

# 06

## Information Visualization

Daniel Gonçalves, Sandra Gama

# Visualizing Geographical Information

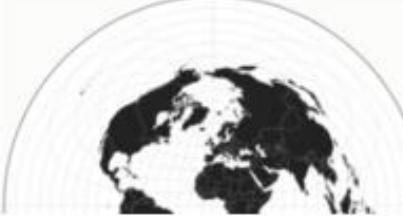


# Get Ready...

**http://etc.ch/o7df**

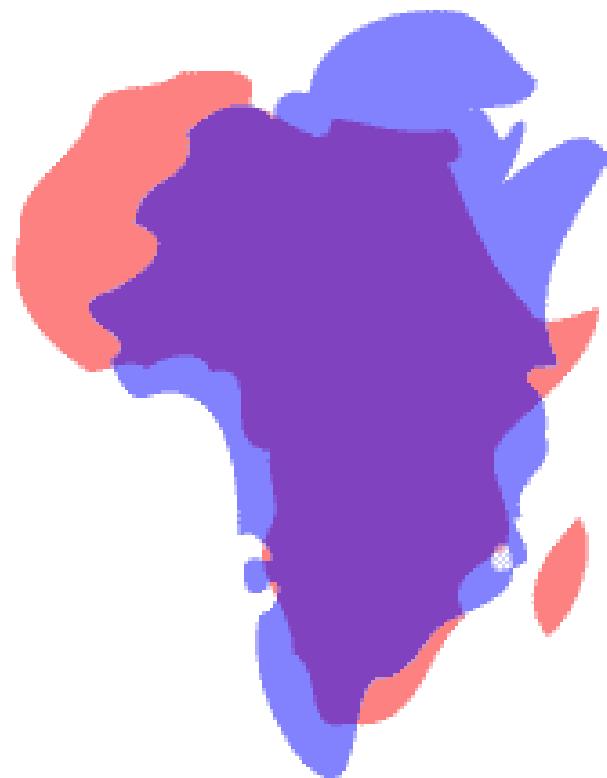


# Projections Available in D3

d3.geo.albersUsa	d3.geo.azimuthalEqualArea	d3.geo.azimuthalEquidistant
		
d3.geo.conicEqualArea	d3.geo.conicConformal	d3.geo.conicEquidistant
		
d3.geo.equirectangular	d3.geo.gnomonic	d3.geo.mercator
		
d3.geo.orthographic	d3.geo.stereographic	d3.geo.transverseMercator
		

# Africa vs. Greenland

<http://www.businessinsider.com/greenland-africa-comparison-2014-5>



Mercator



Actual

# The True Size of Africa

A small contribution in the fight against rampant *Immappancy*, by Kai Krause

Graphic layout for visualization only (some countries are cut and rotated)  
But the conclusions are very accurate: refer to table below for exact data

COUNTRY	AREA x 1000 km <sup>2</sup>
China	9.597
USA	9.629
India	3.287
Mexico	1.964
Peru	1.285
France	633
Spain	506
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	324
Italy	301
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	144
Greece	132
<b>TOTAL</b>	<b>30.102</b>
<b>AFRICA</b>	<b>30.221</b>



## Top 100 Countries

Area in square kilometers, Percentage of World Total  
Sources: Britannica, Wikipedia, Almanac 2010

