

# THE SCIENTIST AND THE JOURNALIST

Storytelling with infographics  
and visualization

Alberto Cairo  
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**After my visit to the Wells Library this morning**



**How I see YOU**



**How I see MYSELF**

**After my visit to the Wells Library this morning**



**How I see YOU**



**How I see MYSELF**

**After my visit to the Wells Library this morning**



**How I see YOU**

[www.nick.com](http://www.nick.com)



**How I see MYSELF**

[www.pritchettcartoons.com](http://www.pritchettcartoons.com)

# How does Jimmy Neutron communicate with the caveman?



1%

[www.nick.com](http://www.nick.com)



99%

[www.pritchettcartoons.com](http://www.pritchettcartoons.com)

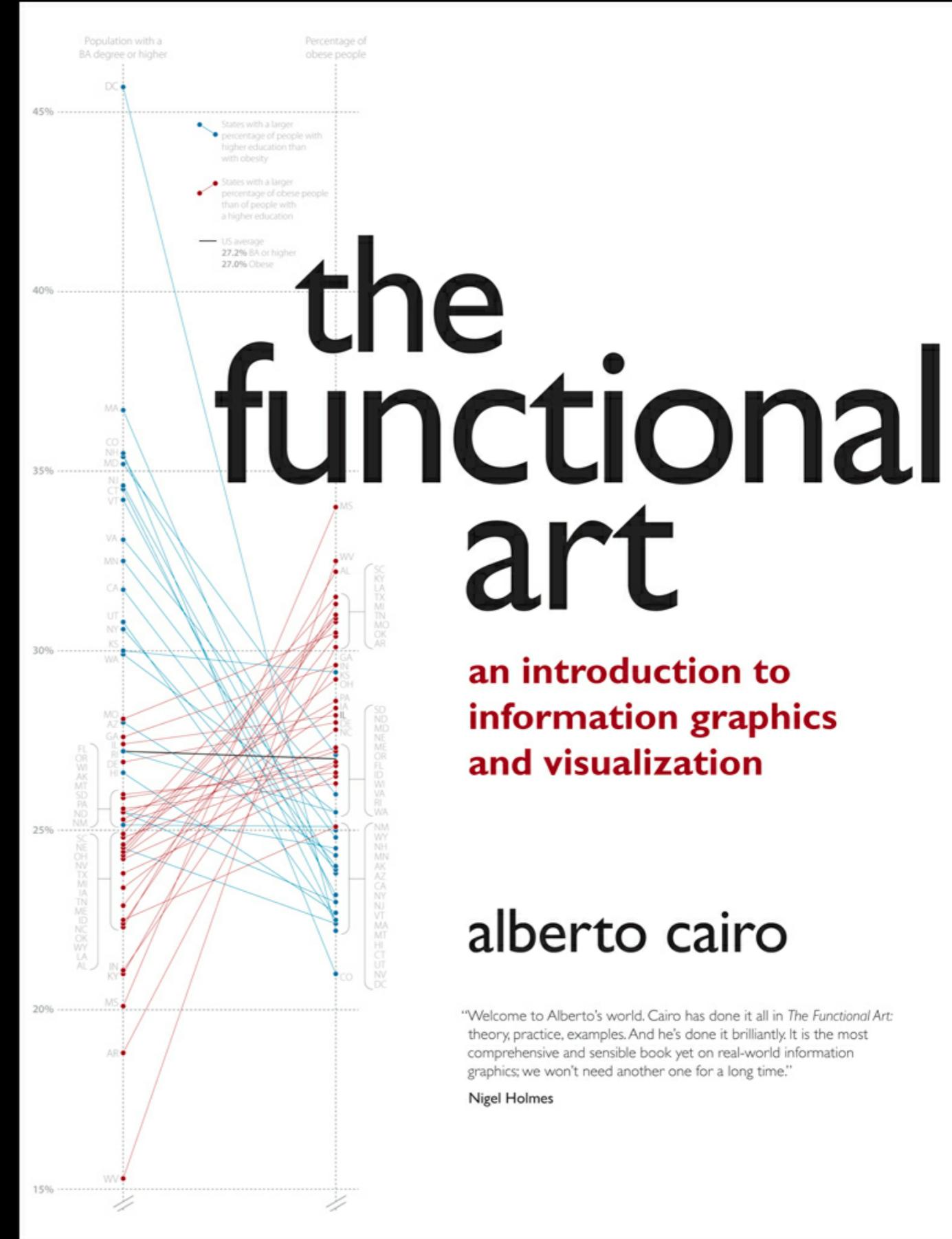


# JIMMY NEUTRON AND THE CAVEMAN

**Storytelling with infographics  
and visualization**

Alberto Cairo  
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An infographic (or a ‘visualization’) is a visual **representation** of **evidence**, a tool for analysis, communication, and understanding



is there real a clear boundary between  
**Infographics and visualization?**

## DIAGRAM

NEWS IN PERSPECTIVE

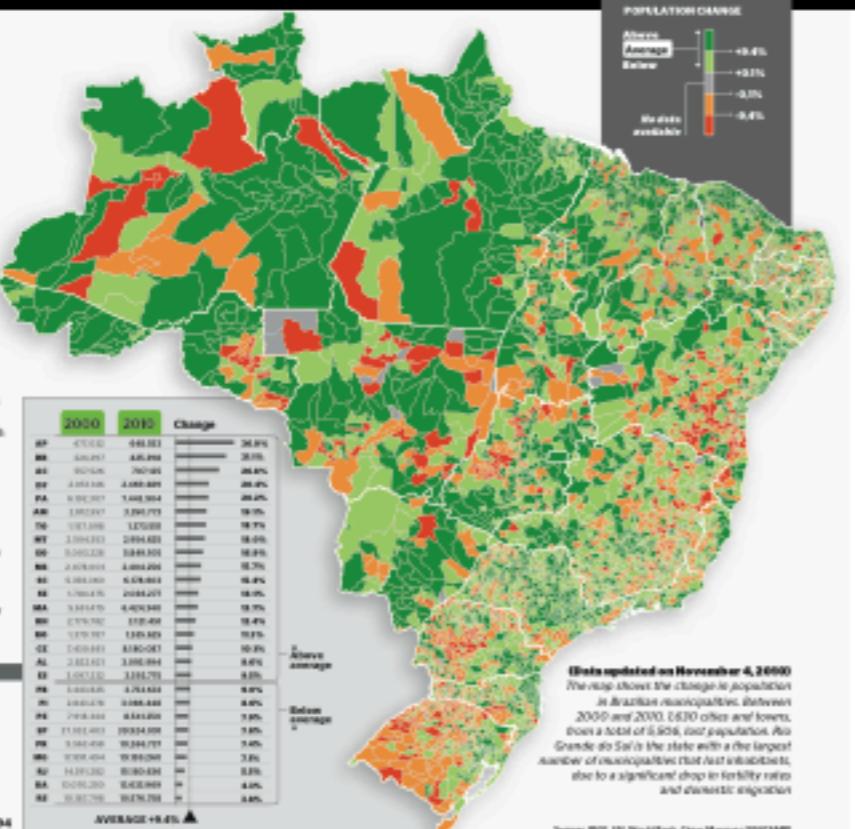
### Brazil's Demographic Opportunity

How Brazil can take advantage of a future with fewer children per couple.

Alberto Cairo, Franklin Lima,  
Marco Verguts

#### PRELIMINARY DATA FROM THE 2010 CENSUS

Create an interesting picture of the changes that the Brazilian population has gone through in the past ten years. Brazil's population grew, on average, 1.0% between 2000 and 2010, but the fertility rate is below 2.1 children per woman, the minimum to keep a population from shrinking. According to Cláudio Marques, a demographer from the University of Campinas, the main challenge Brazil will face in the future is how to maintain a healthy Social Security system if the number of older and retired people will likely be much larger than it is today. Read envelope about the variables of pie in this story.

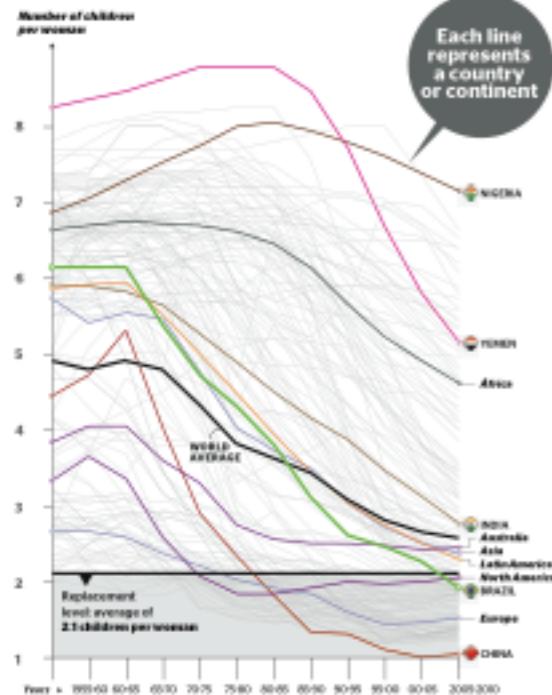


#### 1 BRAZIL'S POPULATION IS BIGGER

The 2010 Census has revealed a 5.4% population increase between 2000 and 2010. The differences between states, as you can see on the chart, in the right, are enormous. Most rich states, such as São Paulo and Rio, didn't grow as fast as the ones in the north east. Read envelope about the variables of pie in this story.

#### 2 BUT THE FERTILITY RATE IS MUCH LOWER THAN EXPECTED

A study in 2004 estimated that in 2010, the fertility rate would be 2.4 children per women, on average. But new data collected by the IBGE prove that the fertility rate is already 1.9, below the threshold called "replacement rate". When the fertility rate drops below this number, the population of a country will eventually start to shrink and grow older.



# Infographics

## Diagram

NEWS IN PERSPECTIVE

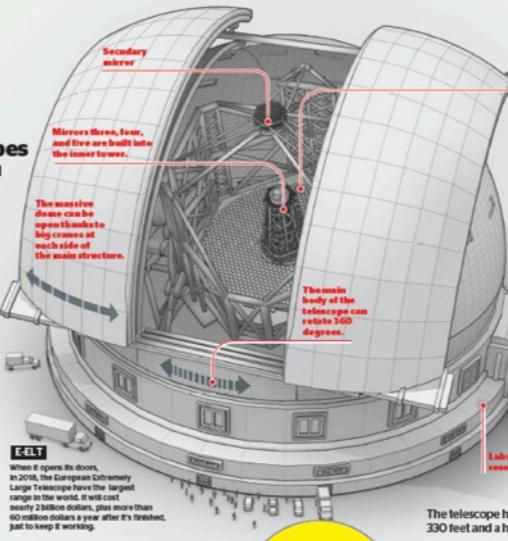
### 400 years after Galileo, mega-telescopes rule space exploration

A new generation of observatories is under construction. Brazil needs to decide if it's going to be part of this new revolution in astronomy.

Peter Moon, Alberto Cairo, Gerson Mora

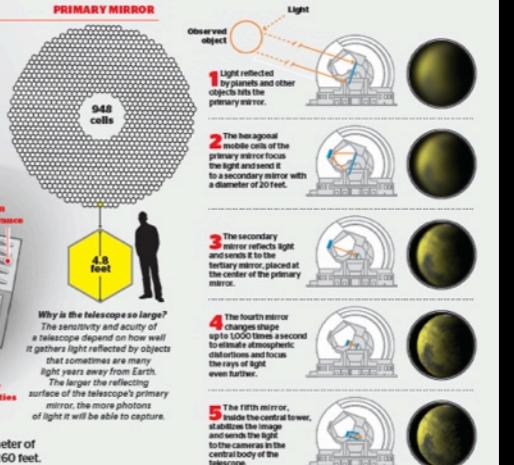
In 1609, Galileo Galilei perfected the telescope, created in 1590 by Hans Lippershey. Galilei's telescope had a lens of 6 inches. Today, the largest telescopes are in Hawaii and northern Chile. Equipped with mirrors 24 to 35 feet in diameter, they are the observation of galaxies, stars or even planets from us, but with little clarity. So a new generation of mega-telescopes is being built. The largest is the European Extremely Large Telescope (E-ELT), an initiative of the European Space Agency that is under construction in the Atacama Desert in Chile and will open in 2018. The Ministry of Science and Technology of Brazil deserves participation in the project, but the huge investment has unleashed concerns in other areas of the government. The total cost for Brazil would be \$650 million over 20 years.

Sources: Southern Cone Observatory (SCOS), TMT, Gemini, Steward



#### HOW THE E-ELT GATHERS HIGH-RESOLUTION IMAGES

The E-ELT will be the first telescope able to shoot pictures of planets outside the solar system, which will be useful for analyzing their atmospheres.



#### THE SUPER TELESCOPE RANKING

The E-ELT is a giant compared to the existing mega-telescopes. Its primary mirror is four times the size of the one in the largest telescope, in the Canary Islands, Spain.



#### TELESCOPES WITH BRAZILIAN INVOLVEMENT

Brazil participates in just two of the largest telescopes.



**Gemini**  
Site: Cerro Pachón, Chile, and the Mauna Kea volcano, Hawaii, these twin telescopes have mirrors with a diameter of 26.5 feet. The National Optical Sciences Development Council covers 24.5% of the total cost of using them for observations.

#### OTHER LARGE TELESCOPES UNDER CONSTRUCTION

Besides the E-ELT, there are other projects in development.



**Thirty Meter Telescope (TMT)**  
Opening: 2018  
Cost: \$1 billion  
Place: Mauna Kea, Hawaii, USA, Canada  
Site: Mauna Kea, Hawaii, USA, Canada



**Interferometer Gigante (IGA)**  
Opening: 2018  
Cost: \$1 billion  
Place: Atacama Desert, Chile



**Atacama Large Millimeter Array (ALMA)**  
Opening: 2012  
Cost: \$1 billion  
Place: Atacama, Chile  
USA, Europe, Japan, Taiwan, Chile

## Diagram

NEWS IN PERSPECTIVE

### Giants Of The Ocean

Giant waves can be a threat to civil navigation and construction in the sea. Is Brazil prepared?

Gerson Mora, Alberto Cairo, Rodrigo Coimbra, Elizeth Barreiro Júnior

The images of the CLÉIA II cruiser being hit by 30-foot tall waves in Antarctica have been broadcast by TV stations all over the world. That footage is a reminder that Brazil represents an exception to what happens in the sea. In her book *The Wave*, which will be released in Brazil this week, American journalist Susan Casey talks about "treak waves" or "rogue waves", giant masses of water that suddenly appear in the middle of the ocean, are one of the most serious dangers to civil navigation and construction.

On average, they sink one medium-sized or large ship per week.

Coastal waves can also be huge. The highest recorded wave

was devastated Lituya Bay, in Alaska, in 1958.

In a strong earthquake, the wave was 1,600 feet tall. In this graphic you will learn why waves appear, how they work, and what resources Brazil is investing in understanding them better.

#### HOW COASTAL GIANT WAVES WORK

Waves are energy traveling through water. They are created by wind blowing on the ocean surface. The stronger the wind, and the longer it blows, the larger the waves it produces. That's why waves are more common and bigger where storms are frequent.

**1** When the wind blows, it creates friction with the water. The water begins to rotate in the same direction as the air, creating the result of the deformation of water surface.

**2** The longer the wind blows, the bigger the waves become. Wind can blow across the surface that can be pushed by that same wind.

**3** This cycle goes on as long as the wind blows. The stronger the wind, and the longer it lasts, the bigger the waves that it will generate.

**4** When waves get closer to the coast, they are slowed down by submarine relief. Also, the currents that flow near the bottom of the sea start moving up over the latter.

**5** As the first waves that reach the coast are slowed down, they stop. Then, other waves that come after them, the latter start piling up over the latter.

**6** The result of the wave is produced by the waves moving over each other, when they are close to the coast.

**A** Regions where storms are common, such as the North Atlantic, are also the regions where waves appear with higher frequency. The strong winds that stir those waters are a key factor.

**B** Submarine relief is another factor. Shallow waters in the North Sea, the Mediterranean, Scandinavia, are prone to freak waves for the same reason that big waves appear in coastal areas.

**C** The confluence of warm and cold currents (see map on the right) and ocean dynamics that make giant waves more likely.

Freak waves are more common in regions near the Poles. They are also frequent in South African national waters. In that area, the Agulhas Current meets cold water that is pushed from

**Giant Waves in Brazil**  
Brazil doesn't keep a centralized record of giant waves in national waters. But Petrobras, the public oil company, takes them into consideration when it builds extraction platforms.



**Campos Basin**  
**Santos Basin**

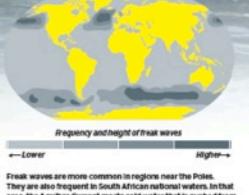
**Statistical analysis** have predicted that waves during a storm can reach an average of 26 feet with a maximum of 40 feet.



**WAVE SIMULATOR**  
The Polytechnic School of the University of São Paulo (Poli-USP), using funding from Petrobras, opened a lab to study giant waves in December 2009. The main element in the laboratory is a 36-foot wide and 13-foot deep pool for simulating giant waves. The waves are generated by 148 rubber flaps, attached to small engines and controlled by a computer.

**WAVES IN BRAZIL**  
In 2010 it was predicted that a wave in Santos (over 40 feet) is 67 feet.

**WAVES IN BRAZIL**  
The New Dose Group (NDG-USP), Science and Letters

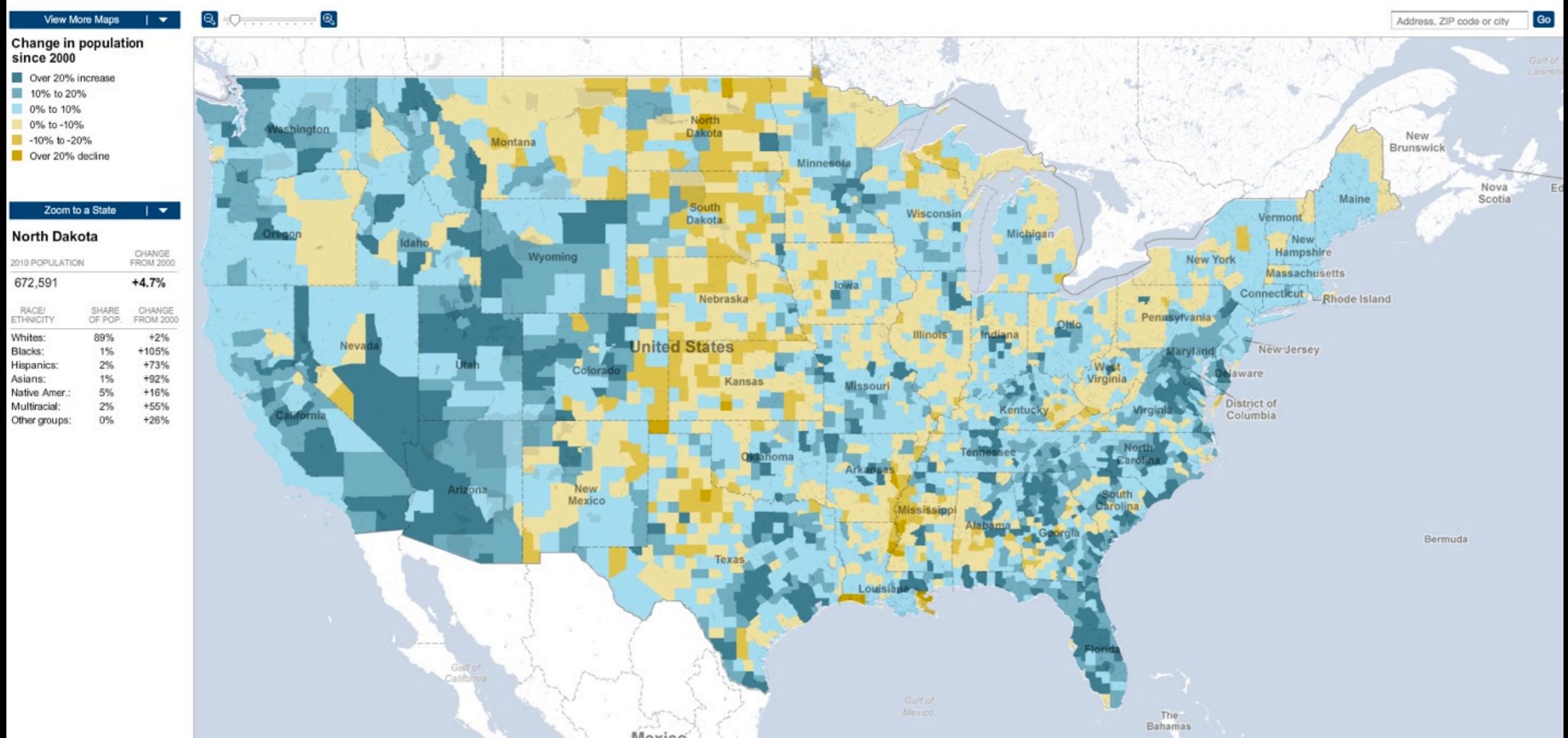


**Frequency and height of freak waves**  
Freak waves are more common in regions near the Poles. They are also frequent in South African national waters. In that area, the Agulhas Current meets cold water that is pushed from

## Mapping the 2010 U.S. Census

Browse population growth and decline, changes in racial and ethnic concentrations and patterns of housing development.

