studies Center (CEO) shows that 45.3 percent of citizens would vote no to the question: "Would you like Catalonia to become an independent state?" compared with 44.5 percent who would support the move.

ENCUESTA SOBRE CONTEXTO POLÍTICO EN CATALUÑA  
**¿Quiere que Cataluña sea un Estado independiente?**



Fuente: CEO / Generalitat de Cataluña.

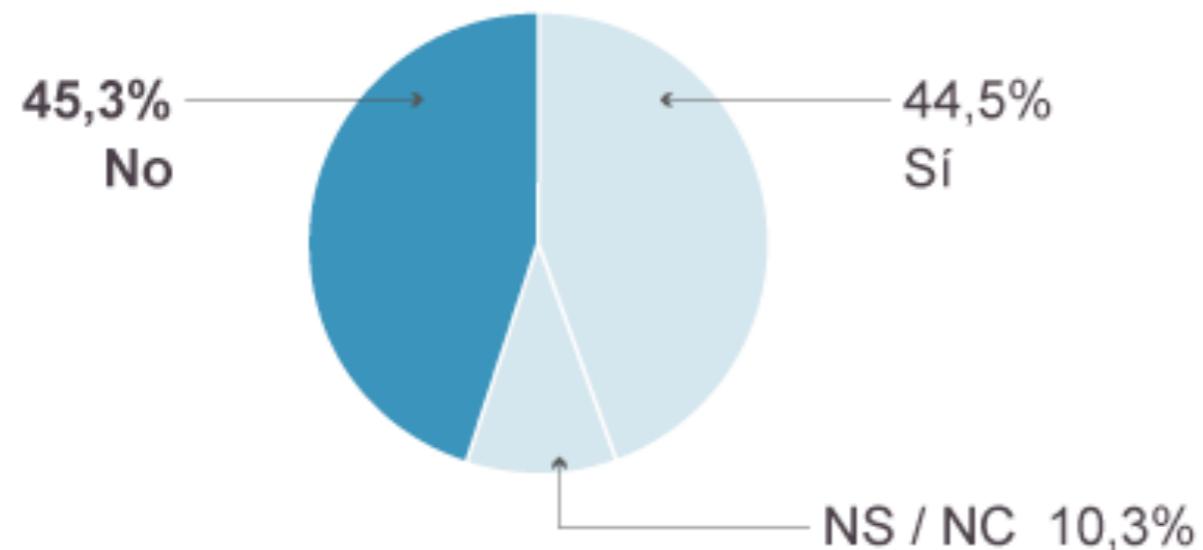
EL PAÍS

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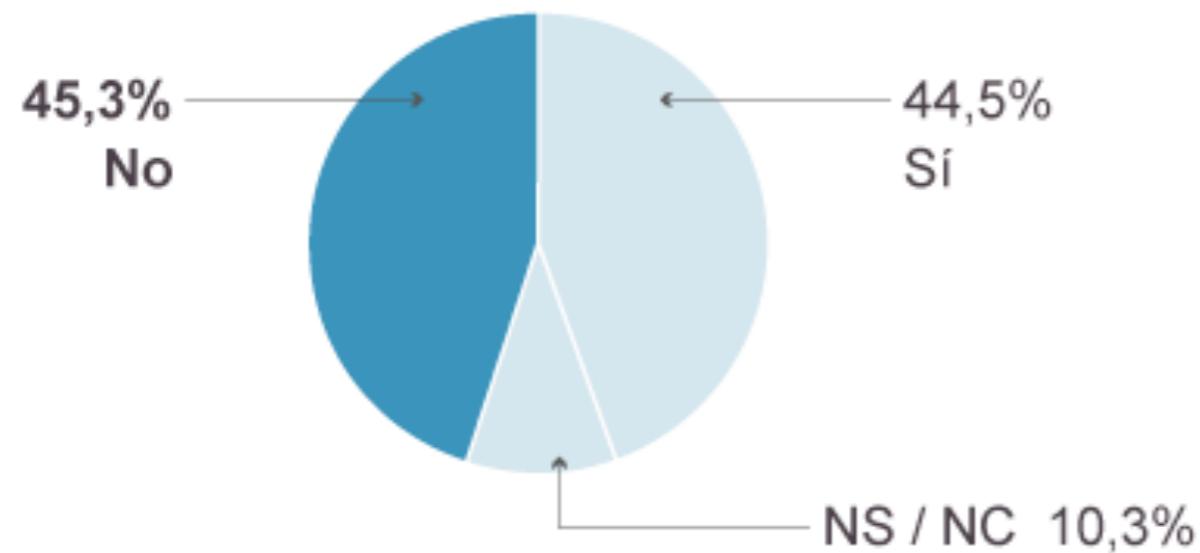
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EL PAÍS

El margen de error de la encuesta es del 2,95%, un dato relevante teniendo en cuenta la estrecha diferencia entre el sí y el no a la independencia.