	AREA km <sup>2</sup>	%
1	Russia	17,098,242 11.50
2	Canada	9,586,961 6.40
3	China	9,586,961 6.40
4	United States	9,623,091 6.40
5	Brazil	8,514,877 5.70
6	Australia	7,692,024 5.20
7	India	3,287,265 2.30
8	Argentina	2,780,400 2.00
9	Kazakhstan	2,651,000 1.80
10	Sudan	2,505,813 1.70
11	Algeria	2,381,741 1.60
12	Congo	2,344,858 1.60
13	Greenland	2,166,088 1.50
14	Saudi Arabia	2,149,690 1.40
15	Mexico	1,964,375 1.30
16	Indonesia	1,959,000 1.30
17	Libya	1,759,540 1.20
18	Iran	1,628,750 1.10
19	Mongolia	1,564,100 1.10
20	Peru	1,285,216 0.86
21	Chad	1,284,000 0.86
22	Niger	1,264,700 0.85
23	Angola	1,246,700 0.85
24	Mali	1,240,192 0.83
25	South Africa	1,221,037 0.82
26	Colombia	1,141,747 0.76
27	Ethiopia	1,104,303 0.74
28	Bolivia	1,098,581 0.74
29	Mauritania	1,025,520 0.69
30	Egypt	1,024,000 0.67
31	Tanzania	945,067 0.63
32	Nigeria	923,768 0.62
33	Venezuela	912,050 0.61
34	Namibia	824,116 0.55
35	Mozambique	801,590 0.54
36	Pakistan	796,000 0.53
37	Turkey	786,562 0.53
38	Chile	756,102 0.51
39	Zambia	752,612 0.51
40	Myanmar	676,578 0.45
41	Afghanistan	652,090 0.44
42	Somalia	637,657 0.43
43	Iraq	630,000 0.43
44	C. African Rep.	622,984 0.42
45	Ukraine	603,500 0.41
46	Madagascar	587,041 0.39
47	Botswana	582,000 0.39
48	Kenya	580,367 0.39
49	Yemen	570,000 0.33
50	Thailand	513,120 0.32
51	Spain	505,392 0.34
52	Turkmenistan	488,100 0.33
53	Cameroun	475,442 0.32
54	Papua New Guinea	462,840 0.31
55	Uzbekistan	447,400 0.30
56	Morocco	446,370 0.30
57	Iraq	438,317 0.29
58	Paraguay	406,752 0.27
59	Zimbabwe	390,757 0.26
60	Japan	377,930 0.25
61	Germany	357,114 0.24
62	Rep. D. Congo	342,000 0.23
63	Finland	341,419 0.23
64	Vietnam	331,212 0.22
65	Malaysia	330,803 0.22
66	Norway	323,802 0.22
67	Côte d'Ivoire	322,463 0.22
68	Poland	312,685 0.21
69	Oman	307,000 0.21
70	Italy	301,336 0.20
71	Philippines	300,000 0.20
72	Burkina Faso	274,222 0.18
73	New Zealand	270,467 0.18
74	Gabon	267,668 0.18
75	Western Sahara	266,000 0.18
76	Ecuador	250,000 0.15
77	Guinea	245,857 0.17
78	United Kingdom	240,900 0.16
79	Uganda	241,038 0.16
80	Ghana	238,539 0.16
81	Romania	238,391 0.16
82	Laos	236,800 0.16
83	Guyana	231,000 0.14
84	Belarus	207,600 0.14
85	Kyrgyzstan	199,951 0.13
86	Senegal	196,722 0.13
87	Syria	185,180 0.12
88	Cambodia	181,035 0.12
89	Uruguay	176,500 0.12
90	Suriname	175,000 0.11
91	Tunisia	163,610 0.11
92	Nepal	147,181 0.10
93	Bangladesh	143,998 0.10
94	Tajikistan	143,100 0.10
95	Greece	131,957 0.09
96	Nicaragua	130,000 0.09
97	North Korea	120,538 0.08
98	Malawi	118,484 0.08
99	Eritrea	117,600 0.08
100	<b>TOP 100 TOTAL</b>	<b>132,632,524 89.34</b>