Share this view on [Twitter](#) or [Facebook](#)



# Data visualizations

## 200 Countries, 200 Years, 4 Minutes

Hans Rosling's 200 Countries, 200 Years, 4 Minu...



Help us cross the river of myths



Please read Hans Rosling's personal appeal.

[Read](#)

[Curtir](#) 9,7 m [Tweet](#) 985 +

TEDTalks

Hans Rosling's TEDTalks have been

# Hans Rosling, [www.gapminder.com](http://www.gapminder.com)

<http://www.gapminder.org/videos/200-years-that-changed-the-world-bbc/>

# What we can learn together

- 1.** Think of what's appropriate to show, and how
- 2.** Think about structure and function
- 3.** Think of labeling and storytelling

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EVGENY MOROZOV

*The Folly of Technological Solutionism*

# TO SAVE EVERYTHING CLICK

Here

Do we seriously think about  
the ethics of what we show  
in our visualizations?  
**Is it acceptable to visually  
represent any kind of  
available dataset, just because  
it is publicly available?**

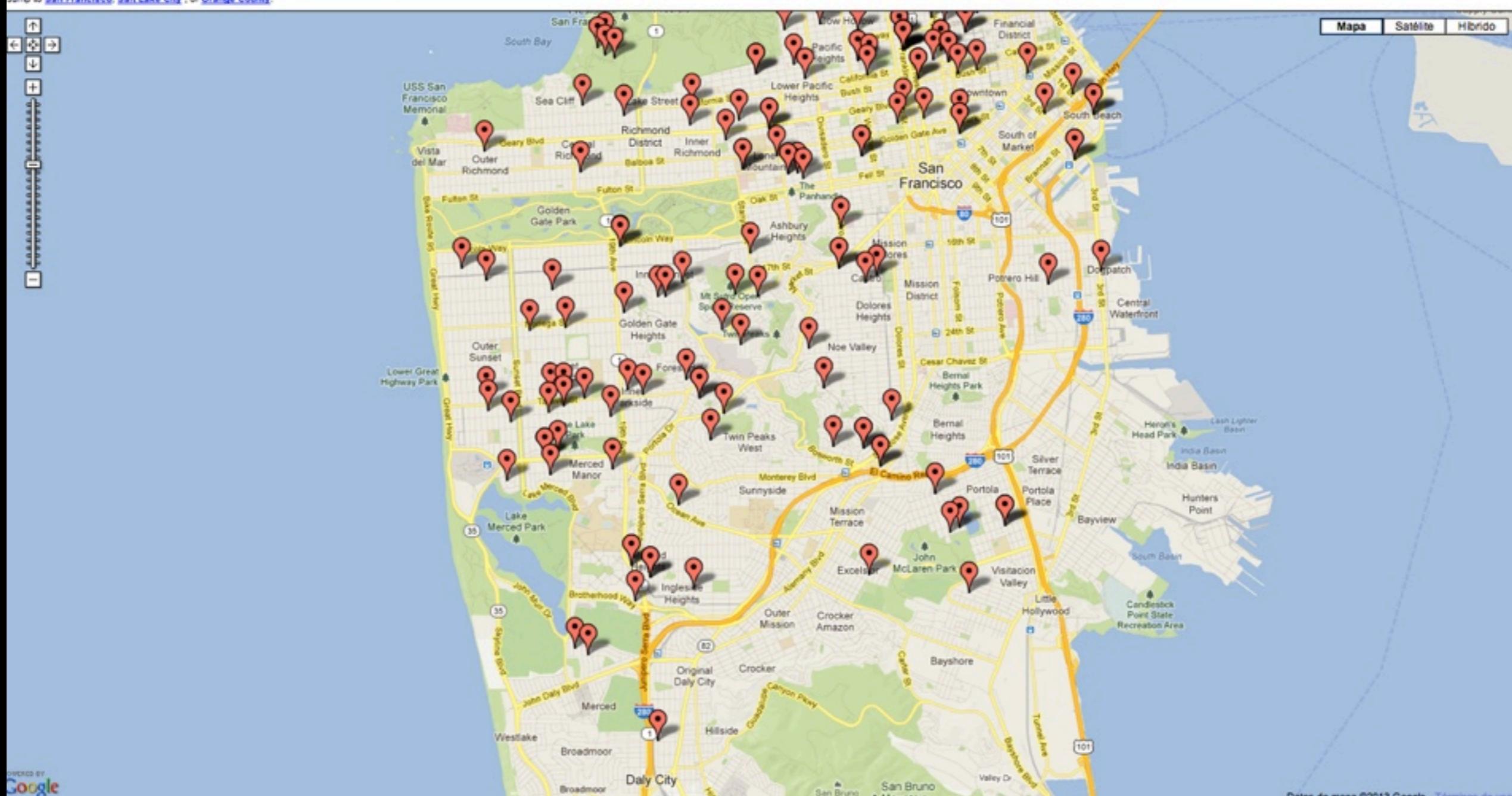
# Donors to Proposition 8 (banning gay marriage)

## PROP 8 MAPS

A mash-up of [Google Maps](#) and [Prop 8 Donors](#).

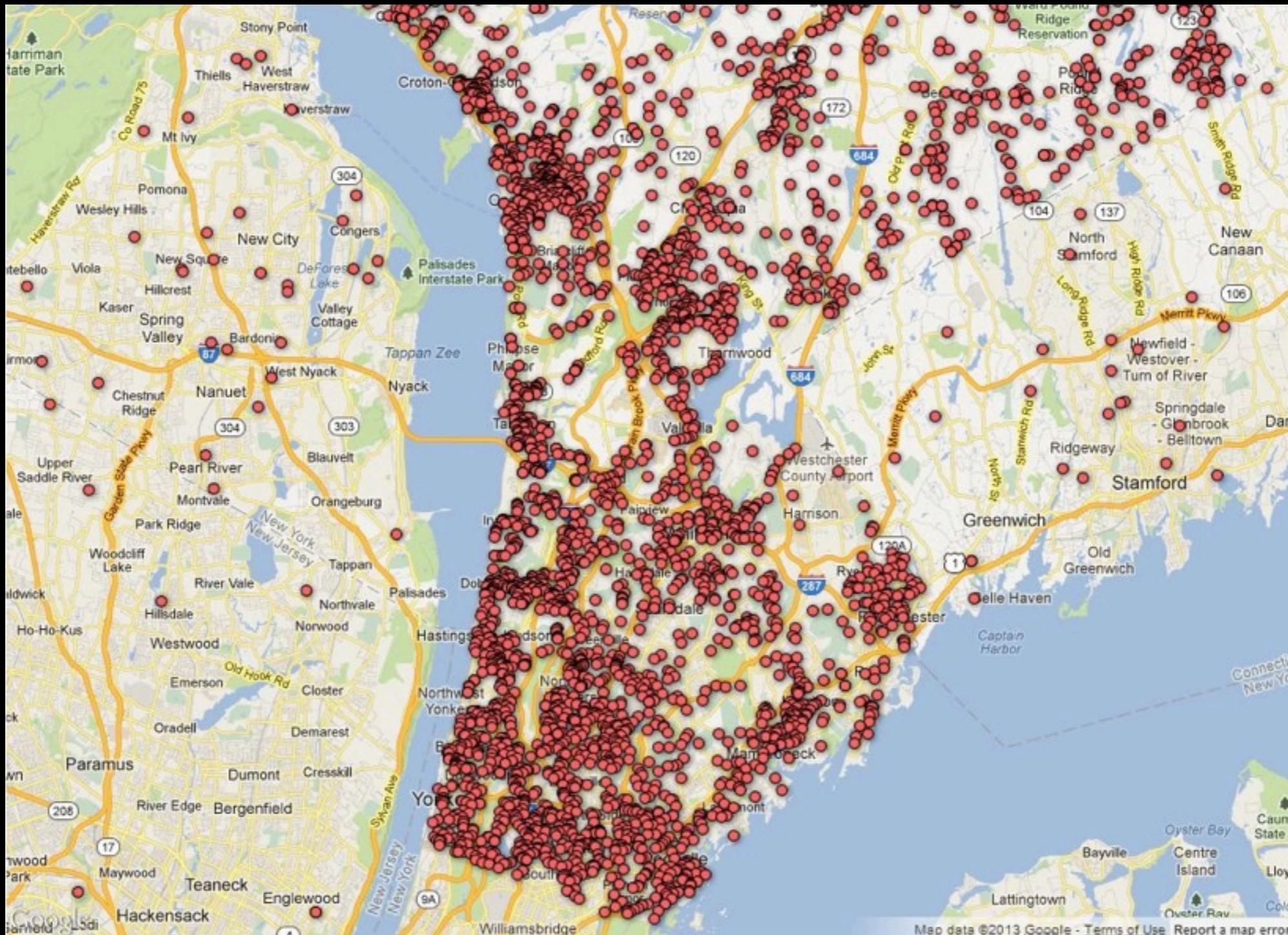
Proposition 8 changed the California state constitution to prohibit same-sex marriage. These are the people who donated in order to pass it.

Jump to [San Francisco](#), [Salt Lake City](#), or [Orange County](#).



<http://www.eightmaps.com/>

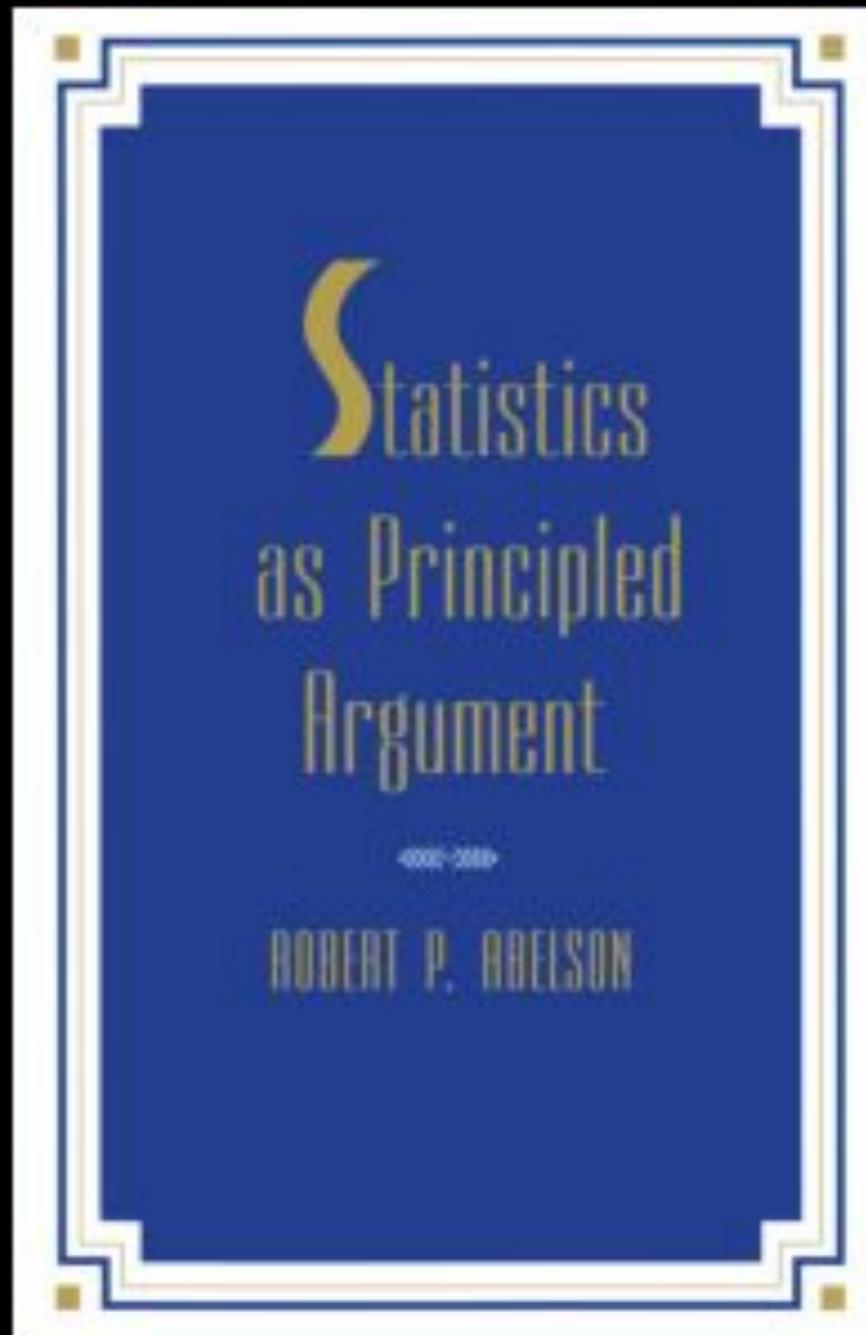
# The Journal News



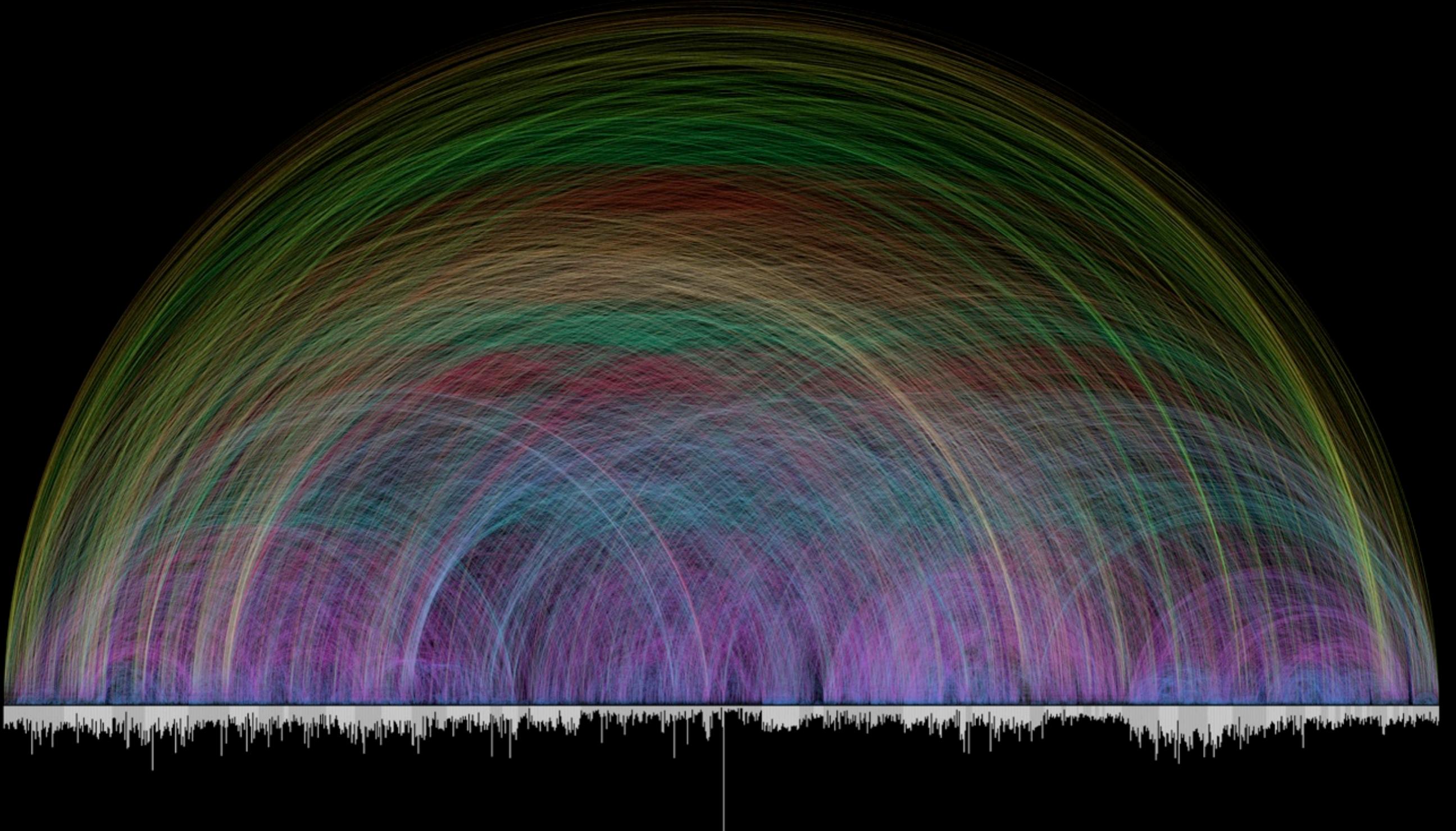
[http://www.slate.com/articles/news\\_and\\_politics/jurisprudence/2013/01/the\\_journal\\_news\\_gun\\_map\\_the\\_first\\_amendment\\_and\\_state\\_law\\_gave\\_the\\_new.html](http://www.slate.com/articles/news_and_politics/jurisprudence/2013/01/the_journal_news_gun_map_the_first_amendment_and_state_law_gave_the_new.html)

This conversation about ethics cannot be limited to academia or to journalism. These datasets are publicly available

If you want to communicate with the public,  
it helps to think a bit as a journalist



What's your point?



<http://www.chrisharrison.net/>

What's your point?

# What we can learn together

1. Think of what's appropriate to show, and how
2. Think about structure and function
3. Think of labeling and storytelling



**Graphics and glasses:**

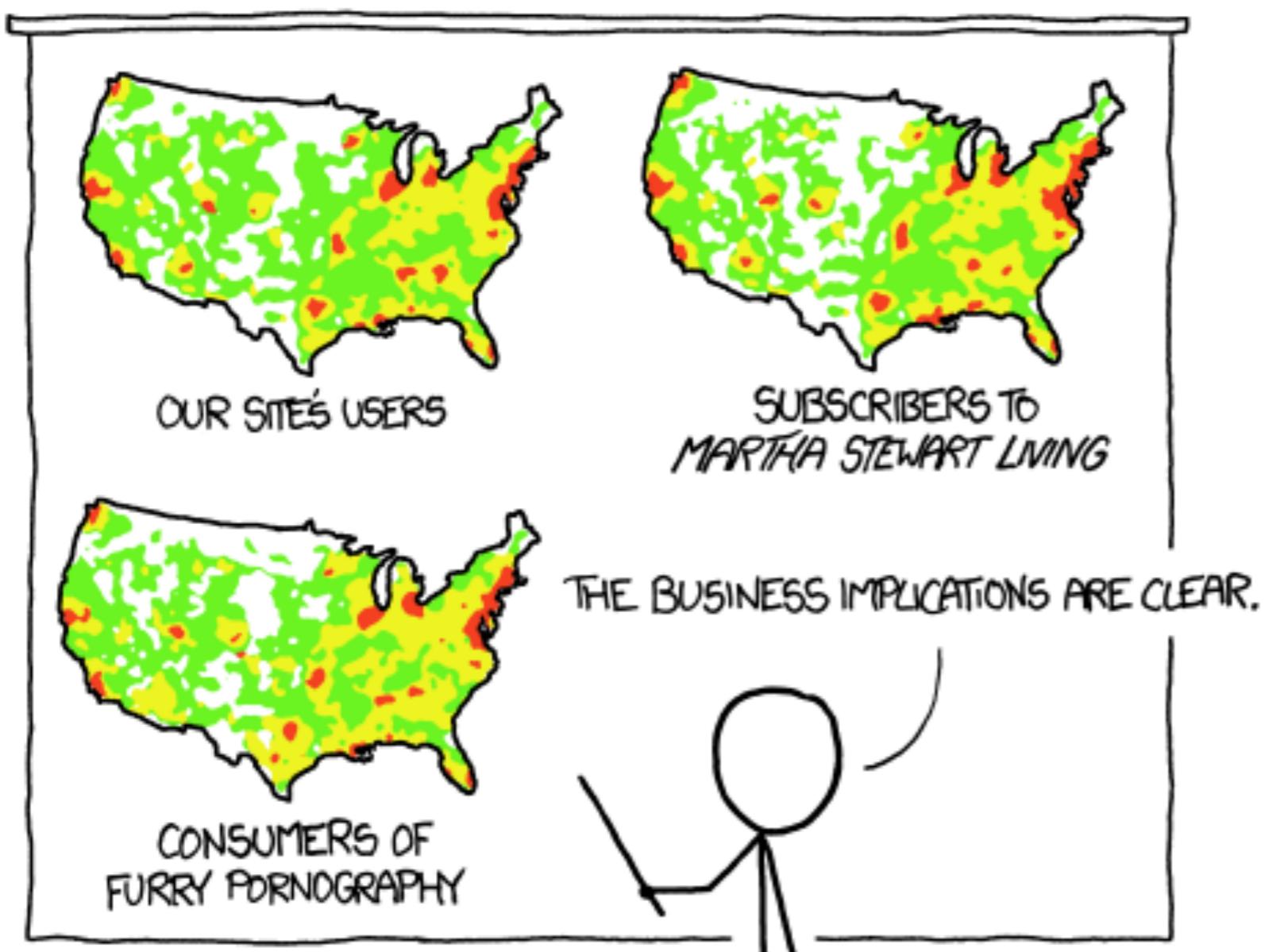
With no glasses, the world is **noise**;  
with glasses, part of that noise becomes **signal**

does this sound as a  
**no-brainer?**

it shouldn't...