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## *Do you want Catalonia to become an independent state?*



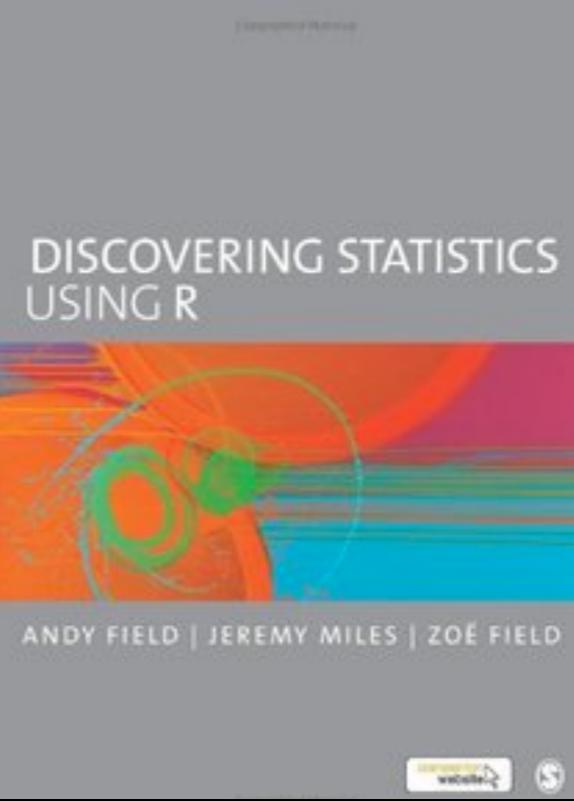
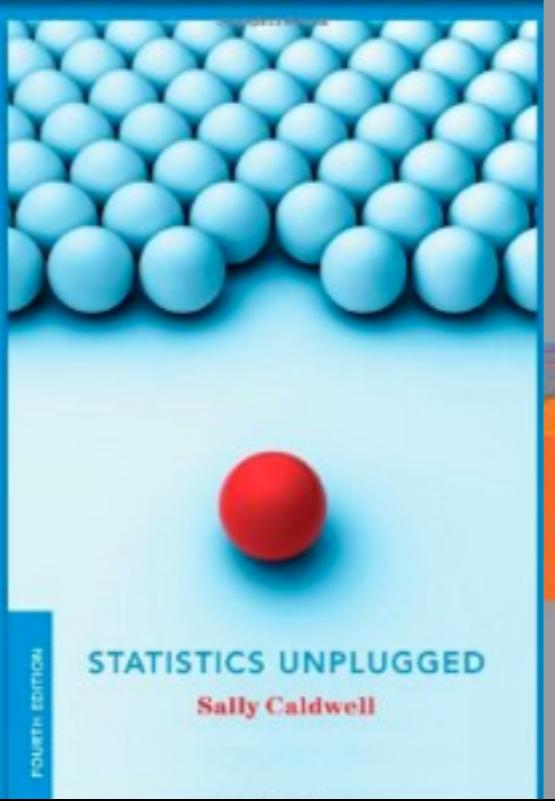
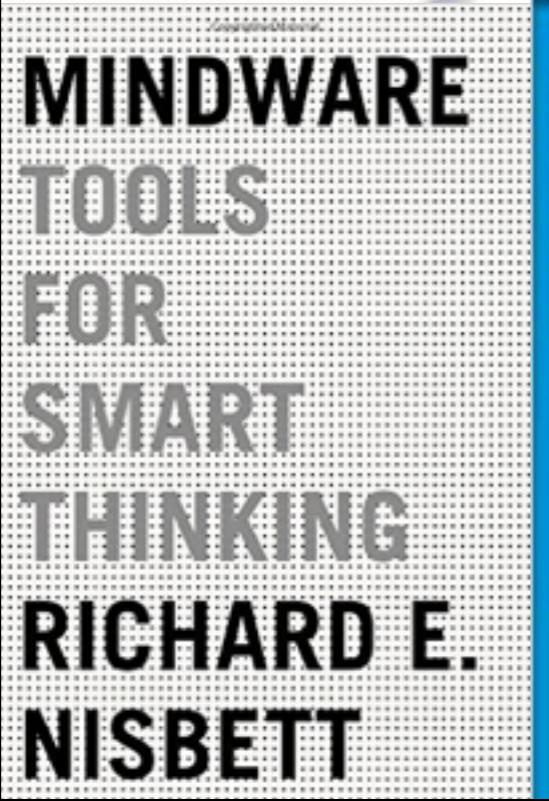
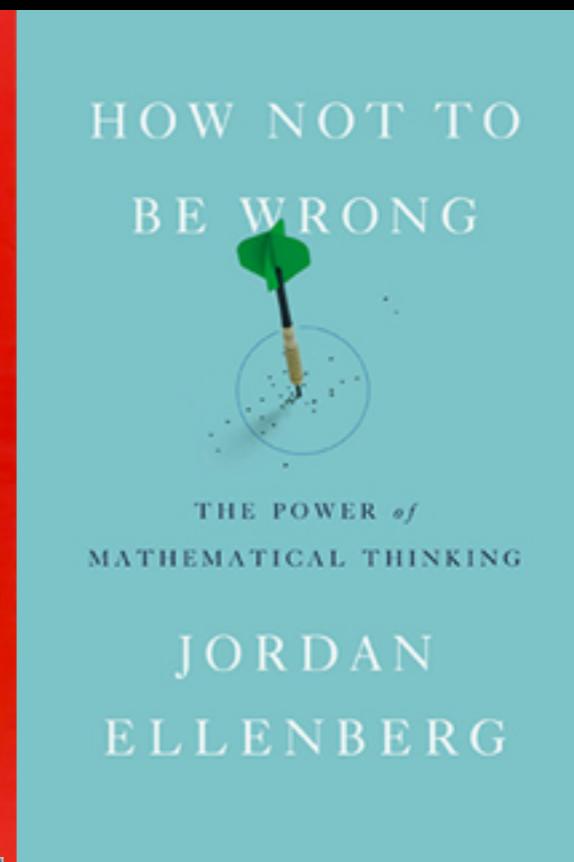
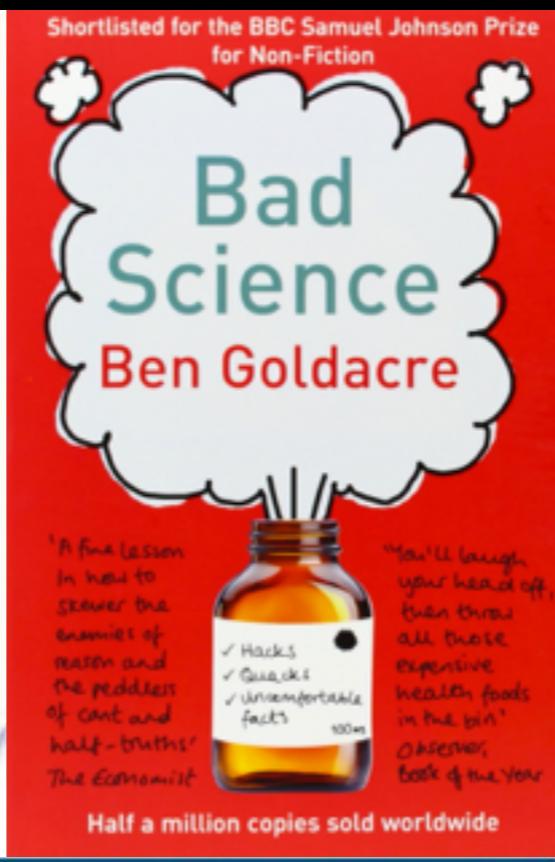
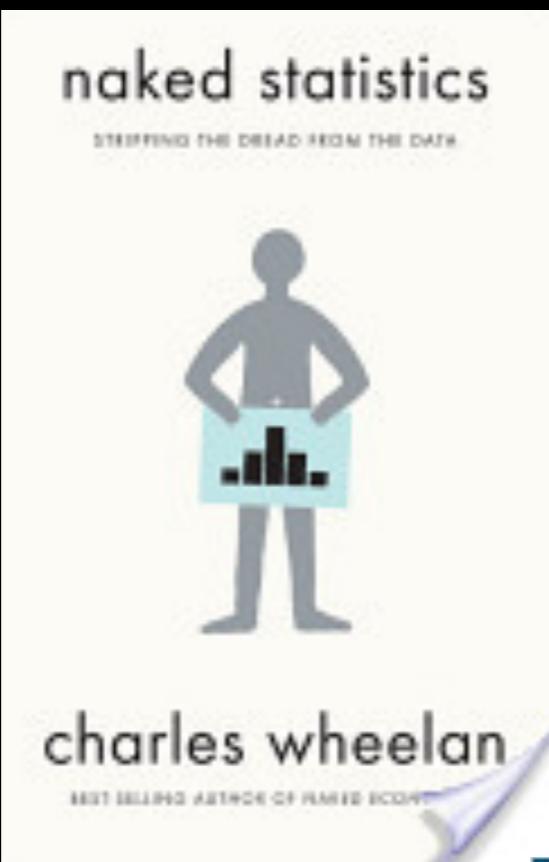
Margin of error: +/-2.95

Level of confidence = 95%

Probability that this difference of 0.8 percentage points is due to chance: **80%**

El margen de error de la encuesta es del 2,95%, un dato relevante teniendo en cuenta la estrecha diferencia entre el sí y el no a la independencia.

# Read these books...



# How graphics lie

Showing the data incorrectly

Not including the right amount of data

Not taking uncertainty into account

(or interpreting it incorrectly)

A reasoning revolution won't lead  
us anywhere if isn't paired with an  
ethical thinking revolution



BUILD      DESTROY

Make your choice

# ETHICS AND TRUST

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