Europe



India



Japan



China

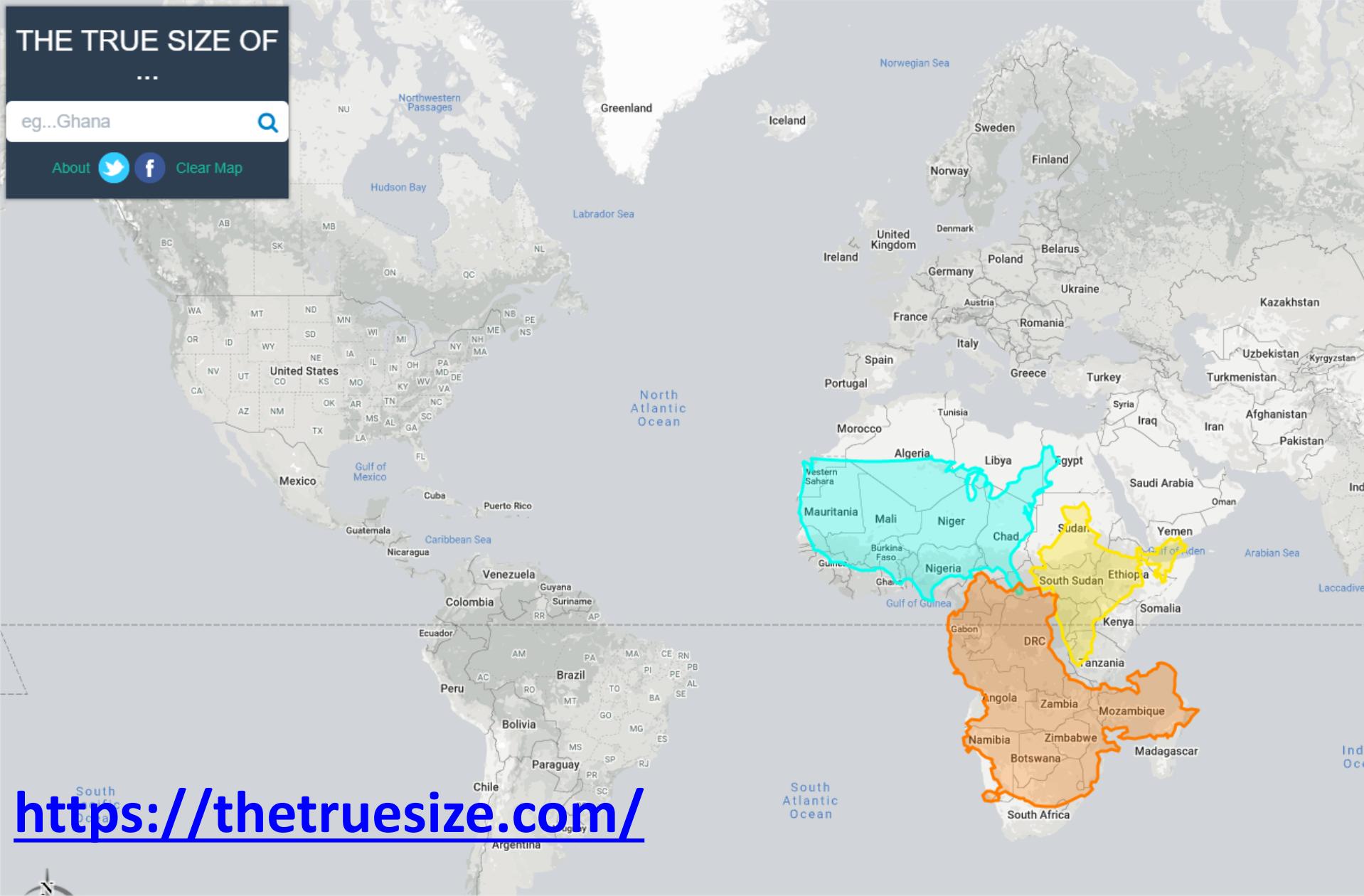
In addition to the well known social issues of *illiteracy* and *innumeracy*, there also should be such a concept as "*immappancy*", meaning *insufficient geographical knowledge*.

A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose "*1-2 billion*" and "*largest in the world*", respectively.

Even with Asian and European college students, geographical estimates were often off by factors of 2-3. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as *Mercator*).

A particularly extreme example is the worldwide misjudgement of the true size of *Africa*. This single image tries to embody the massive scale, which is larger than the *USA*, *China*, *India*, *Japan* and *all of Europe.....combined!*