SOURCE: XKCD

We don't think  
about the data  
deeply enough

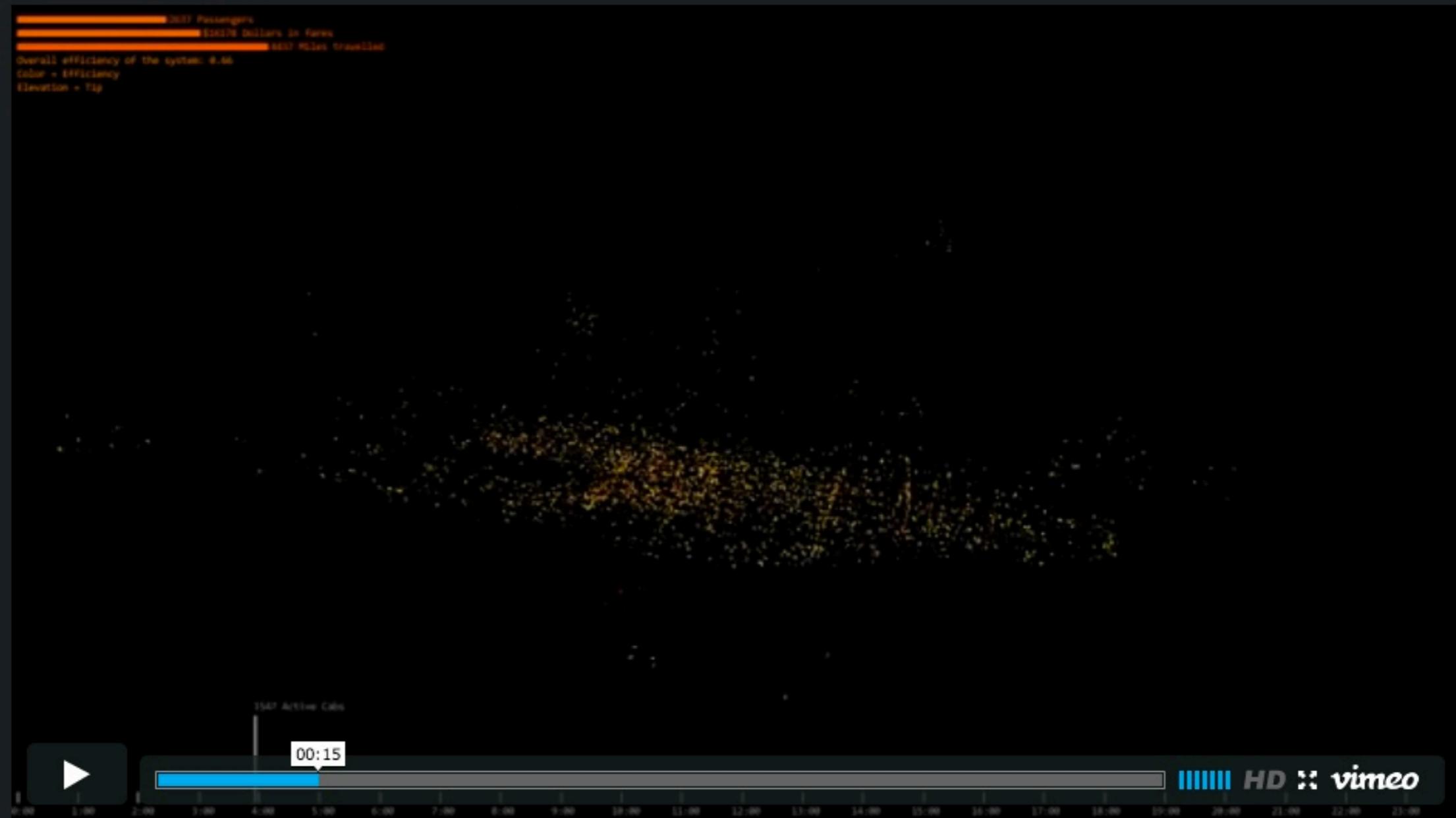


What am I  
supposed to see  
in the following  
map?

PET PEEVE #208:  
GEOGRAPHIC PROFILE MAPS WHICH ARE  
BASICALLY JUST POPULATION MAPS

“Let’s just show the data. Readers will figure stuff up”

## VIDEO



### Visualizing the Paths of 10,000 Taxi Rides Across Manhattan

February 21, 2012 | Using data from 10,000 taxi trips and the Google Maps API, graduate students at Columbia University created this mesmerizing animation of the transit arteries of New York City. [More](#)

<http://www.theatlantic.com/video/index/253385/>

# PROVIDE CONTEXT

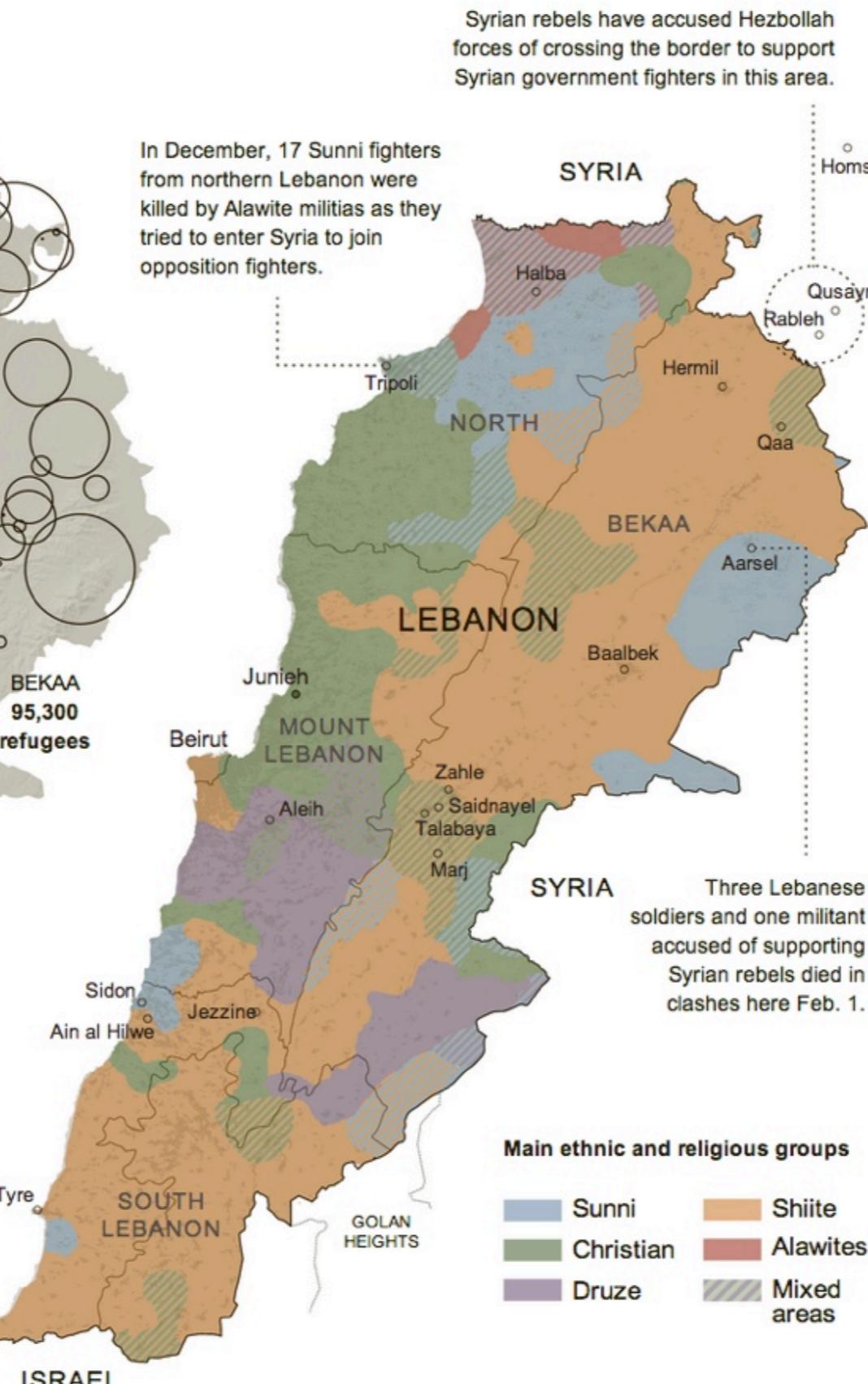
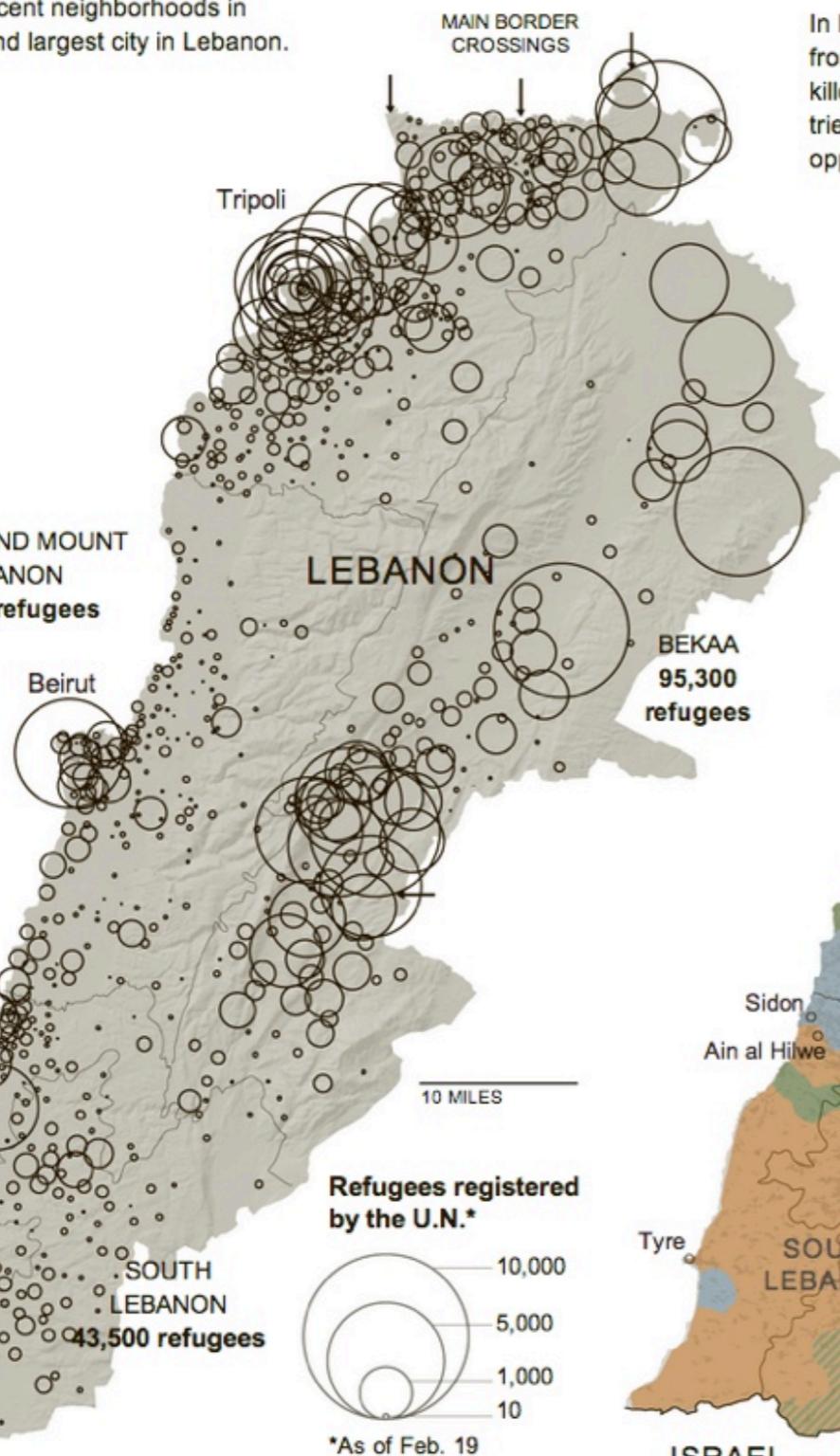
## Refugee Influx Threatens Balance in Lebanon

Many in Lebanon worry that the influx of up to 400,000 Syrian refugees, who are mostly Sunni, may disrupt the delicate balance in the country. Lebanon fought its own sectarian civil war from 1975 to 1990. [Related Article »](#)

### NORTH LEBANON

**111,700 refugees**

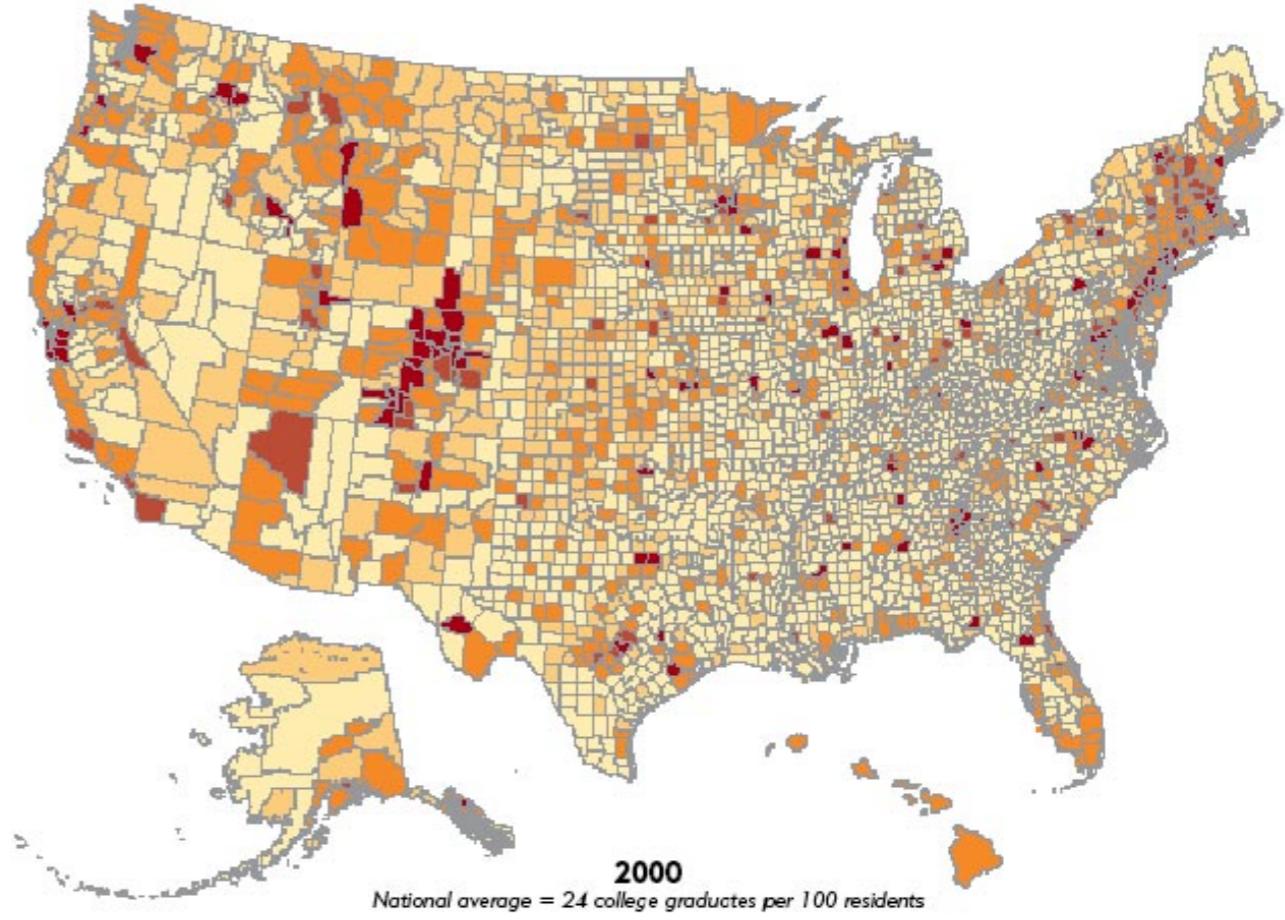
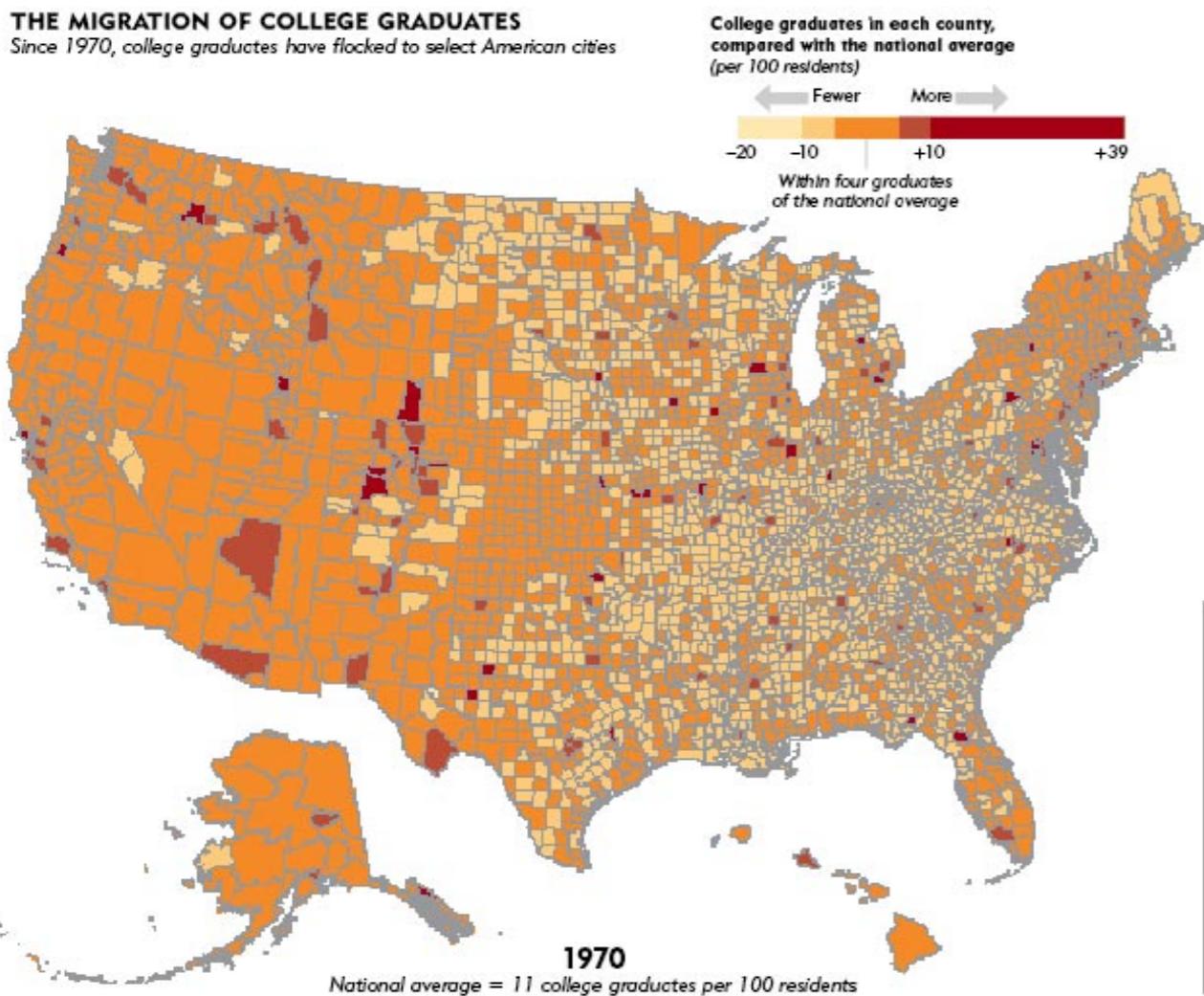
Violence has erupted sporadically in this region. Many of the same sects at odds in Syria live in adjacent neighborhoods in Tripoli, the second largest city in Lebanon.