# Let's Play!





KEEP  
CALM

TELL ME  
WHAT TO DO

# Tell me what to do!



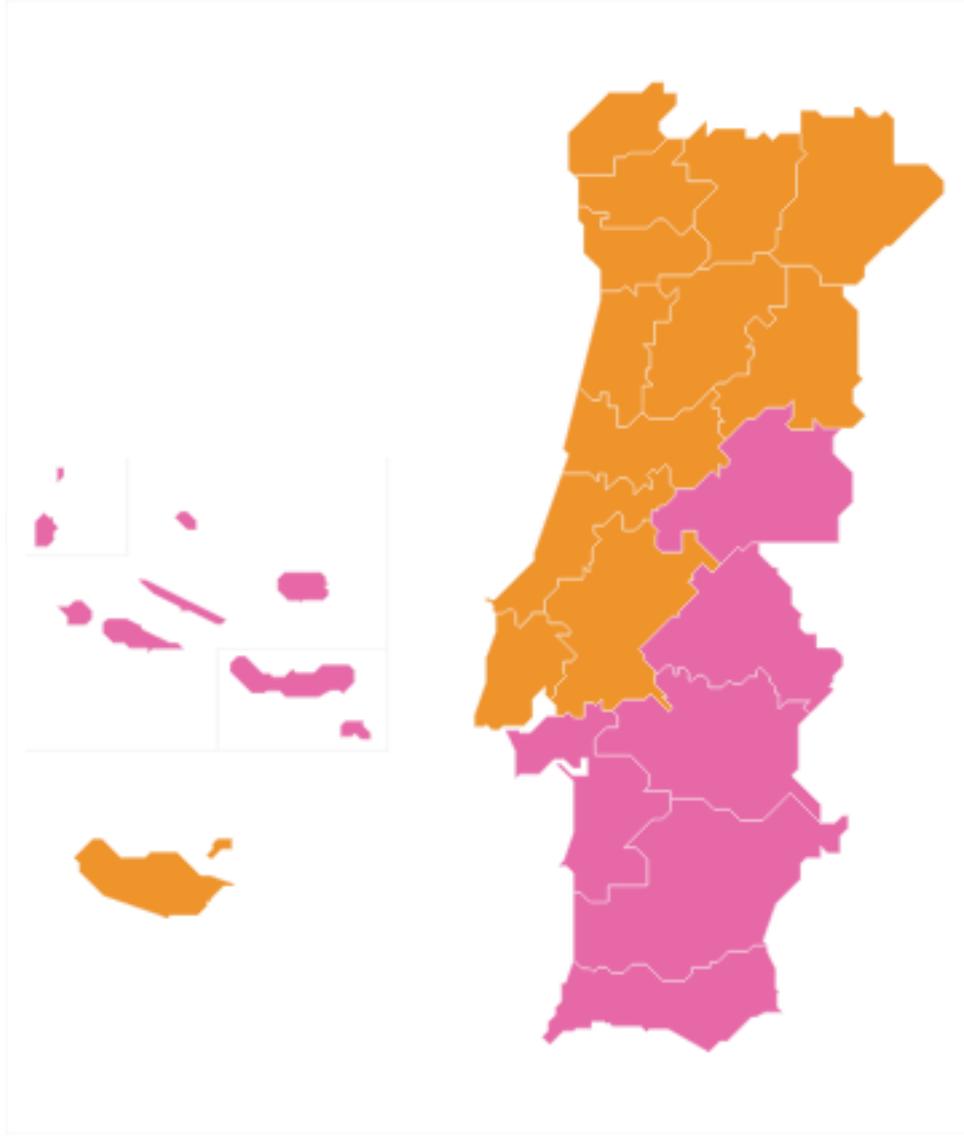
KEEP  
CALM  
TELL ME  
WHAT TO DO

## Election winners by district (2015)

District	Winner
Viana do Castelo	PSD
Braga	PSD
Porto	PSD
Vila Real	PSD
Bragança	PSD
Aveiro	PSD
Viseu	PSD
Guarda	PSD
Coimbra	PSD
Castelo Branco	PS
Leiria	PSD

District	Winner
Santarém	PSD
Portalegre	PS
Lisboa	PSD
Évora	PS
Setúbal	PS
Beja	PS
Faro	PS







KEEP  
CALM

TELL ME  
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KEEP  
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# Tell me what to do!