# Let me compare

## THE MIGRATION OF COLLEGE GRADUATES

Since 1970, college graduates have flocked to select American cities

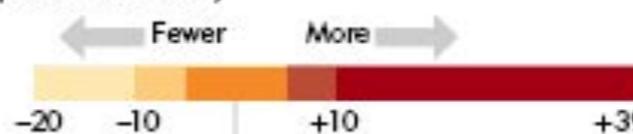


# Let me compare

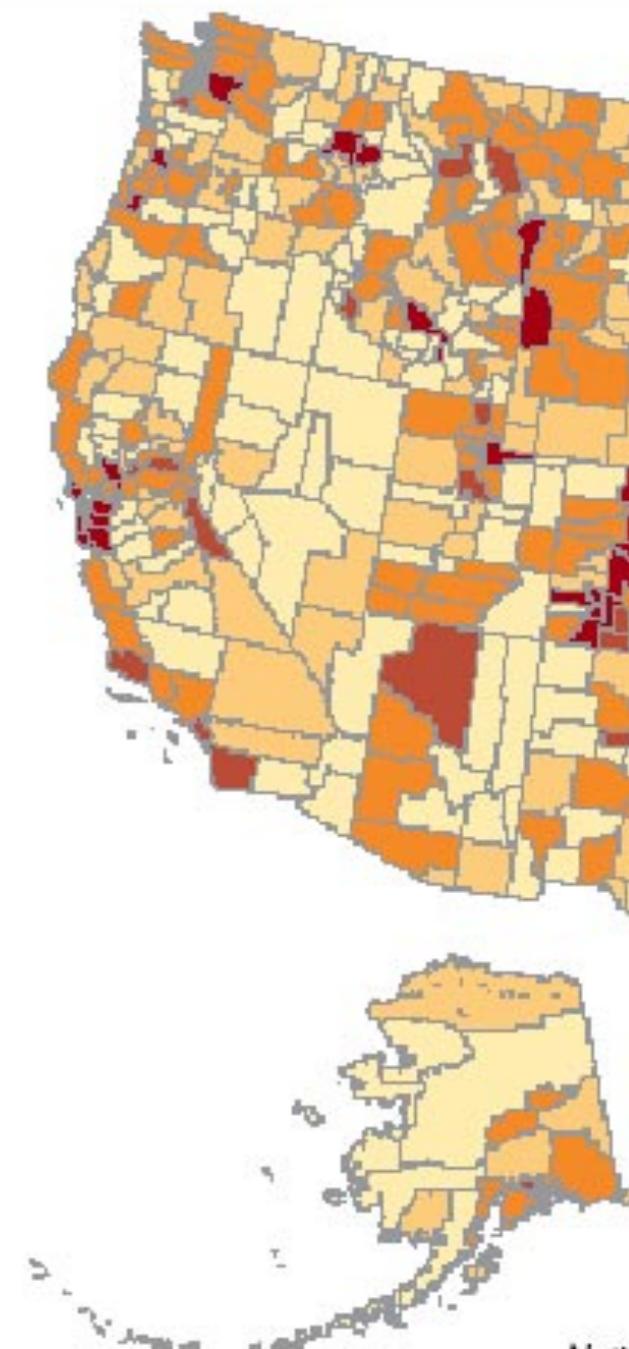
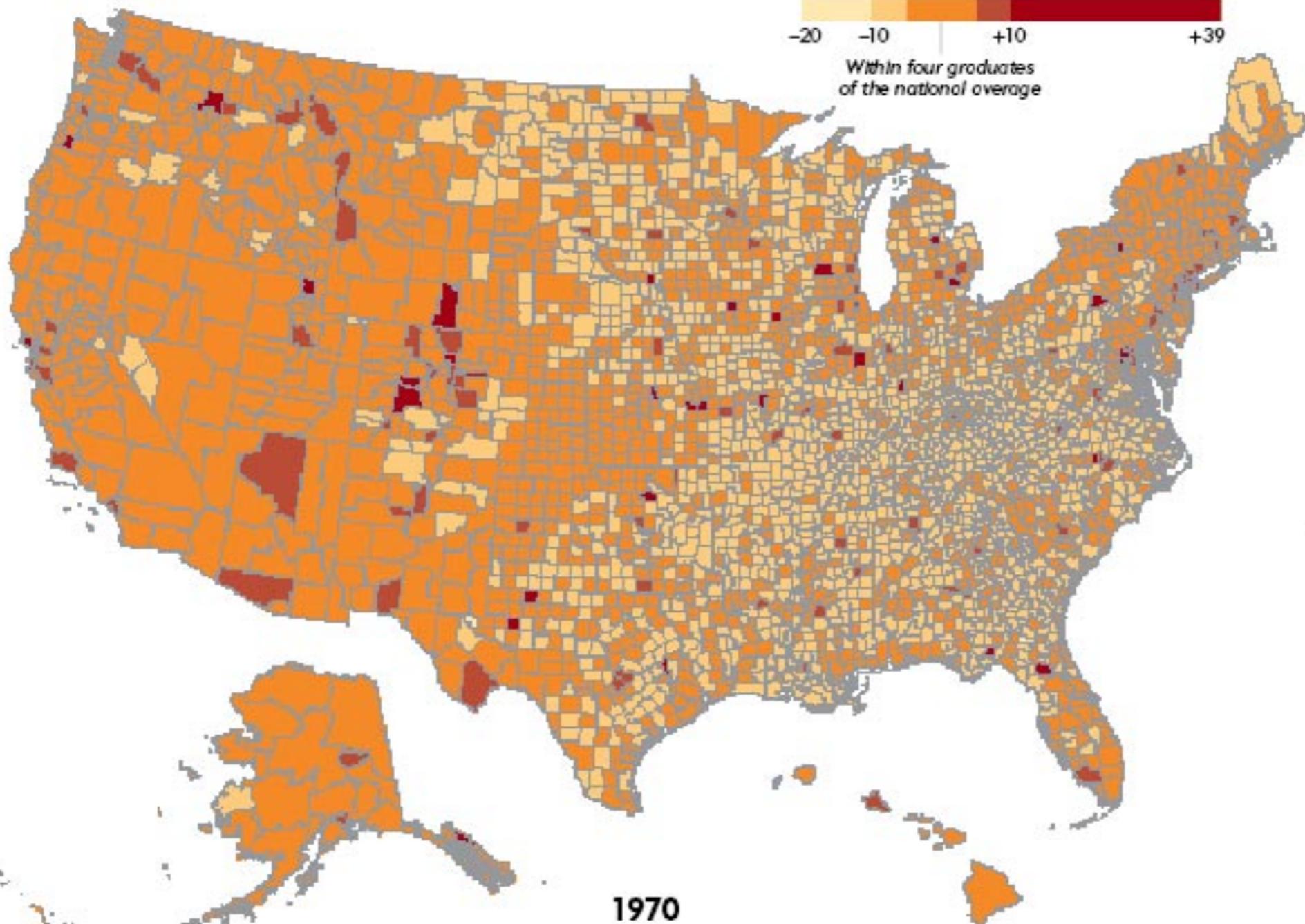
## THE MIGRATION OF COLLEGE GRADUATES

Since 1970, college graduates have flocked to select American cities

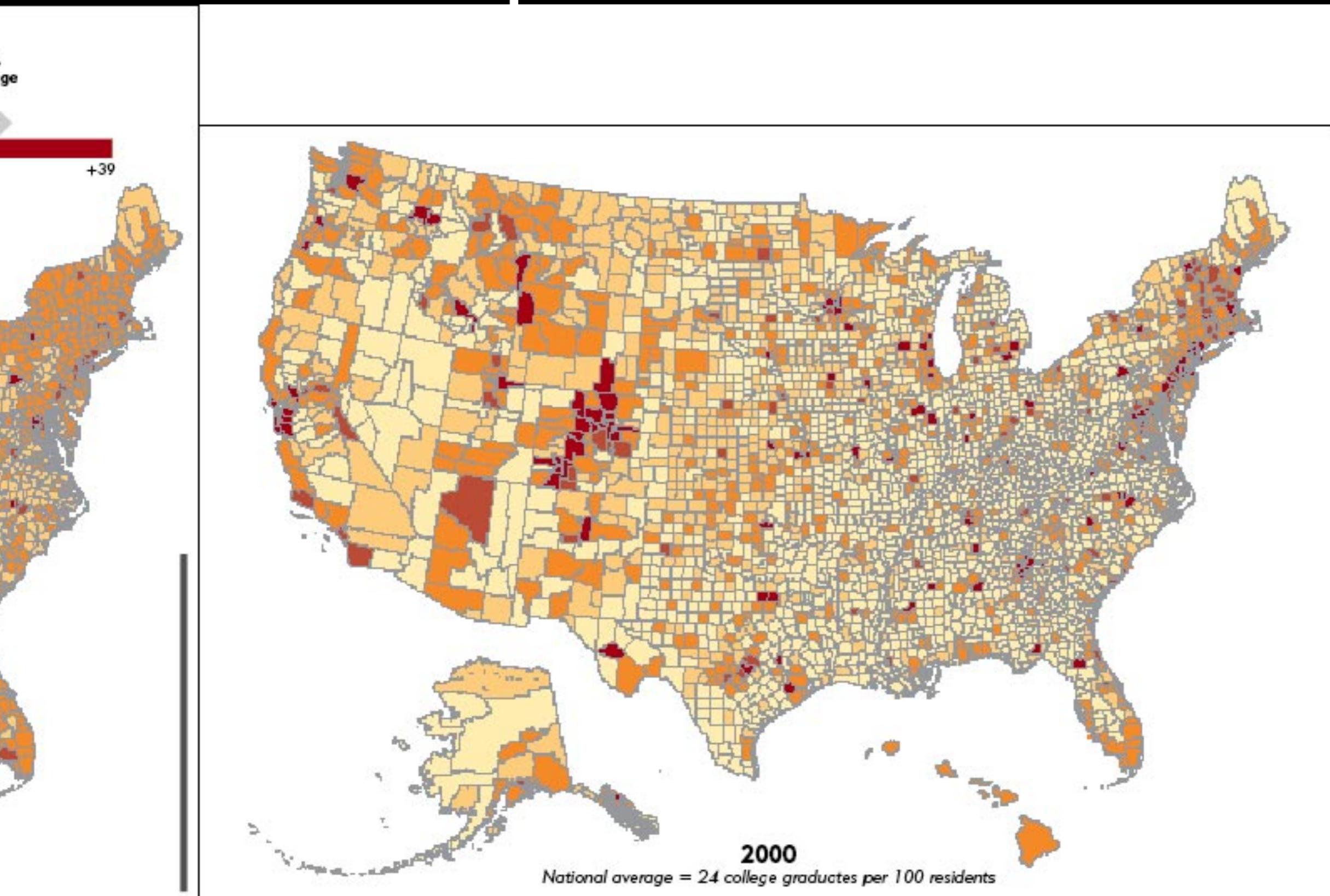
College graduates in each county,  
compared with the national average  
(per 100 residents)



Within four graduates  
of the national average



# Let me compare



The Atlantic magazine

Is it possible to objectively decide which graphic forms are more appropriate?

To a certain point, yes

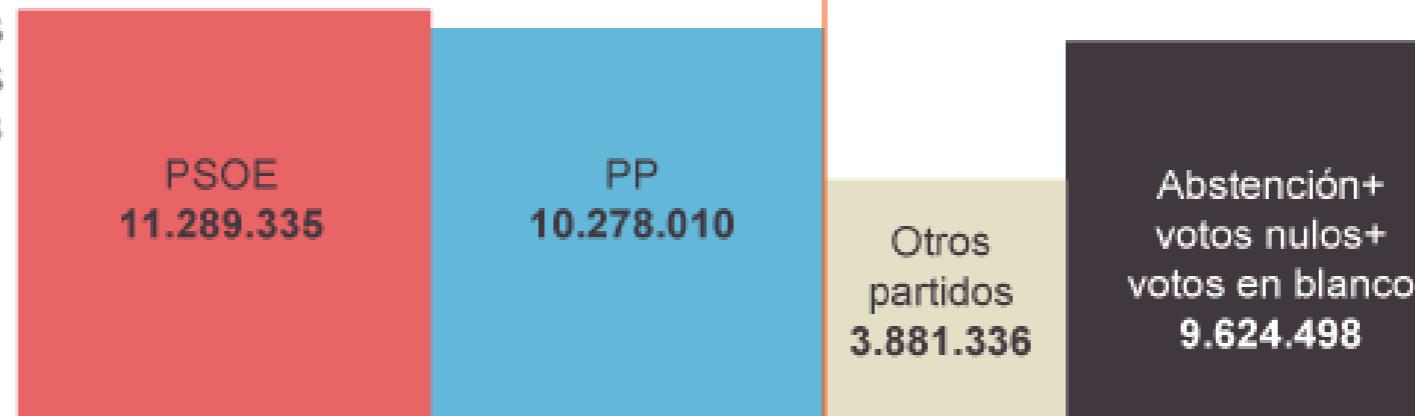
Think about your audience, your publication, and the questions your graphic should help readers answer. Finally, can your graphic be understood without reading every single label and figure?



20N

Áreas proporcionales  
al número de votos

► ELECCIONES  
GENERALES  
2008



► ELECCIONES  
MUNICIPALES  
2011

El porcentaje es  
la variación respecto  
a 2008

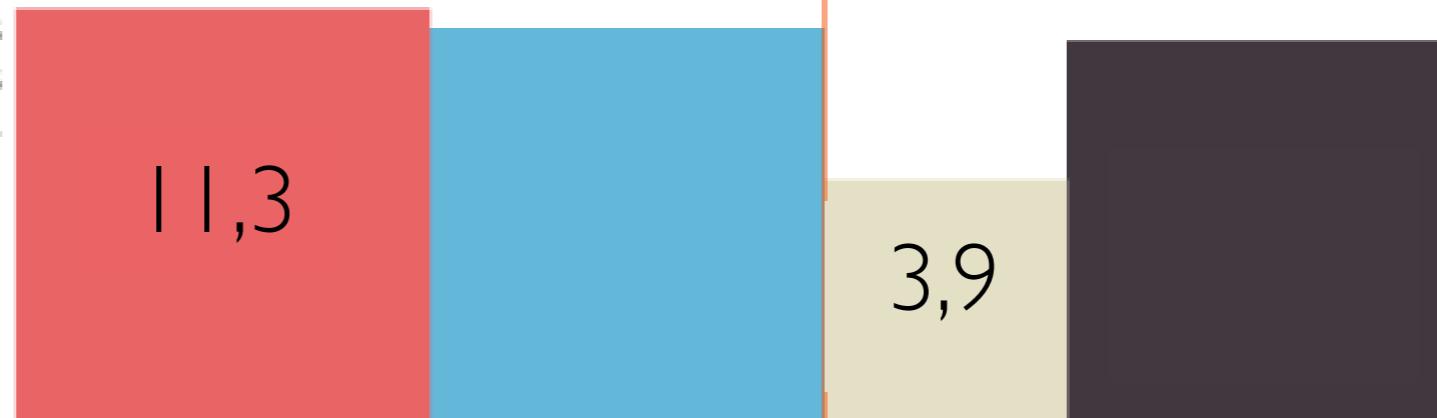


Fuente Ministerio del Interior. RODRIGO SILVA.



Áreas proporcionales  
al número de votos

► ELECCIONES  
GENERALES  
2008

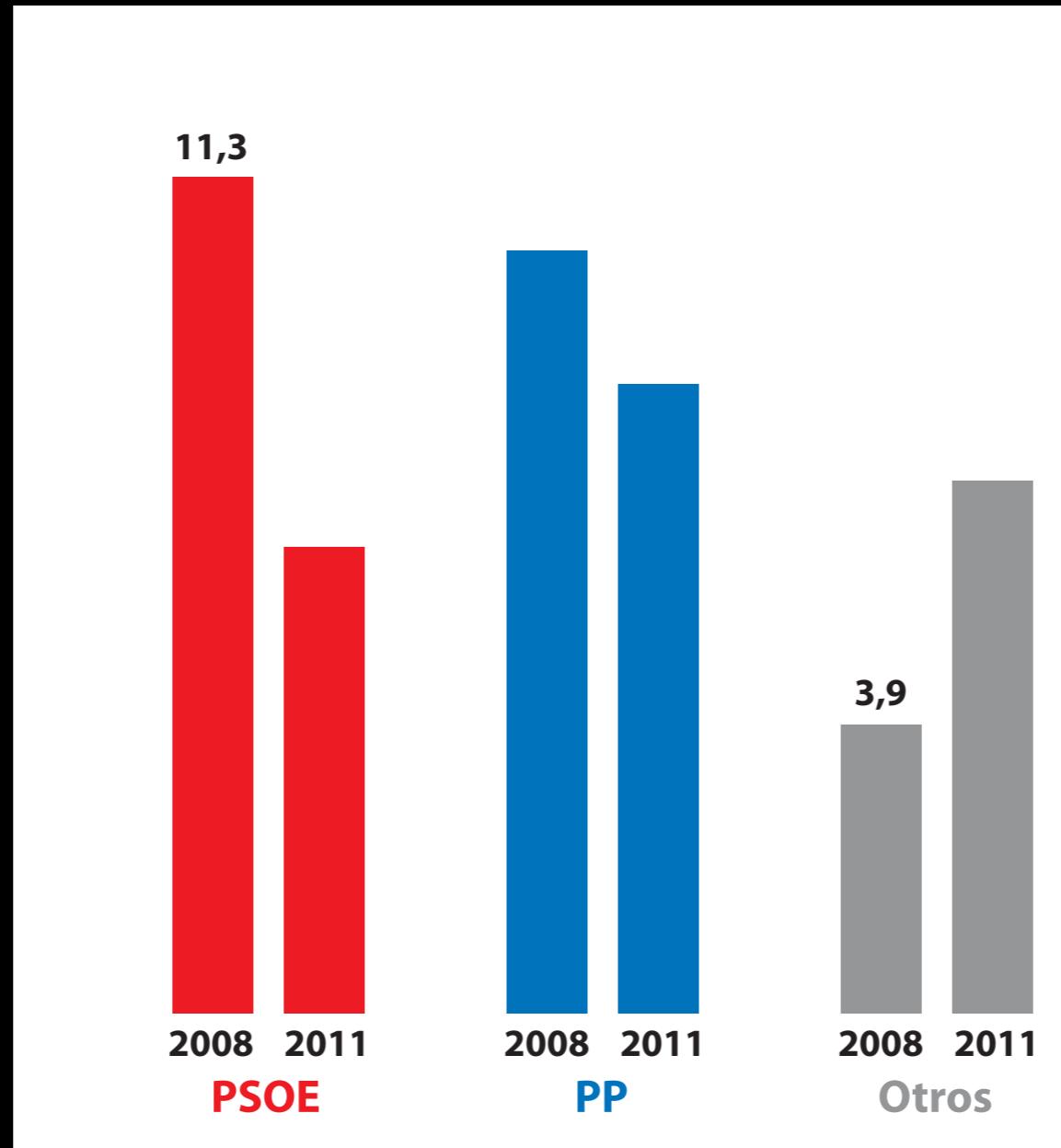


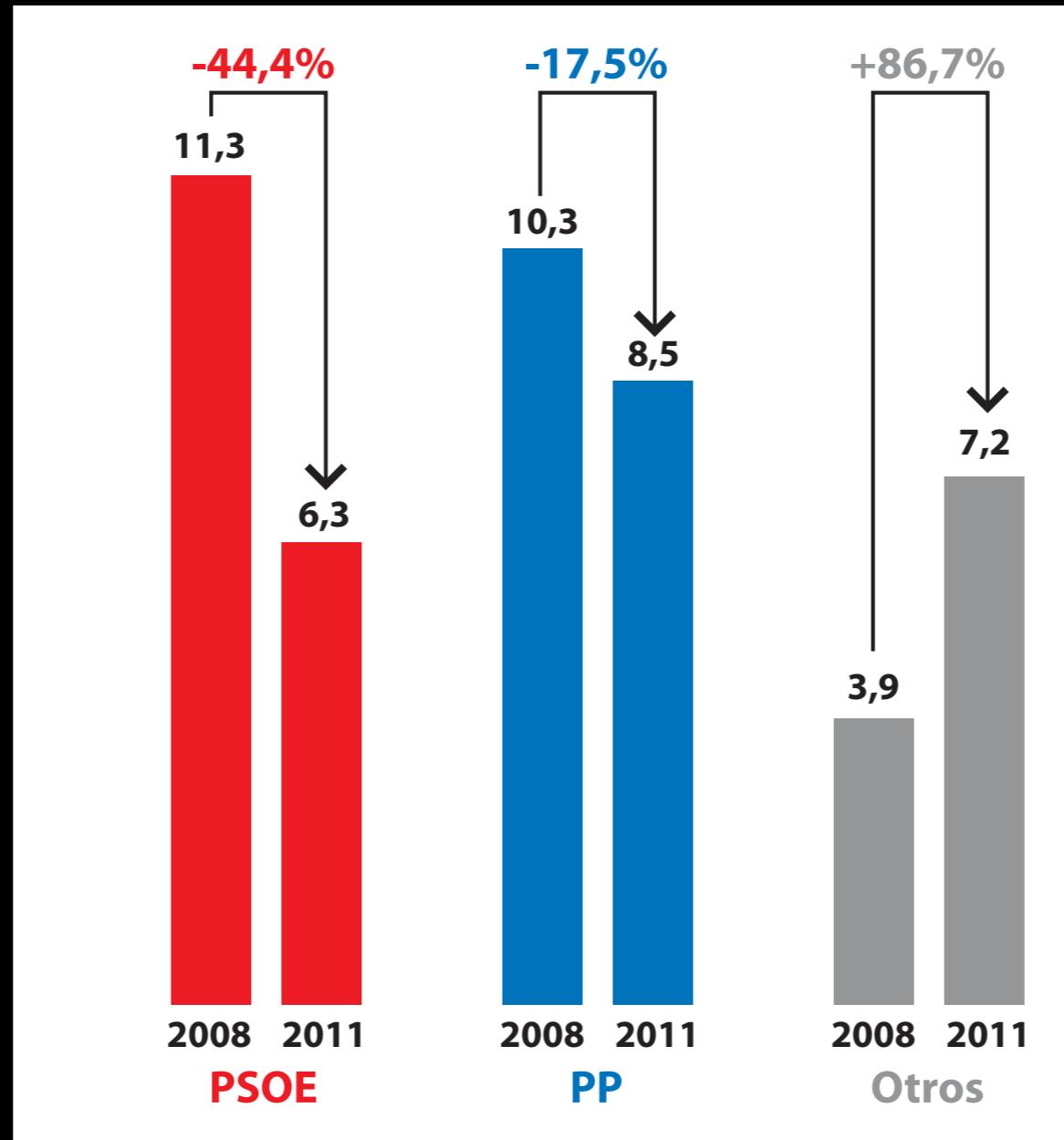
► ELECCIONES  
MUNICIPALES  
2011

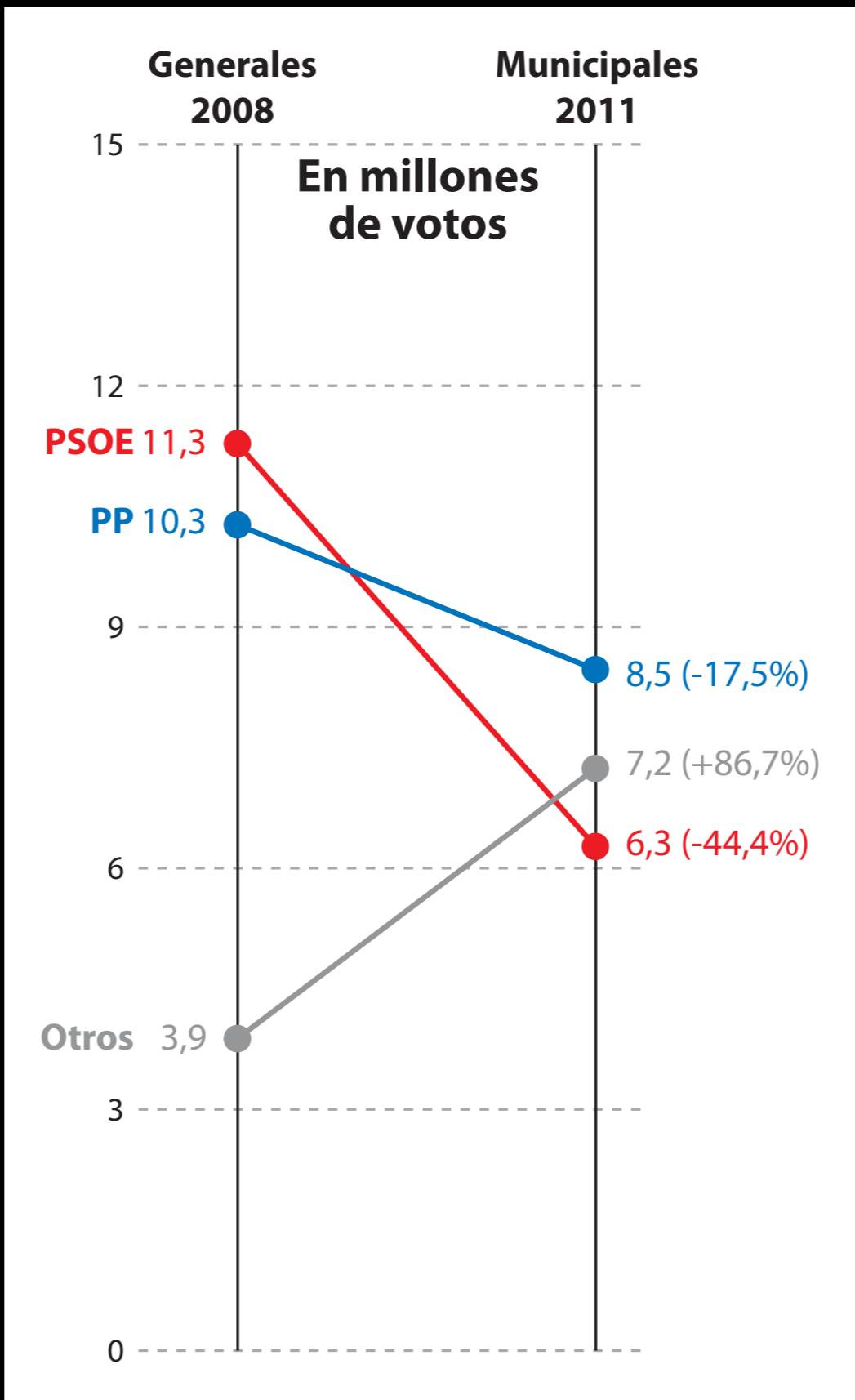
El porcentaje es  
la variación respecto  
a 2008



Fuente Ministerio del Interior. RODRIGO SILVA.







Áreas proporcionales  
al número de votos

VOTOS DE PSOE Y PP

VOTOS DEL RESTO DEL CENSO ELECTORAL

► ELECCIONES GENERALES 2008

PSOE

PP

OTROS

ABST/NUL/BL

► ELECCIONES MUNICIPALES 2011

PSOE

PP

OTROS

ABST/NUL/BL

Áreas proporcionales  
al número de votos

VOTOS DE PSOE Y PP

VOTOS DEL RESTO DEL CENSO ELECTORAL

► ELECCIONES GENERALES 2008

PSOE

PP

OTROS

ABST/NUL/BL

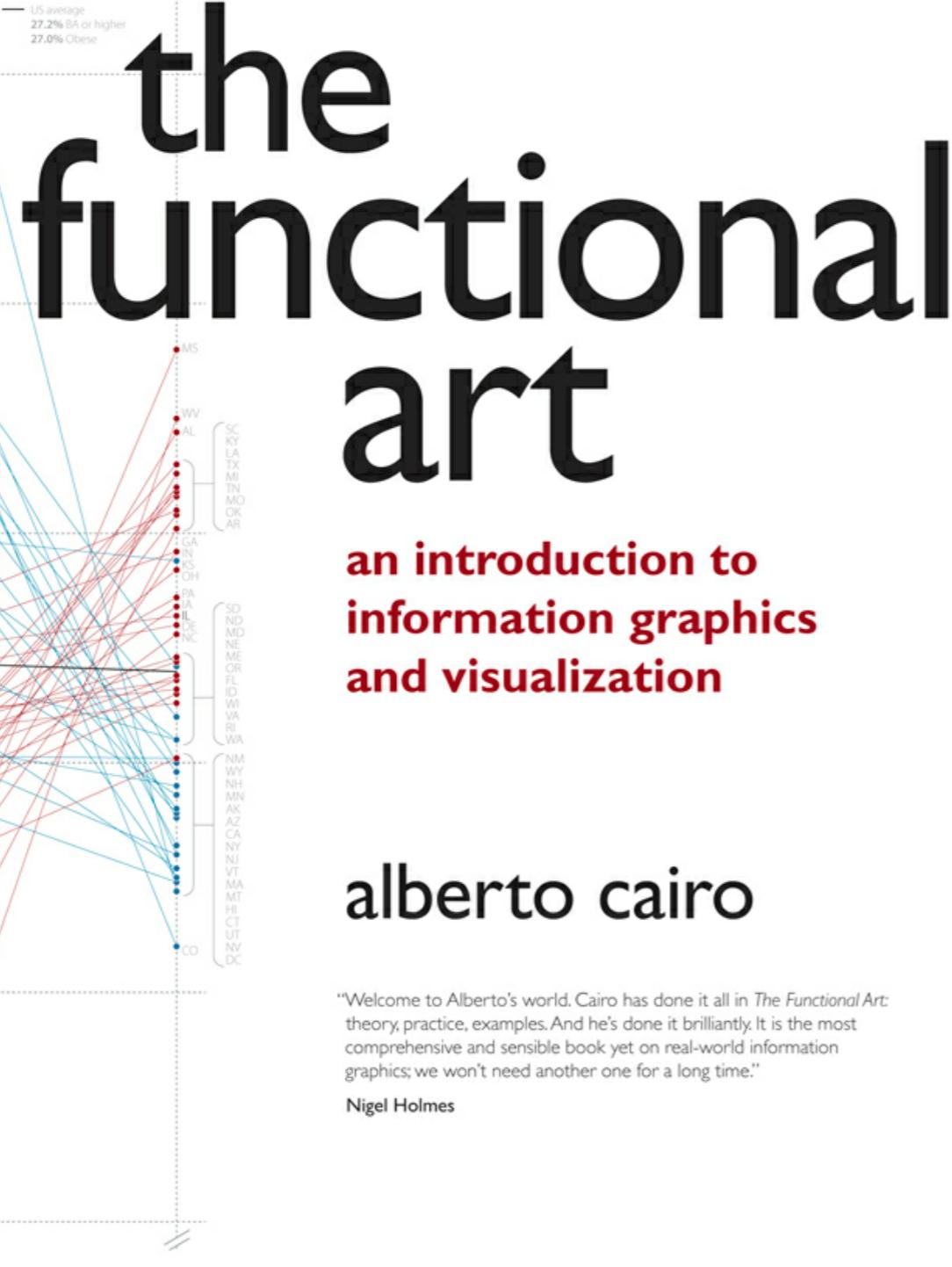
► ELECCIONES MUNICIPALES 2011

PSOE

PP

OTROS

ABST/NUL/BL



# the functional art

**an introduction to  
information graphics  
and visualization**

alberto cairo

"Welcome to Alberto's world. Cairo has done it all in *The Functional Art*: theory, practice, examples. And he's done it brilliantly. It is the most comprehensive and sensible book yet on real-world information graphics; we won't need another one for a long time."

Nigel Holmes

**"Obesity is, on average, inversely proportional to education"**

Why don't you show me the evidence of that assertion?

OBESITY\_EDUCATION.xlsx

The screenshot shows a Microsoft Excel spreadsheet titled "OBESITY\_EDUCATION.xlsx". The data is organized into two main sections: one for state obesity percentages and another for state education levels. The first section, spanning columns A and B, lists 52 US states with their corresponding obesity percentages. The second section, spanning columns C and D, lists the same 52 states along with their respective percentages of individuals with at least a Bachelor's degree. The final column, labeled "R Correlation", contains the calculated correlation coefficient for each state, with the value for the last row (Wyoming) highlighted in orange.

	STATE	OBESITY (%)	STATE	BA or higher (%)	R Correlation
1	Alabama	32.2	Colorado:	35.50%	-0.6734764
2	Alaska	24.5	Iowa:	24.30%	
3	Arizona	24.3	Tennessee:	24.30%	
4	Arkansas	30.1	Utah:	30.80%	
5	California	24	Maine:	24.20%	
6	Colorado	21	West Virgin	15.30%	
7	Connecticut	22.5	Indiana:	21.10%	
8	Delaware	28	Rhode Islan	27.20%	
9	District of Co	22.2	Arkansas:	18.80%	
10	Florida	26.6	South Dako	25.50%	
11	Georgia	29.6	New York:	30.60%	
12	Hawaii	22.7	Alabama:	22.30%	
13	Idaho	26.5	Pennsylvani	25.30%	
14	Illinois	28.2	Illinois:	27.40%	
15	Indiana	29.6	Kansas:	30%	
16	Iowa	28.4	Georgia:	27.60%	
17	Kansas	29.4	Washington	29.90%	
18	Kentucky	31.3	Maryland:	35.20%	
19	Louisiana	31	New Jersey:	34.60%	
20	Maine	26.8	Alaska:	25.50%	
21	Maryland	27.1	Oregon:	25.90%	
22	Massachusett	23	Wyoming:	22.50%	
23	Michigan	30.9	Vermont:	34.20%	
24	Minnesota	24.8	Michigan:	24.40%	
25	Mississippi	34	District of Co	45.70%	
26	Missouri	30.5	Minnesota:	32.50%	
27	Montana	23	Louisiana:	22.40%	
28	Nebraska	26.9	Wisconsin:	25.60%	
29	Nevada	22.4	Mississippi:	20.10%	
30	New Hampsh	25	Texas:	24.50%	
31	New Jersey	23.8	North Carol	23.40%	
32	New Mexico	25.1	Ohio:	24.60%	
33	New York	23.9	Idaho:	23.80%	
34	North Carolin	27.8	Delaware:	26.90%	
35	North Dakot	27.2	Florida:	26%	
36	Ohio	29.2	Missouri:	28.10%	
37	Oklahoma	30.4	California:	31.70%	
38	Oregon	26.8	Montana:	25.50%	
39	Pennsylvania	28.6	Arizona:	28%	
40	Rhode Island	25.5	South Carol	24.90%	
41	South Carolin	31.5	New Hamps	35.40%	
42	South Dakota	27.3	Hawaii:	26.60%	
43	Tennessee	30.8	Virginia:	33.10%	
44	Texas	31	Connecticut	34.50%	
45	Utah	22.5	Kentucky:	21%	
46	Vermont	23.2	Oklahoma:	22.90%	
47	Virginia	26	New Mexico	25.10%	
48	Washington	25.5	Nebraska:	24.80%	
49	West Virginia	32.5	Massachuse	36.70%	
50	Wisconsin	26.3	North Dako	25.20%	
51	Wyoming	25.1	Nevada:	24.50%	
52					
53					
54	Average	26.99	Average	27.20%	