KEEP  
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WHAT TO DO

## Median household income per state (2018)

imgflip.com

**state            med. inc.  
(in USD)**

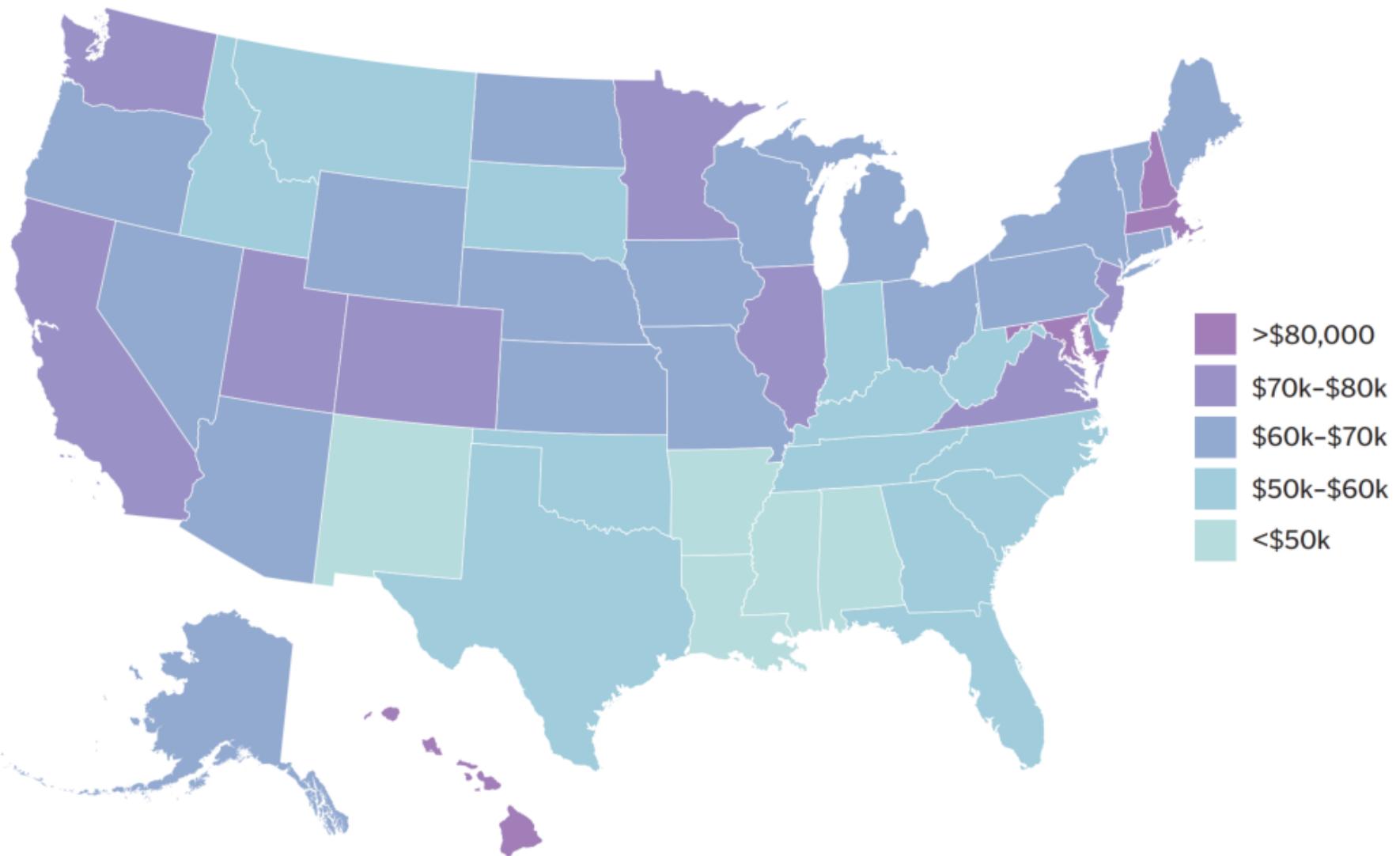