# This doesn't work...

Percentage with a  
BA degree or higher

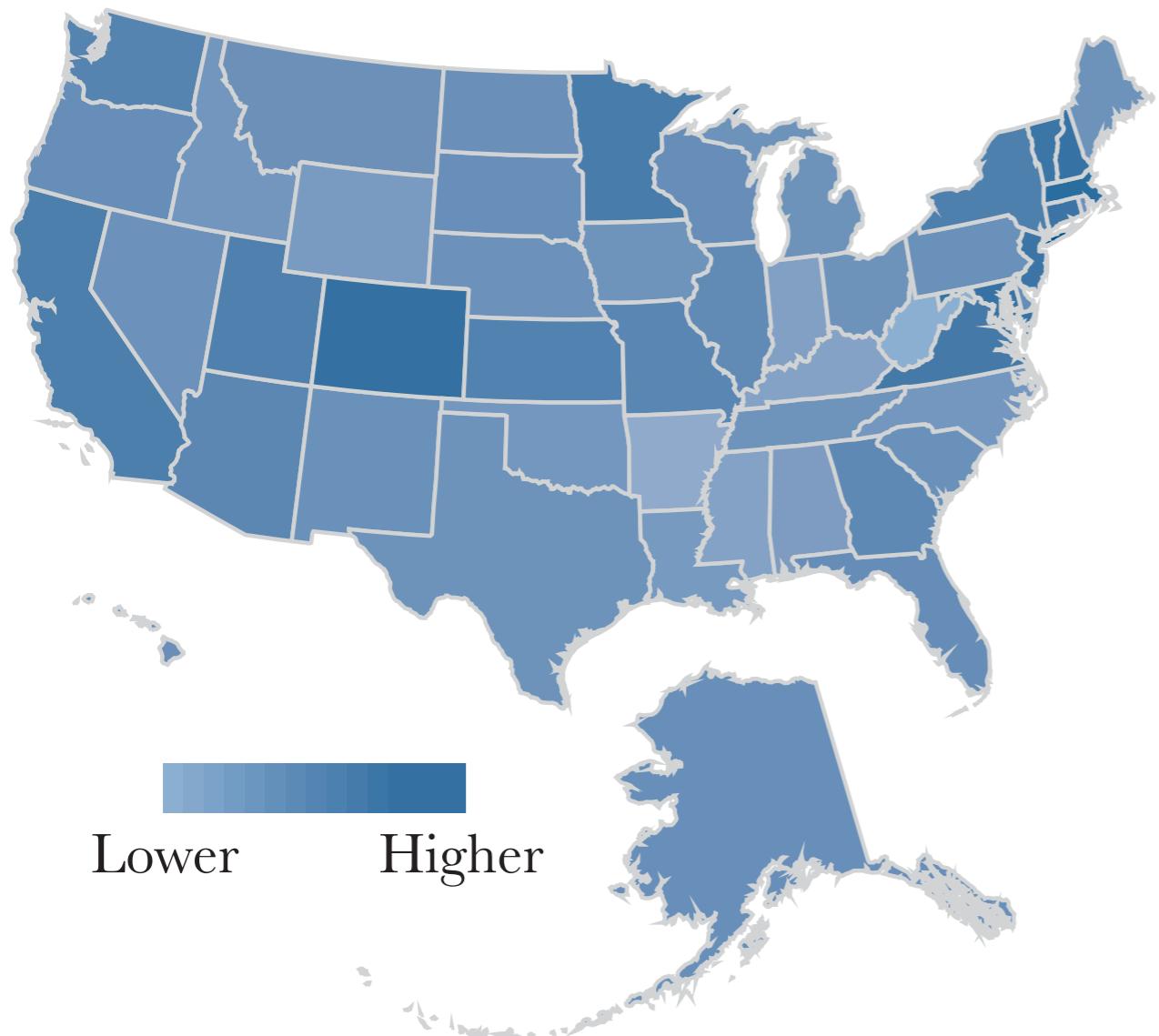


Percentage of  
obese people

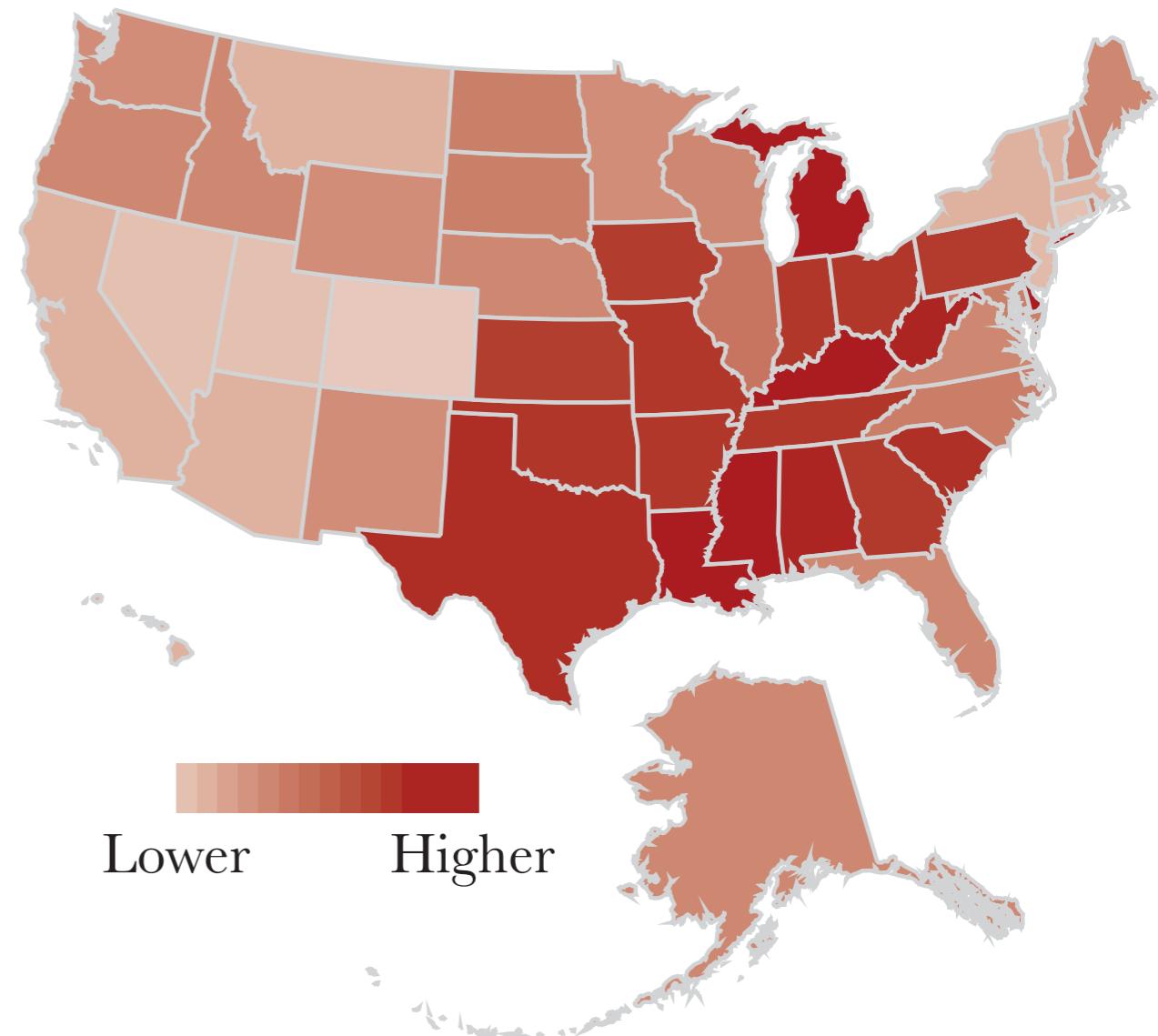


# This is a little bit better, but not much...

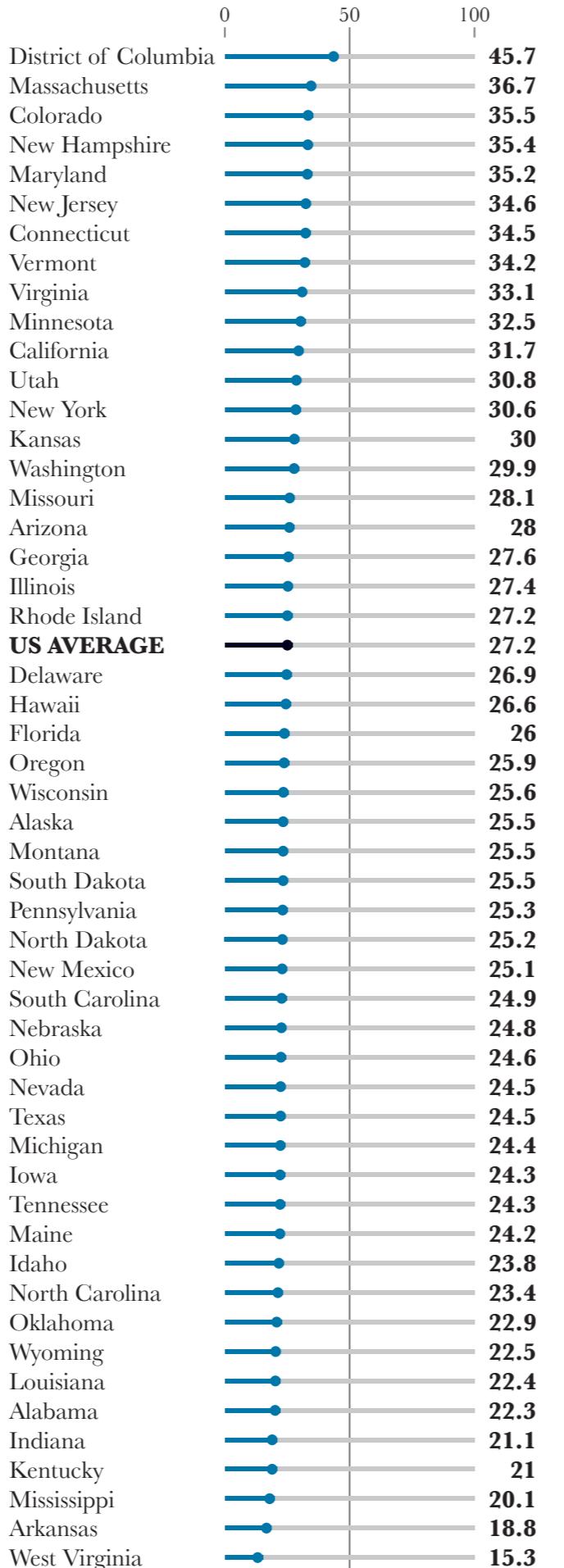
Percentage with a  
BA degree or higher



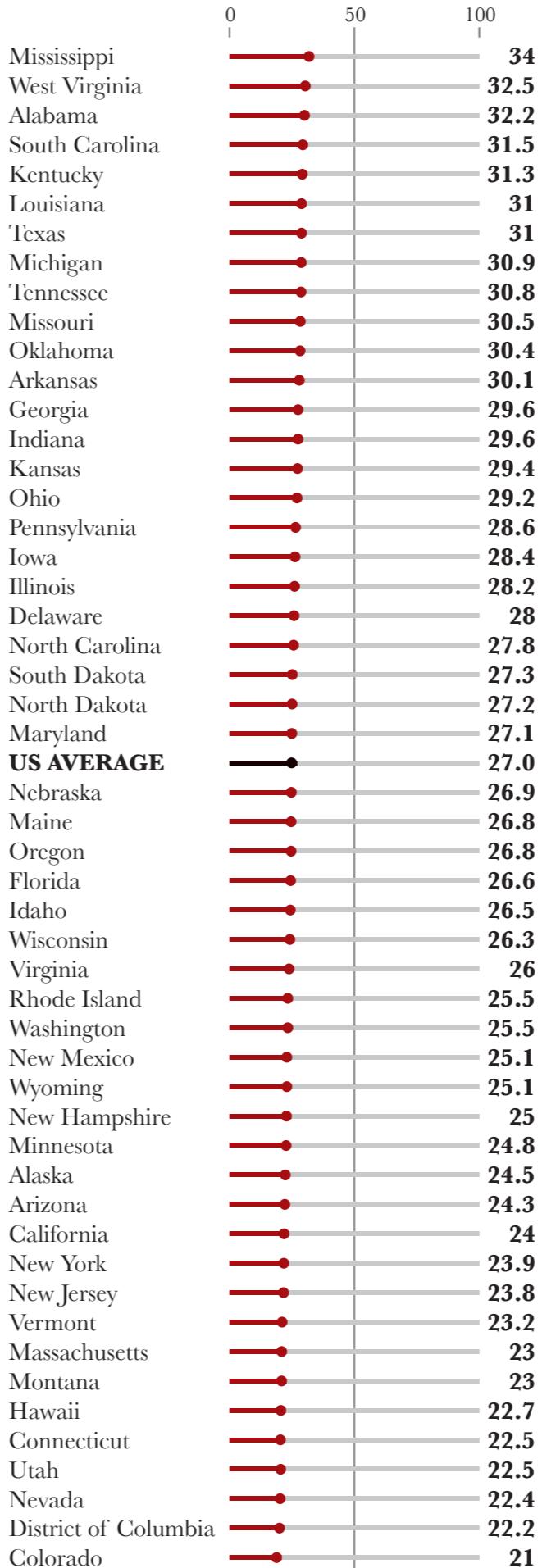
Percentage of  
obese people

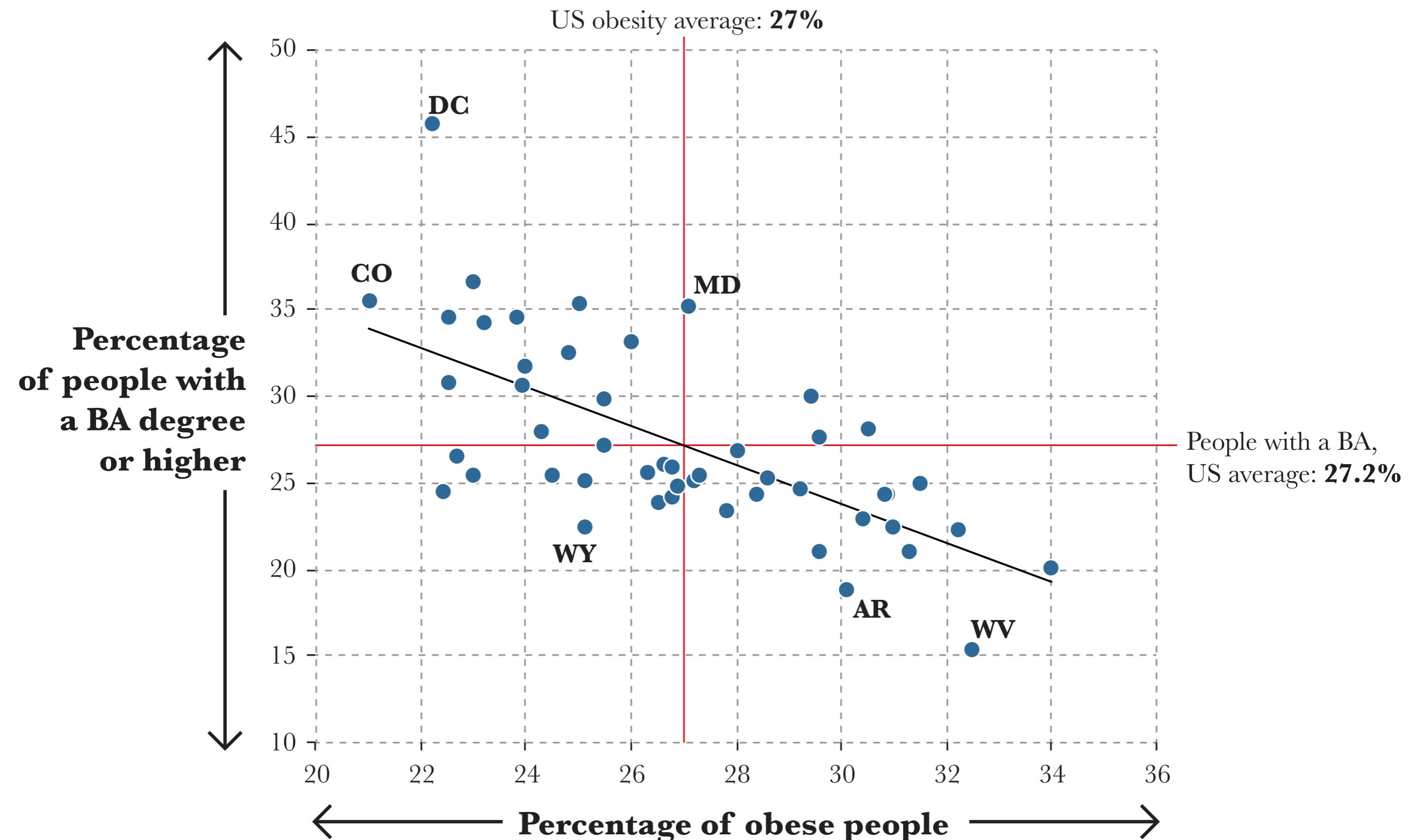


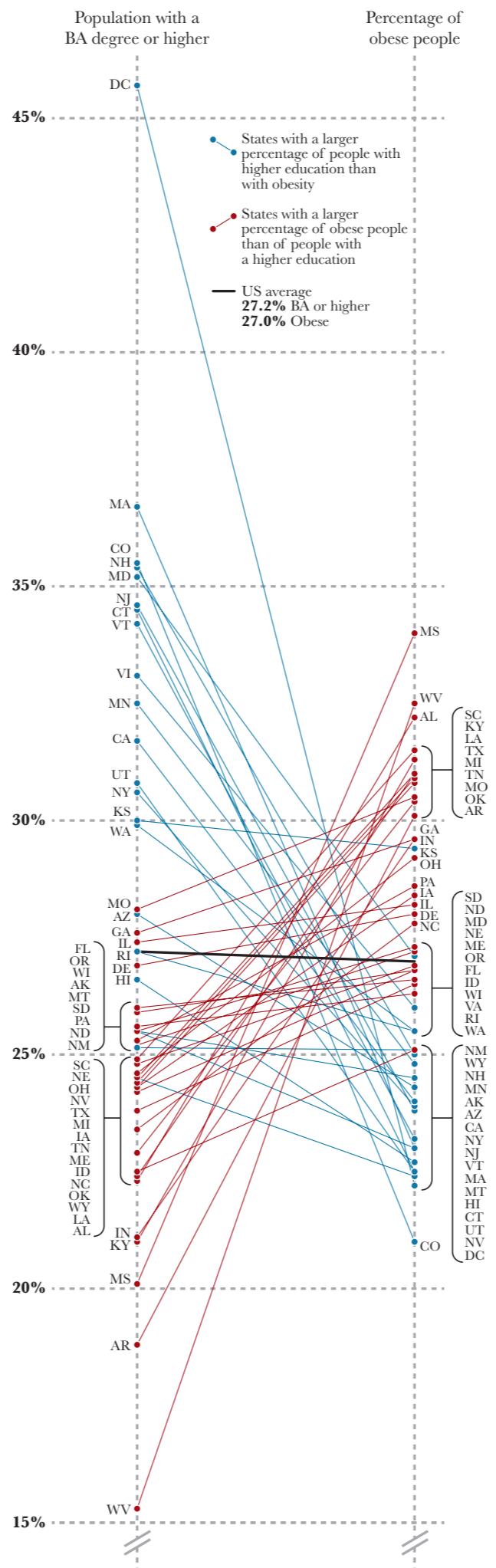
Percentage with a  
BA degree or higher



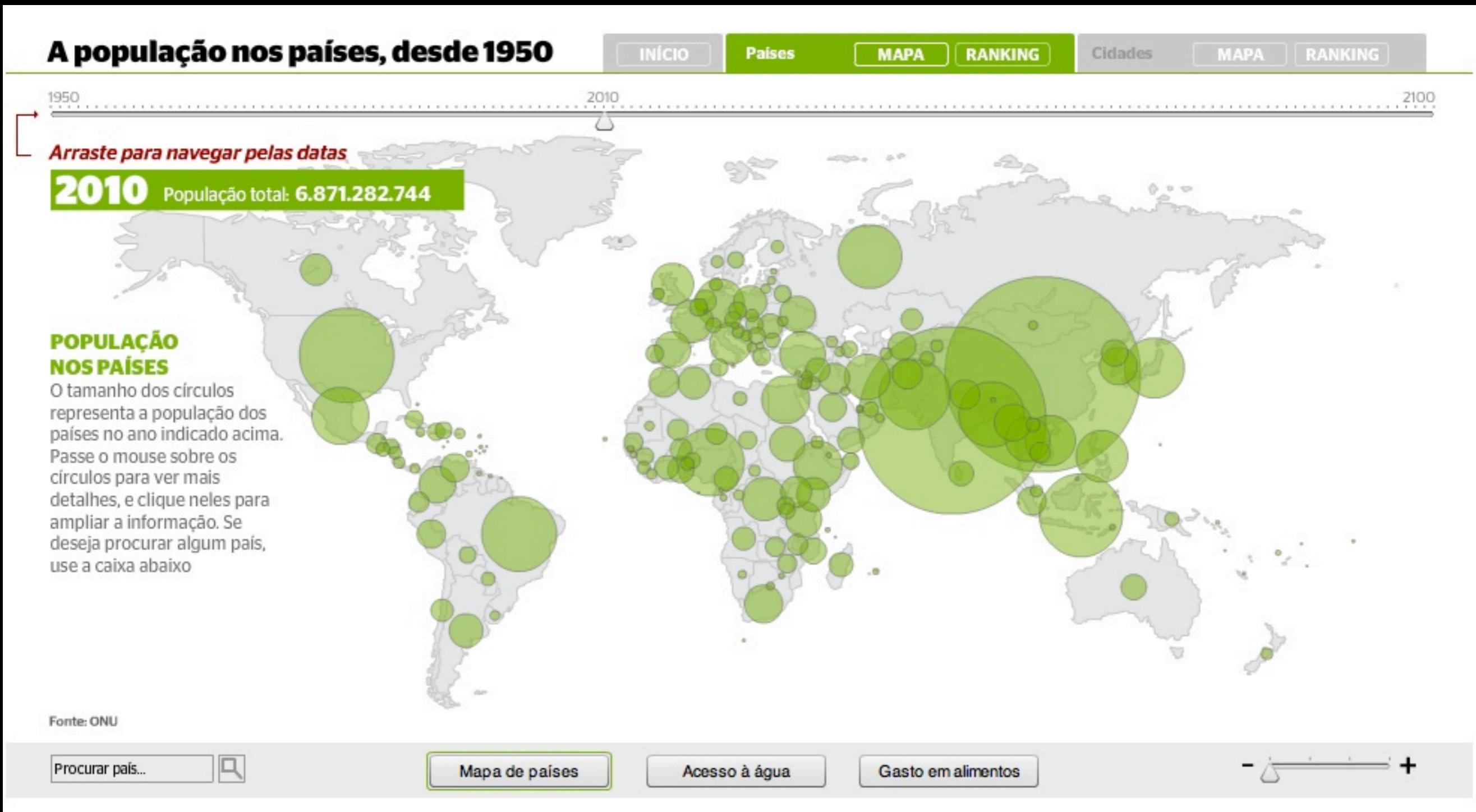
Percentage of  
obese people







It is acceptable to encode your data more than once



<http://revistaepoca.globo.com/Revista/Epoca/0,,EMI238256-17445,00.html>

ÉPOCA magazine (Editora Globo)

# What we can learn together

1. Think of what's appropriate to show, and how
2. Think about structure and function
3. Think of labeling and storytelling

(More info: [www.thefunctionalart.com](http://www.thefunctionalart.com))

# GREAT WHITE THE ULTIMATE PREDATOR

Wintertime in False Bay, South Africa is known for its awe-inspiring white shark acrobatics during predatory attacks on juvenile Cape fur seals. Success rates in these ambush attacks are high, averaging 48%, but soaring up to 60% for specific skilled individuals. There is a constant struggle for survival for the seals that live on Seal Island where around 60,000 seal pups are born each November and December.

Illustration: James D. Cook (University of Illinois Urbana-Champaign) / National Geographic

**PUPS USE INSTINCT**  
Seal pups are incredible at evading sharks, even though they might be the first prey they ever see. And, using that instinct that comes up with maturation that often leads to their escape.

**THE IMPACT**  
Targeting lone drayaries or seals returning alone, great whites come from below at great speed. Often, the impact takes both the shark and the seal off balance. The seal will use its front flippers to turn the shark's head as the shark cannot turn quickly.

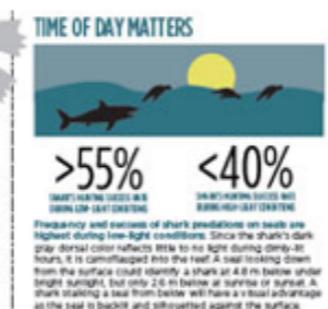
## THE HUNT



From the shark's view, down-welling light is dimmed, camouflaging the shark's dark gray dorsal color. In contrast, a shark striking from below has a visual advantage, as the seal is backlit from the sun.

The shark makes a sudden vertical lunge that propels it out of the water. This strategy maximizes a shark's chances of catching a seal unaware. Speed and ambush are key elements in the shark's predatory strategy.

With acrobatic dives, the shark immediately strikes the seal once above the surface, initiating a fatal bite strike. If the seal escapes, a skilled shark will continue its attempt until the seal is captured.



**SEAL REBUTTAL**

A. If a seal is not killed or disabled in the initial strike by an attacking shark, the seal has tactical advantages in terms of reduced hunting radius. In both [A] and [B], a highly maneuverable seal evades an attacking shark during its secondary pursuit.

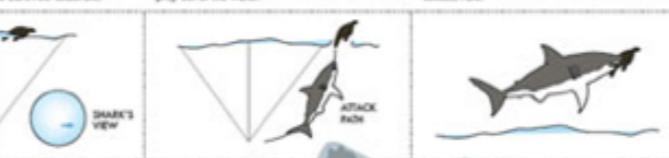
B. If a seal is not killed or disabled in the initial strike by an attacking shark, the seal has tactical advantages in terms of reduced hunting radius. In both [A] and [B], a highly maneuverable seal evades an attacking shark during its secondary pursuit.

# THE GREAT WHITE SHARK

Wintertime in False Bay, South Africa is known for its awe-inspiring white shark acrobatics during predatory attacks on juvenile Cape fur seals. Success rates in these ambush attacks are high, averaging 48%, but soaring up to 60% for specific skilled individuals. Find out all the facts on these predatory animals. BY ANA CALDERONE

## HUNTING FOR PREY

The Great Whites use a hunting strategy called breach attacks. They attack seals on the surface via a sudden vertical lunge, which propels predator and prey out of the water.



## THE LOCATION

During the winter, white sharks visit Seal Island to hunt Cape fur seals. They appear to hunt solitary juvenile seals near their primary entry and exit point early in the morning, when light levels are low.



The waters surrounding Seal Island in False Bay, South Africa, provide a unique opportunity to study predator-prey interactions involving Great White Sharks.

## THE STATISTICS

The shark attack stats can be shocking and researchers have found that smaller sharks exhibit more dispersed prey search patterns and have lower predatory success rates than larger ones, suggesting possible learning with experience.

**48%** average shark attacks result in successful kills

**6.68** average attacks per day, per shark

**43** highest number of attacks recorded in a single day

**26-30** average meter bottom depths of most shark attacks on seals

Sources: The University of Miami RJ Dunlap Marine Conservation Program and National Geographic

# GREAT WHITE SHARKS

The reality about these astounding creatures

South Africa is home to one of the world's most feared sea creatures. Great White sharks are apex predators, and their appearance matches their level of aggression towards humans. In reality, it is a selective animal that only hunts to survive. Hommeling and his team have conducted a 10 year research study in False Bay, where he monitored the sharks in the area without physically touching them. He was able to discover how they hunt and how they can be further protected as they are endangered species.

## Where do they live?



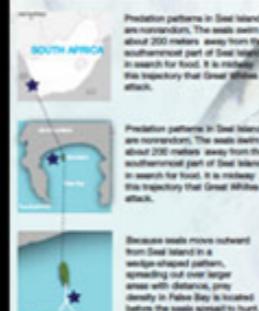
Most Great White Sharks are concentrated in the above mentioned lightly-shaded region and tend to concentrate in warm waters. Great Whites congregate in False Bay not only because of the warm temperature, but because there is also a large seal colony that lives on Seal Island. The triangle extending from the island depicts the range of the seals that leave and return to the island. Said triangle is the area where most sharks wait to attack their prey of choice. Down provides the ideal hunting conditions because of murky water and limited visibility.



# FLYING SHARKS

Great white sharks are much more dangerous in our heads than in reality. Their undeserved stereotype lies mostly with their magnanimous size, accompanied by teeth that with just one bite could be fatal.

## White Shark Hotspot



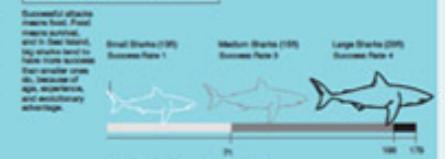
**Because seals move outward from Seal Island in a wedge-shaped pattern, the area with distance, prey density in False Bay is located before the seals spread to hunt.**



## Compare and Contrast



## Size Matters to Darwin



In partnership with the School of Marine Sciences and the RJ Dunlap Marine Conservation Program



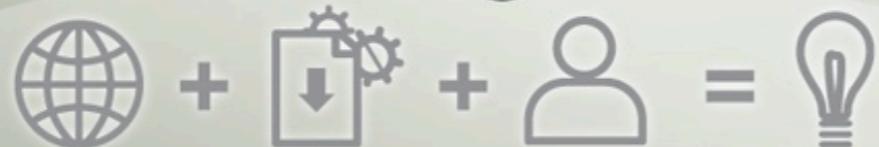
## Data

[By Country](#) [By Topic](#) [Indicators](#) [Data Catalog](#) [News](#) [About](#) [For Developers](#) [Products](#)

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GNI per capita, Atlas method (current US\$)

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### By Topic

See key indicators for a variety of topics



### Use our Data

Learn how to use World bank's data

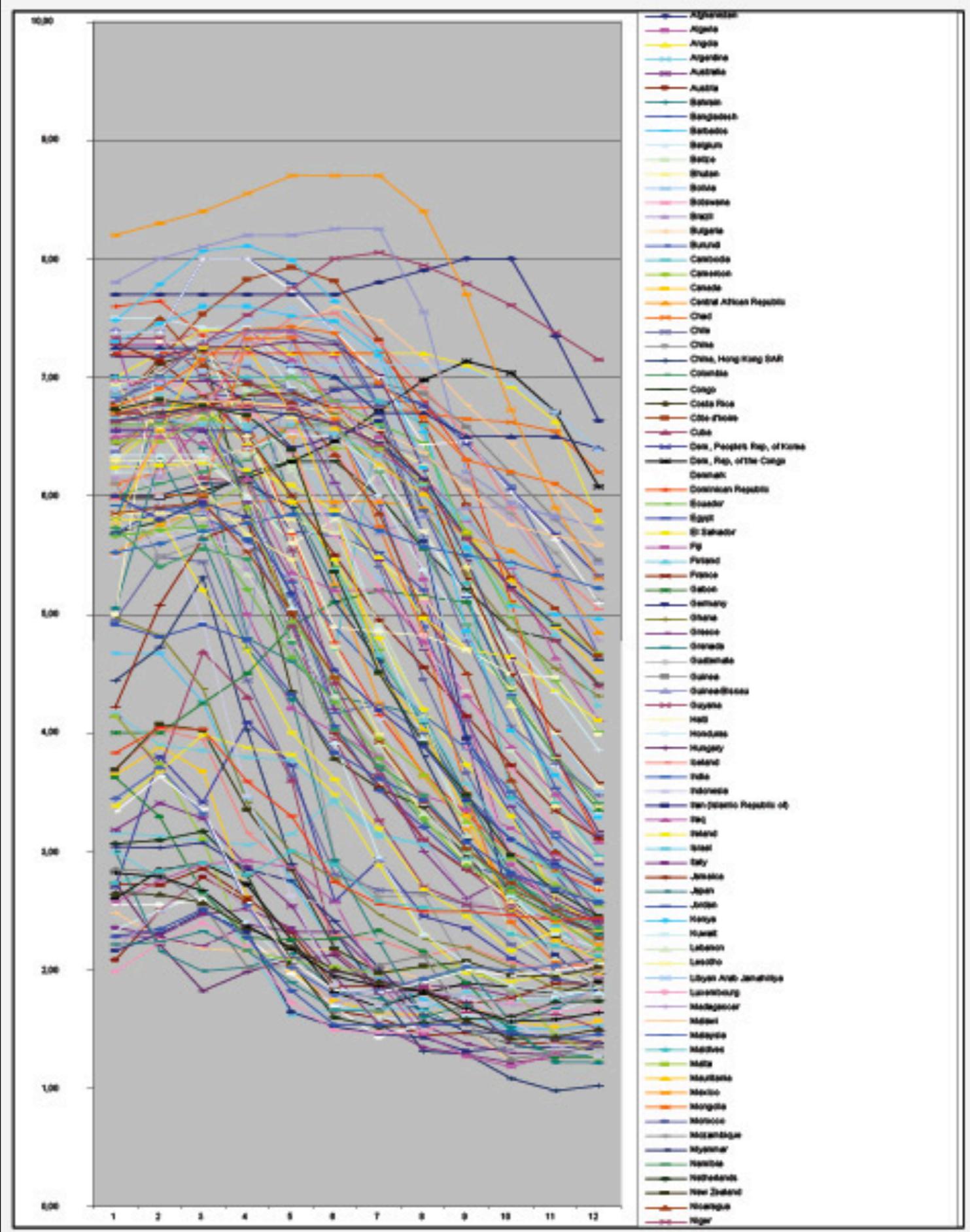
Microsoft Excel - POPULACAO BOM GDP Per capita.xls

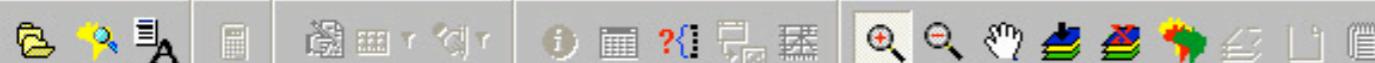
Arquivo Editar Exibir Inserir Formatar Ferramentas Dados Janela Contribuye Ajuda

Abrir no Contribuye Publicar no site Postar no blog

T1 = 2008

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Country or A	1950-1955	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2005	2005-2010		Country or A	1970	2008	VarGDP	VarNAT			
2	Afghanista	7,70	7,70	7,70	7,70	7,70	7,70	7,80	7,90	8,00	8,00	7,35	6,63		Afghanistan	147,7133	465,9868923	215,4671	-13,84			
3	Algeria	7,28	7,28	7,38	7,38	7,38	7,18	6,49	5,29	4,13	2,89	2,53	2,38		Algeria	375,8692	4958,84537	1219,301	-67,71			
4	Angola	7,00	7,20	7,40	7,40	7,20	7,20	7,20	7,20	7,10	6,92	6,63	5,79		Angola	470,9031	1942,142686	312,4294	-19,65			
5	Argentina	3,15	3,13	3,09	3,05	3,15	3,44	3,15	3,05	2,90	2,63	2,35	2,25		Argentina	1306,446	8357,509649	539,7134	-28,34			
6	Australia	3,18	3,41	3,27	2,87	2,54	1,99	1,91	1,86	1,86	1,78	1,75	1,83		Australia	3375,216	48252,77501	1329,62	-27,81			
7	Austria	2,08	2,50	2,78	2,57	2,04	1,65	1,59	1,44	1,47	1,37	1,39	1,38		Austria	2044,135	49596,39333	2326,277	-32,20			
8	Bahrain	6,97	6,97	7,18	6,97	5,95	5,23	4,63	4,08	3,36	2,76	2,51	2,29		Bahrain	1680,851	28239,78497	1580,088	-61,44			
9	Bangladesh	6,70	6,76	6,85	6,85	6,85	6,63	5,92	4,89	3,96	3,30	2,80	2,36		Bangladesh	89,56228	493,7427057	451,2842	-65,5			
10	Barbados	4,67	4,67	4,26	3,45	2,74	2,19	1,92	1,75	1,60	1,50	1,50	1,53		Barbados	799,694	14422,38651	1703,488	-44,34			
11	Belgium	2,34	2,50	2,64	2,39	2,02	1,71	1,60	1,56	1,61	1,60	1,64	1,77		Belgium	2736,932	47609,44498	1639,519	-12,10			
12	Belize	6,65	6,55	6,45	6,35	6,25	6,20	5,40	4,70	4,35	3,85	3,35	2,94		Belize	205,5303	4569,421947	2123,235	-53			
13	Bhutan	6,67	6,67	6,67	6,67	6,67	6,45	6,26	5,41	4,23	3,38	2,68		Bhutan	211,3921	1932,838541	814,338	-59,88				
14	Bolivia	6,75	6,75	6,63	6,56	6,50	5,80	5,30	5,00	4,80	4,32	3,96	3,50		Bolivia	239,8159	1722,815344	618,3909	-46,15			
15	Botswana	6,50	6,58	6,65	6,70	6,55	6,37	5,97	5,11	4,32	3,70	3,18	2,90		Botswana	123,528	6108,004265	4844,633	-55,75			
16	Brazil	6,15	6,15	6,15	5,38	4,72	4,31	3,80	3,10	2,60	2,45	2,25	1,90		Brazil	440,9046	8311,117551	1785,015	-59,72			
17	Bulgaria	2,48	2,27	2,18	2,15	2,17	2,17	2,01	1,92	1,51	1,22	1,25	1,40		Bulgaria	1060,124	6572,845401	520,0072	-35,39			
18	Burundi	6,80	6,80	6,80	6,80	6,80	6,80	6,79	6,45	6,08	5,41	4,66		Burundi	69,85529	137,6211112	97,00885	-31,55				
19	Cambodia	6,29	6,29	6,29	6,22	5,54	4,70	6,60	6,00	5,55	4,45	3,41	2,96		Cambodia	90,85125	768,6257419	746,0266	-46,4			
20	Cameroon	5,68	5,68	5,90	6,10	6,30	6,40	6,40	6,10	5,70	5,10	4,92	4,67		Cameroon	169,1264	1217,845953	620,0803	-25,92			
21	Canada	3,65	3,88	3,68	2,61	1,98	1,73	1,63	1,62	1,69	1,56	1,52	1,57		Canada	3973,997	45166,19217	1036,543	-20,7			
22	Central Afr	5,52	5,75	5,90	5,95	5,95	5,95	5,95	5,90	5,65	5,54	5,30	4,85		Central Afric	128,4357	464,4922527	261,6536	-18,54			
23	Chad	6,10	6,20	6,30	6,40	6,60	6,74	6,75	6,70	6,65	6,62	6,54	6,20		Chad	112,3869	765,4590255	581,0928	-6,136			
24	Chile	4,95	5,49	5,44	4,44	3,63	2,80	2,67	2,65	2,55	2,21	2,00	1,94		Chile	970,1871	10091,24945	940,1343	-46,44			
25	China	6,11	5,48	5,61	5,94	4,77	2,93	2,61	2,63	2,01	1,80	1,77	1,77		China, Peop	114,2003	3292,122201	2782,761	-62,95			
26	China, Hor	4,44	4,72	5,31	4,02	2,89	2,32	1,80	1,31	1,29	1,08	0,98	1,02		China: Hong	966,995	30872,11565	3092,583	-64,70			
27	Colombia	6,76	6,76	6,76	6,18	5,00	4,34	3,68	3,24	3,00	2,75	2,55	2,45		Colombia	449,9515	5415,088629	1103,483	-51,00			
28	Congo	5,68	5,79	5,99	6,19	6,29	6,29	5,99	5,55	5,21	4,87	4,78	4,41		Congo	196,6705	2933,563991	1391,613	-29,92			
29	Costa Rica	6,72	7,11	7,23	5,80	4,35	3,78	3,53	3,37	2,95	2,58	2,28	1,96		Costa Rica	686,7874	6599,109373	860,8664	-54,90			
30	Côte d'Ivoir	6,77	7,15	7,53	7,83	7,93	7,81	7,31	6,61	5,92	5,31	5,05	4,65		Côte d'Ivoire	286,8446	1136,703705	296,2786	-41,39			
31	Cuba	4,15	3,70	4,68	4,30	3,60	2,15	1,85	1,85	1,65	1,61	1,63	1,50		Cuba	653,2217	5596,276931	756,7194	-58,34			
32	Dem, Peop	2,70	3,80	3,41	4,09	3,72	2,58	2,93	2,45	2,35	2,09	1,92	1,86		Democratic	387,6021	555,3673573	43,28287	-49,91			
33	Dom, Pan	5,98	5,98	6,04	6,15	6,29	6,46	6,72	6,98	7,14	7,04	6,70	6,07		Democratic	97,394	180,7331607	95,61137	3,415			





Variáveis



Digite a palavra a ser pesquisada:

 Busca

Resultados do Universo

Brasil - Todo os municípios Brasil

- Pessoas residentes
  - Homens residentes
  - Mulheres residentes
  - Pessoas residentes - área urbana
  - Pessoas residentes - área rural
  - Pessoas residentes - 10 anos ou mais de idade
  - Pessoas residentes - 10 anos ou mais de idade - alfabeto
- 