Alabama	73,321
Alaska	86,463
Arizona	71,432
Arkansas	65,675
California	120,742
Colorado	54,542
Connecticut	84,432
Delaware	76,437
Florida	58,432

...

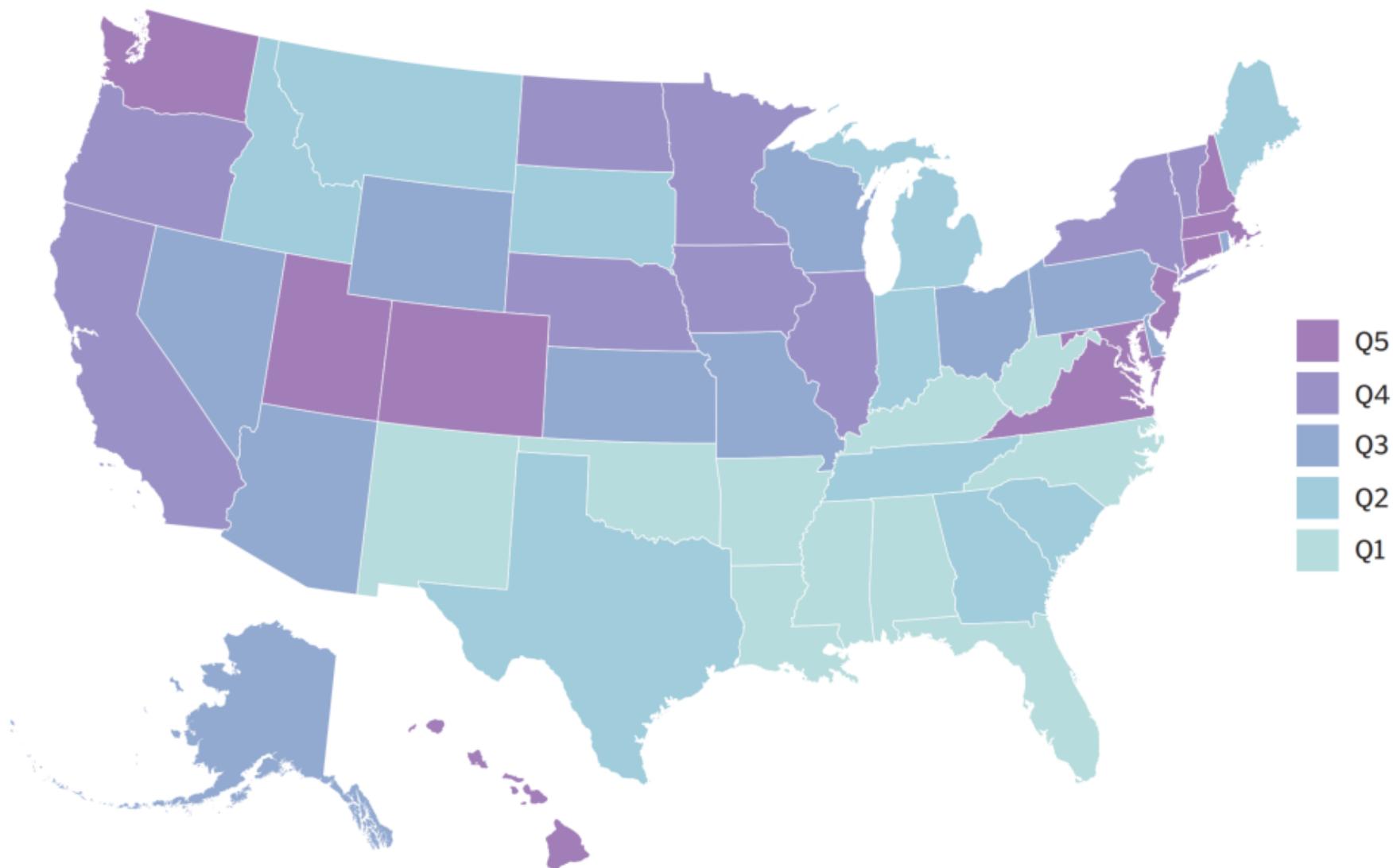
(mockup data)



# MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES IN 2018

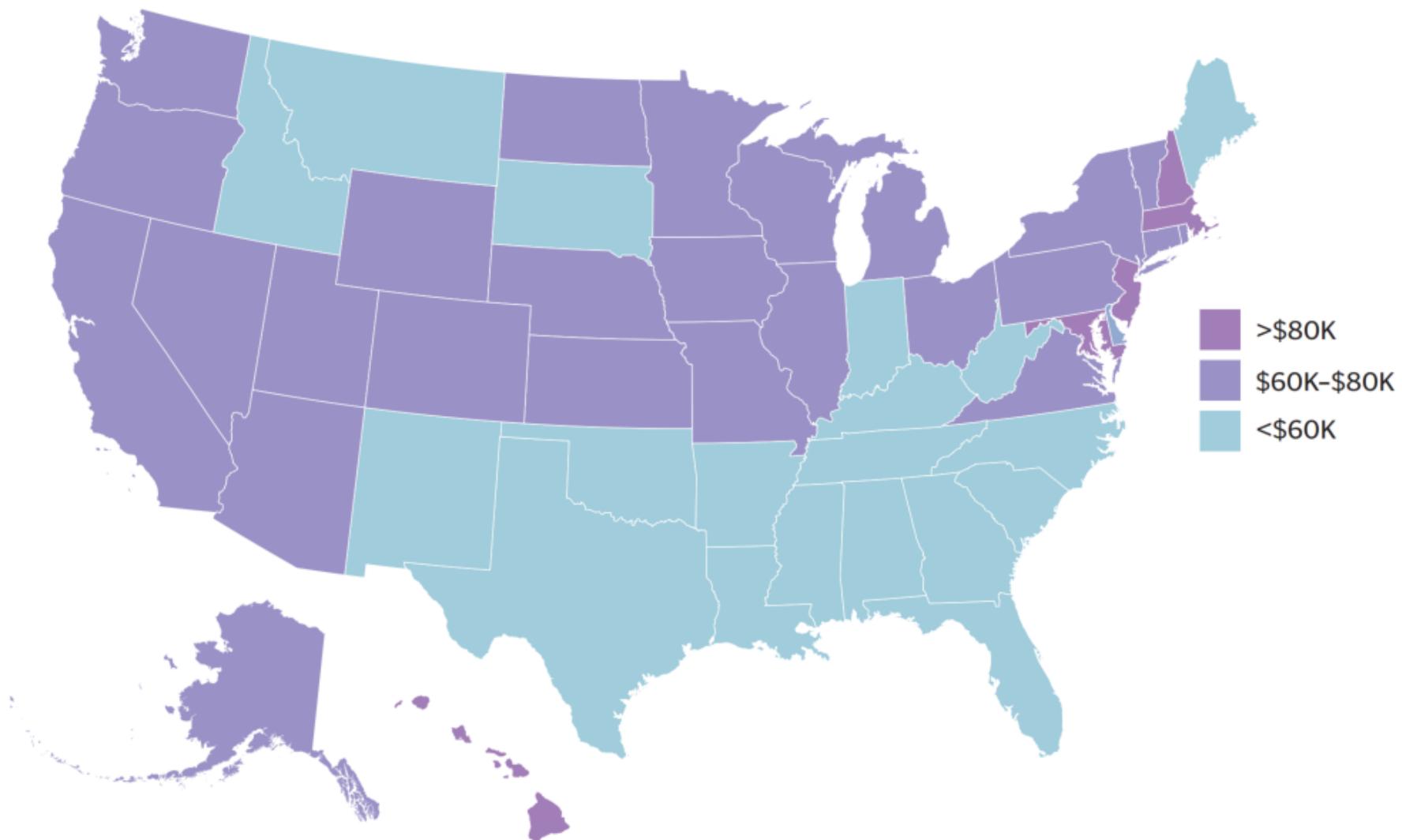


# MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES IN 2018



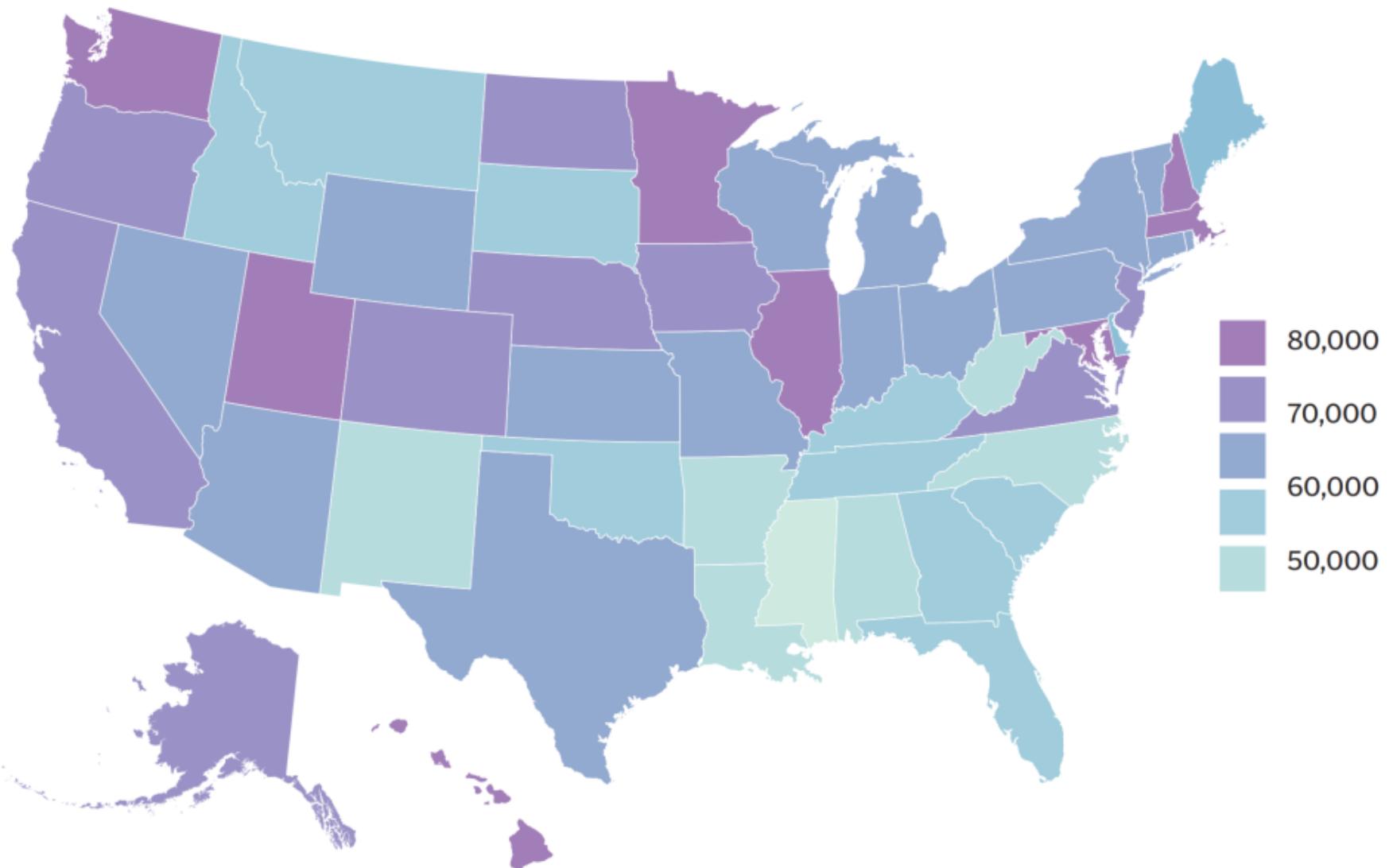