Fonte: IBGE, Censo Demográfico 2000



## Diagrama

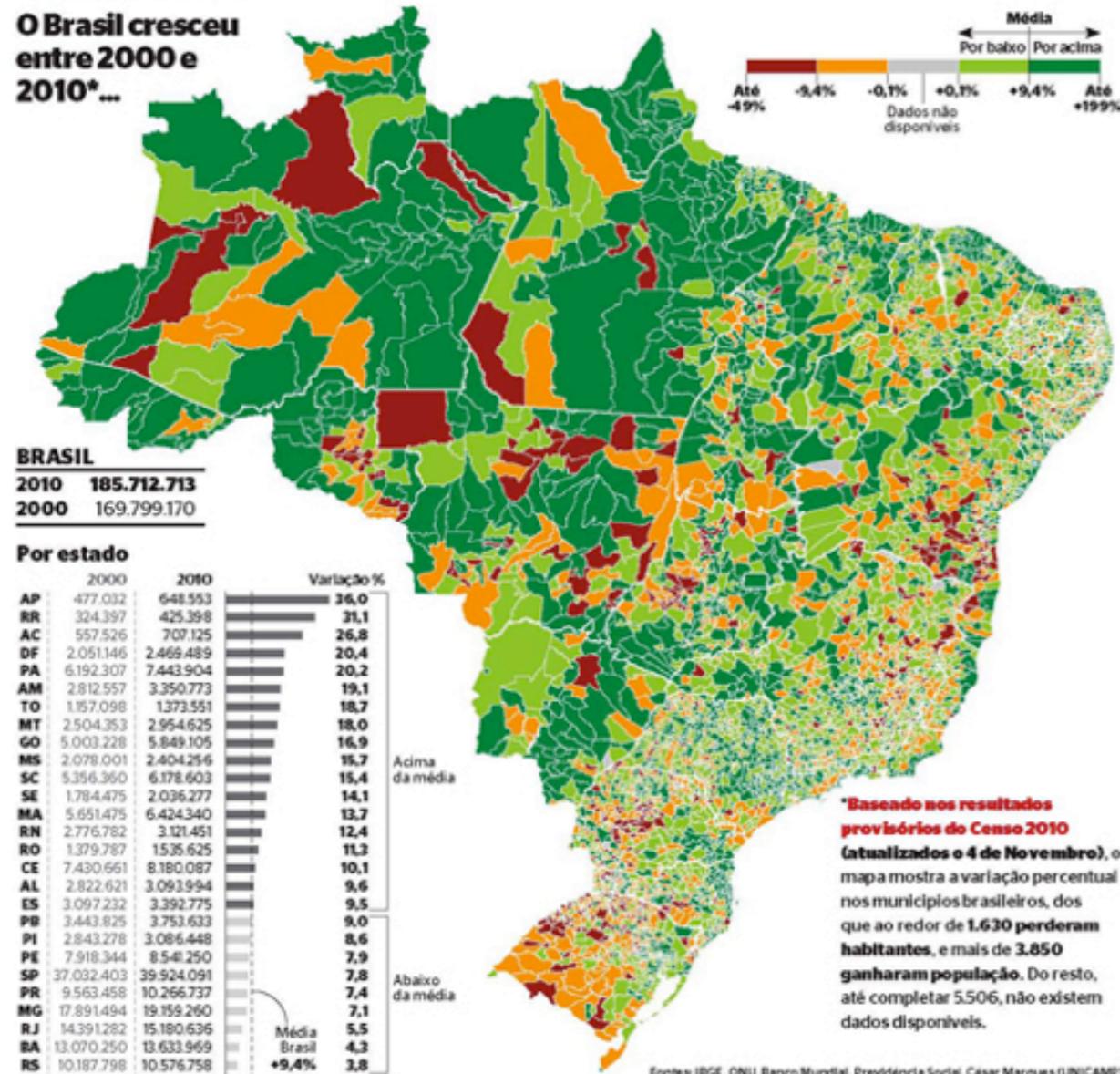
A NOTÍCIA EM PERSPECTIVA

### A oportunidade demográfica

E como o Brasil pode se aproveitar de uma população mais velha e envelhecida

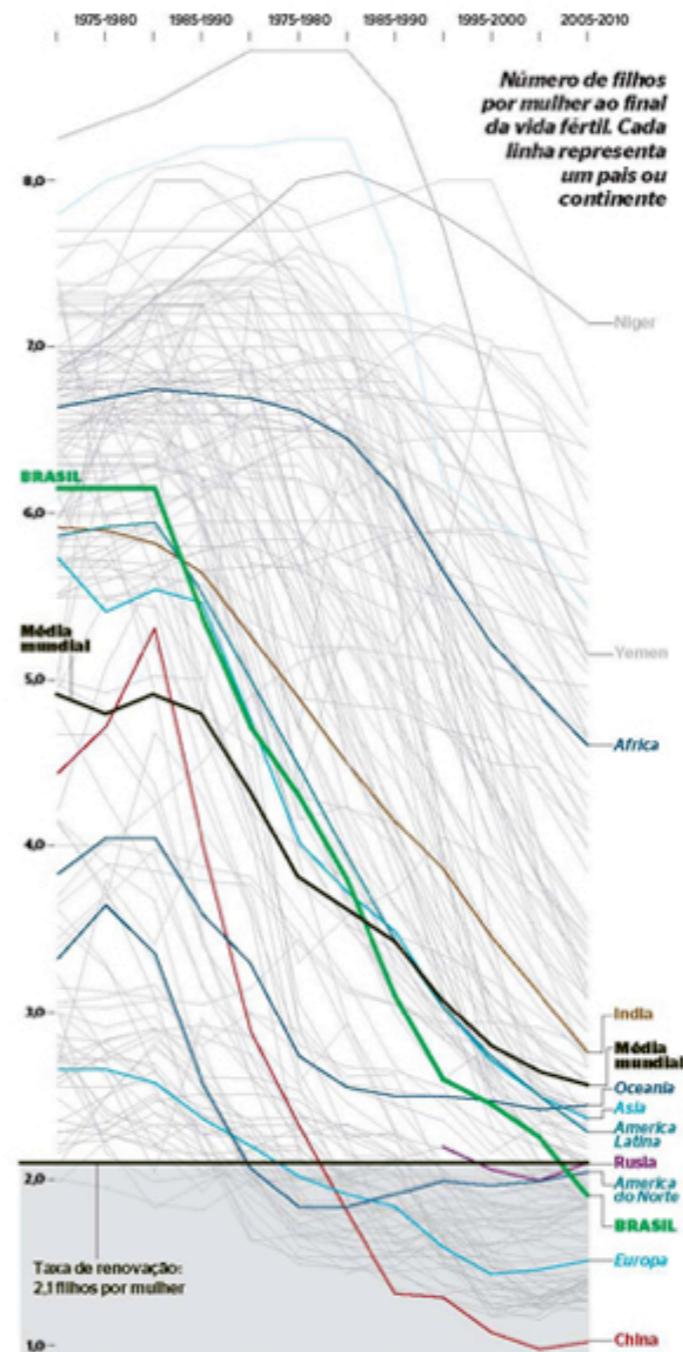
Alberto Cairo e Francine Lima

O Brasil cresceu entre 2000 e 2010\*



### ...mas a taxa de fertilidade está abaixo do previsto...

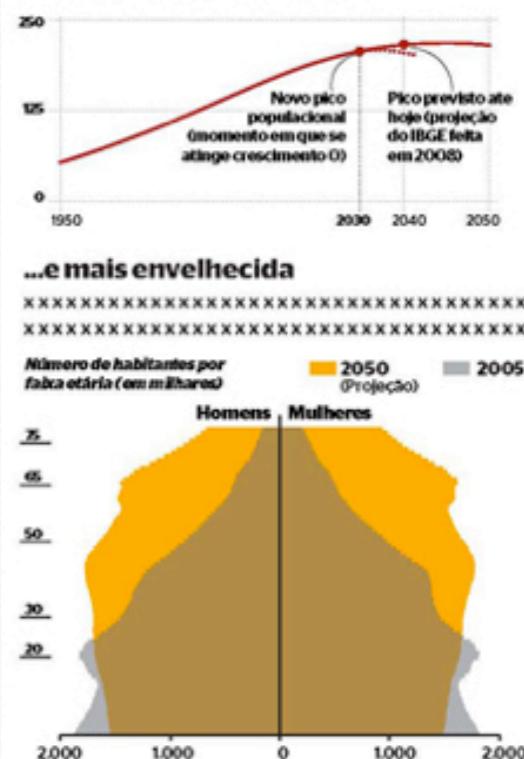
A taxa de natalidade no Brasil é menor do que as projeções previam, o que pode parar o crescimento da população antes do esperado. Um estudo de 2004 estimou que em 2010 a natalidade estaria em torno a 2,3 ou 2,4. Mas novo cálculo é de 1,9. Isto deixa ao Brasil longe da natalidade de outros países em desenvolvimento x x Acelerada envelhecimento x x A China caso especial



### ...o que levará uma população menor...

As últimas previsões antes do censo falavam que a população ia parar de crescer ao redor de 2040. Mas, comprovado que a taxa de fertilidade está por baixo do esperado, é possível ela cair a partir de 2030.

Milhões de habitantes. Projeções 1950-2050



### E como o Brasil pode transformar isto em uma oportunidade

Ainda há tempo para o país se preparar. Aproveitar aumento da população entre 15 e 64 anos que mais geram renda e participam do mercado. x x x x

A proporção de pessoas em idade ativa (PIA) está aumentando e também envelhecendo. Se esse contingente for absorvido pelo mercado de trabalho essa poderá ser uma grande oportunidade para a preparação de um sistema previdenciário mais equilibrado e pronto para o futuro. x x x

A população com menos de 15 anos está caindo hoje. Isso abre preciosas oportunidades no campo da educação até 2030. x x x x

A existência de muitos jovens em famílias pobres, que devem ser priorizados na formulação das políticas educacionais, visando o aumento da sua mobilidade

## Brazil's Demographic Opportunity

How Brazil can take advantage of a future with fewer children per couple.

Alberto Cairo, Francine Lima,  
Marco Vergottini

**PRELIMINARY DATA FROM THE 2010 CENSUS**  
create an interesting picture of the changes that the Brazilian population has gone through in the past ten years. Brazil's population grew, on average, 10% between 2000 and 2010, but the fertility rate is below 2.1 children per woman, the minimum to keep a population from shrinking. According to César Marques, a demographer from the University of Campinas, the main challenge Brazil will face in the future is how to maintain a healthy Social Security system if the number of older and retired people will likely be much larger than it is today. Read on to learn about all the variables at play in this story.

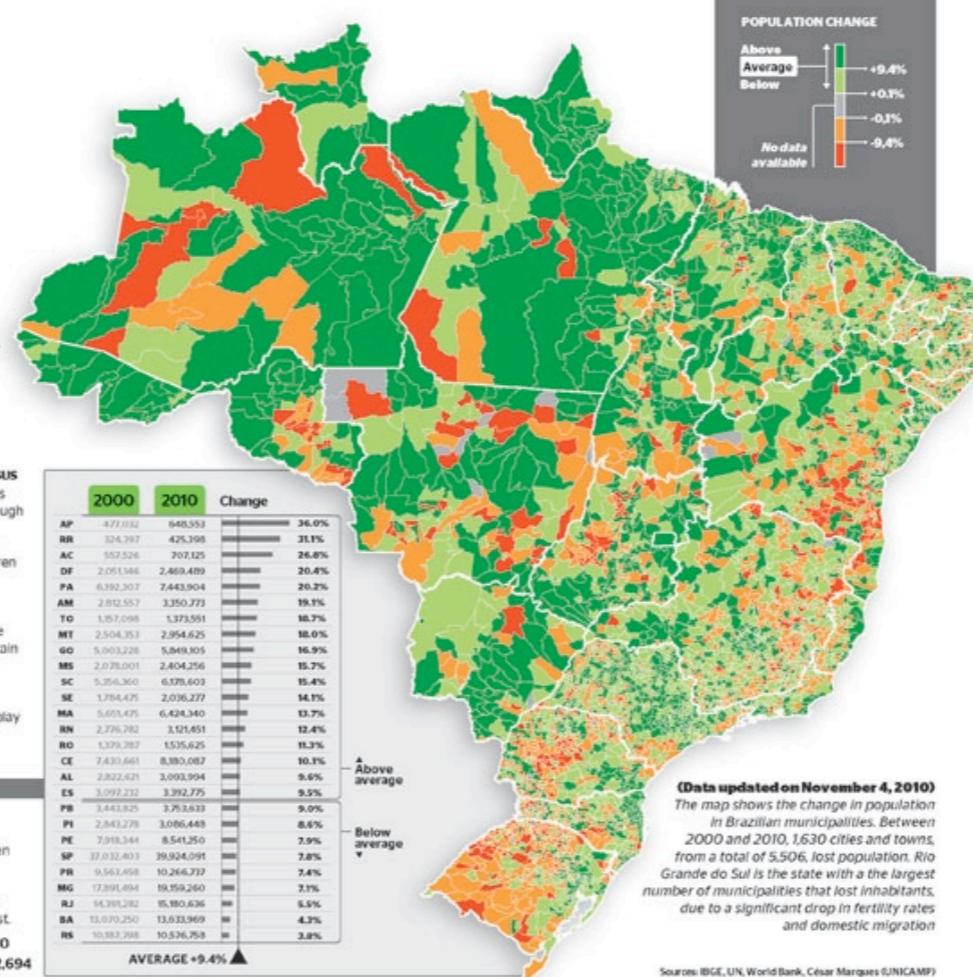
### 1 BRAZIL'S POPULATION IS BIGGER

The 2010 Census has revealed a 9.4% population increase between 2000 and 2010. The differences between states, as you can see on the chart on the right, are noticeable. Most rich states, such as São Paulo and Rio, didn't grow as fast as the ones in the north east.

2000      169.799.170  
2010      190.732.694

	2000	2010	Change
AP	477.012	648.553	36.0%
RR	324.397	425.398	31%
AC	557.526	707.125	26.6%
DF	2.051.546	2.469.489	20.4%
PA	6.192.307	7.443.904	20.2%
AM	2.812.557	3.350.773	19.1%
TO	1.557.098	1.573.551	16.7%
MT	2.504.253	2.954.625	16.0%
GO	5.093.228	5.849.305	16.9%
MS	2.078.001	2.404.256	15.7%
SC	5.356.360	6.076.603	15.4%
SE	1.784.475	2.036.277	14.1%
MA	5.655.475	6.424.340	13.7%
RN	2.776.782	3.515.451	12.4%
RO	1.379.287	1.535.625	11.3%
CE	2.430.661	2.830.087	10.1%
AL	2.822.421	3.003.994	9.6%
ES	3.097.222	3.392.775	9.5%
PR	3.443.825	3.753.833	9.0%
PI	2.843.278	3.086.448	8.6%
PE	7.018.344	8.541.250	7.9%
SP	17.032.403	19.924.091	7.8%
PR	9.543.458	10.266.737	7.4%
MG	17.391.494	19.359.260	7.2%
RJ	14.399.282	15.180.636	5.5%
BA	13.070.250	13.633.969	4.3%
RS	10.182.398	10.526.758	3.8%

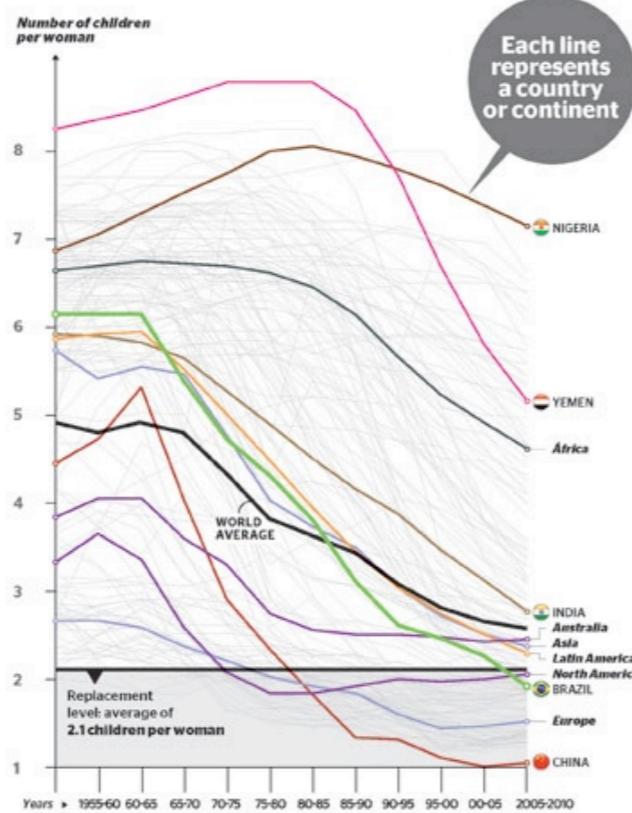
AVERAGE +9.4% ▲



Sources: IBGE, UN, World Bank, César Marques (UNICAMP)

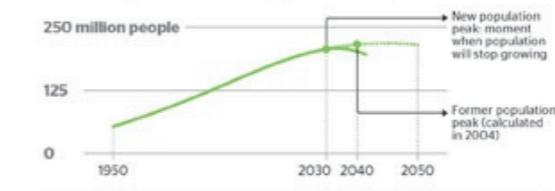
### 2 —BUT THE FERTILITY RATE IS MUCH LOWER THAN EXPECTED

A study in 2004 estimated that in 2010, the fertility rate would be 2.4 children per woman, on average. But new data collected by the IBGE prove that the fertility rate is already 1.9, below the threshold called "replacement rate". When the fertility rate drops below this number, the population of a country will eventually start to shrink and grow older.



### 3 AS A CONSEQUENCE, POPULATION WILL STOP GROWING

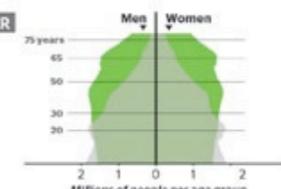
Forecasts made in 2004 anticipated that Brazil's population would stop growing in 2040. But the most recent data from the IBGE suggests that this could happen much earlier, in 2030.



### 4 —AND IT WILL BECOME OLDER

Comparing the current population pyramid with the one predicted for 2050

2005      Forecast for 2050



### How Brazil can transform the population challenge into an opportunity

- As the population ages, the proportion of people of working age increases. The country will therefore have more people producing wealth (if the labor market can absorb them) and fewer children to consume investments. It is a window of opportunity, because in some cases the number of people of working age to fall back when older people are leaving the market.
- The population under 15 years of age is falling today. A smaller number of students in public schools will facilitate the quality of teaching, if the amount invested in education stays the same.
- Educational policy focused on low-income youth favors the formation of more skilled workforce and greater social mobility.
- In the future, Brazil will reach the stage of Europe and Japan, which struggle to support their elders. This is why it's so important to prepare a more balanced retirement system, which will include retirement at a later age.



## Enem

### Inscrição 2012

Prezado Participante,

Todas as informações prestadas nesta inscrição são de sua inteira responsabilidade. Confira atentamente todos os seus dados.

Após a confirmação da inscrição, qualquer alteração nos dados cadastrais será feita por meio do acompanhamento da inscrição.

O Inep não se responsabiliza por informações incorretas ou não recebidas por motivos de ordem técnica, como falhas de computadores ou outros que impossibilitem a conclusão da inscrição.

A taxa de inscrição para participar do ENEM 2012 é de R\$ 35,00 (trinta e cinco reais). No entanto, estão isentos do pagamento da taxa:

- **Automaticamente:** Alunos matriculados no último ano (concluintes) do Ensino Médio em instituições públicas de ensino (federais, estaduais e municipais);
- **Mediante Declaração de Carência:** Demais participantes, desde que declarem carência no ato de sua inscrição e que a declaração seja aprovada pelo Inep.

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# Confira a média e o ranking das escolas na prova do Enem 2010

Pesquise na tabela completa das escolas participantes do Enem e categorizadas por Estado, rede e nível de participação

GERARDO RODRIGUEZ; CAMILA GUIMARÃES E ALBERTO CAIRO



ESCOLAS ACIMA E ABAIXO DA MÉDIA

RANKING DE ESCOLAS

PARTICIPAÇÃO DAS ESCOLAS

## Escolas acima e abaixo da média nacional no Enem 2010

Com qualquer taxa de participação

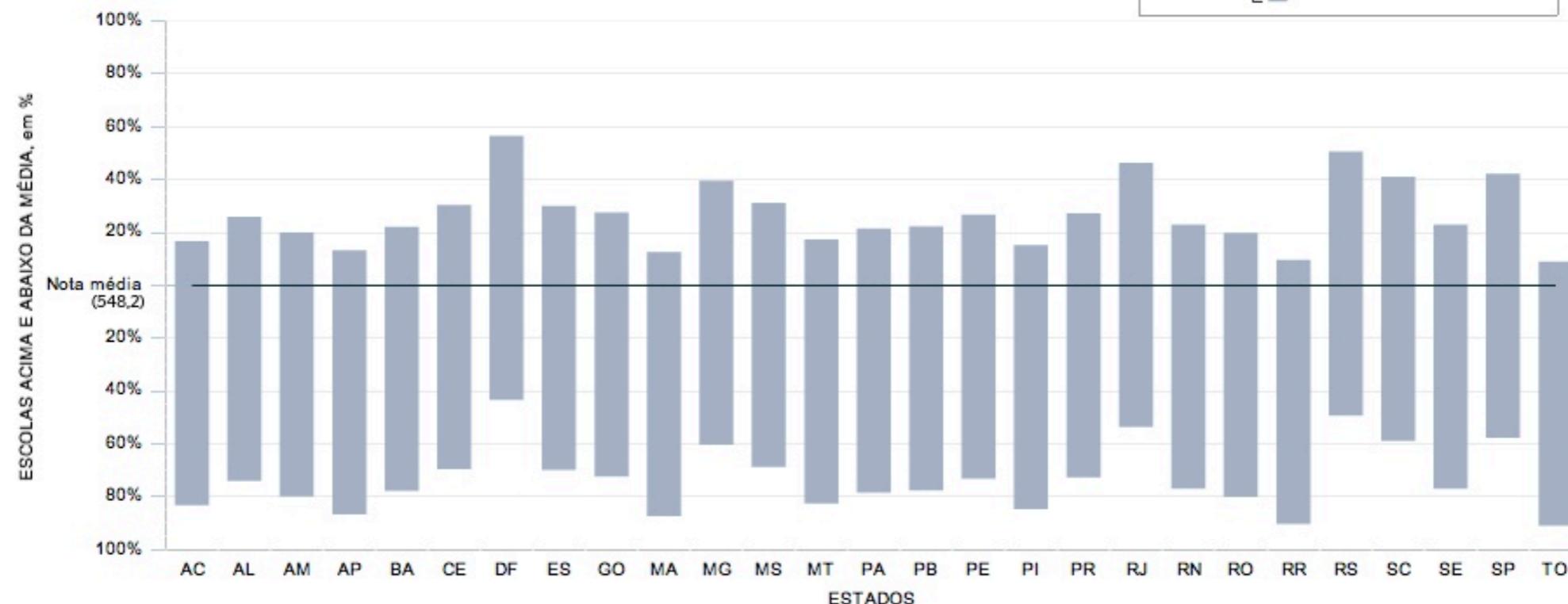
Redes pública e particular

100% das escolas

% acima da média

Média

% abaixo da média



### Claves do gráfico:

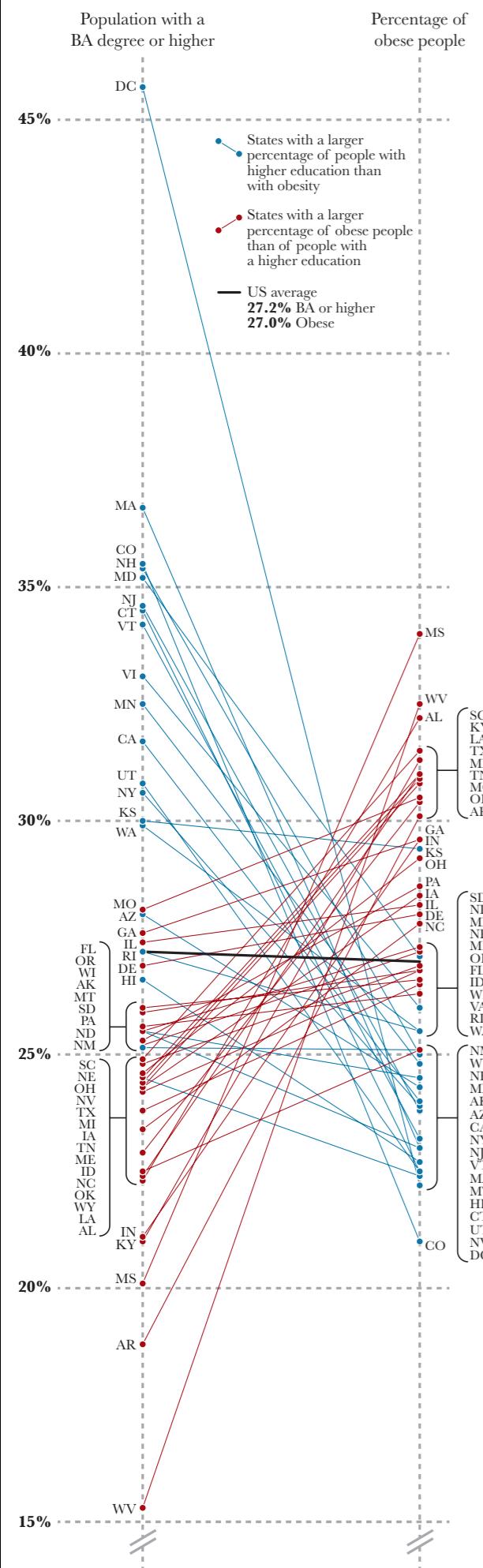
A média nacional das escolas foi calculada de acordo com cada faixa de participação dos alunos na prova. Não foram consideradas, no cálculo da média, as escolas sem nota

Na menor faixa de participação de alunos na prova, a maioria das escolas, em todos os estados, ficam abaixo da média

Mais da metade das escolas da Bahia, Rio de Janeiro, São Paulo, Minas Gerais, Goiás e do Distrito Federal, na faixa de participação acima de 75%, ficaram acima da média

# What we can learn together

- 1.** Think of what's appropriate to show, and how
- 2.** Think about structure and function
- 3.** Think of labeling and storytelling



# Thank you

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