Source: U.S. Census Bureau

# MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES IN 2018

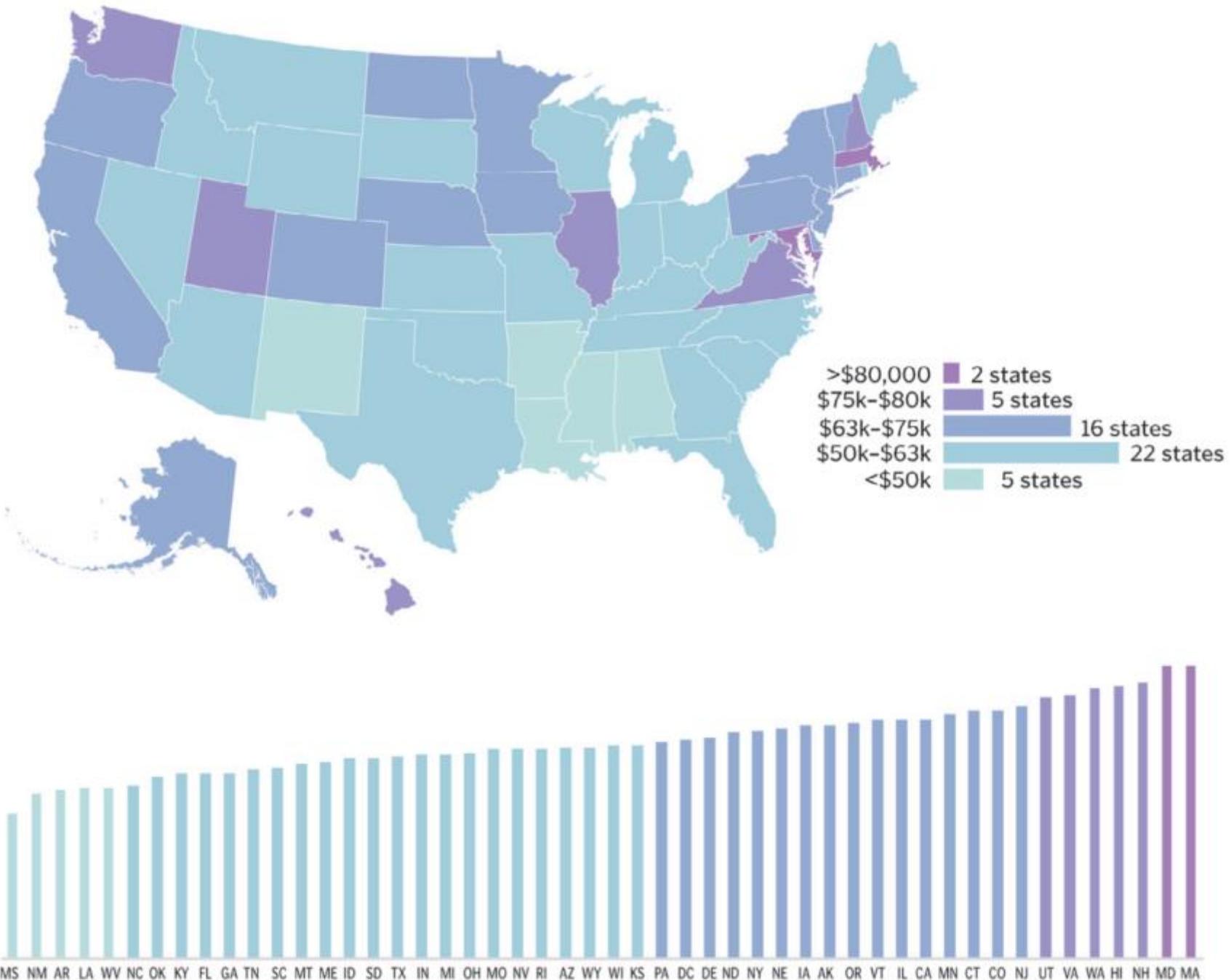


Source: U.S. Census Bureau

# MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES IN 2018



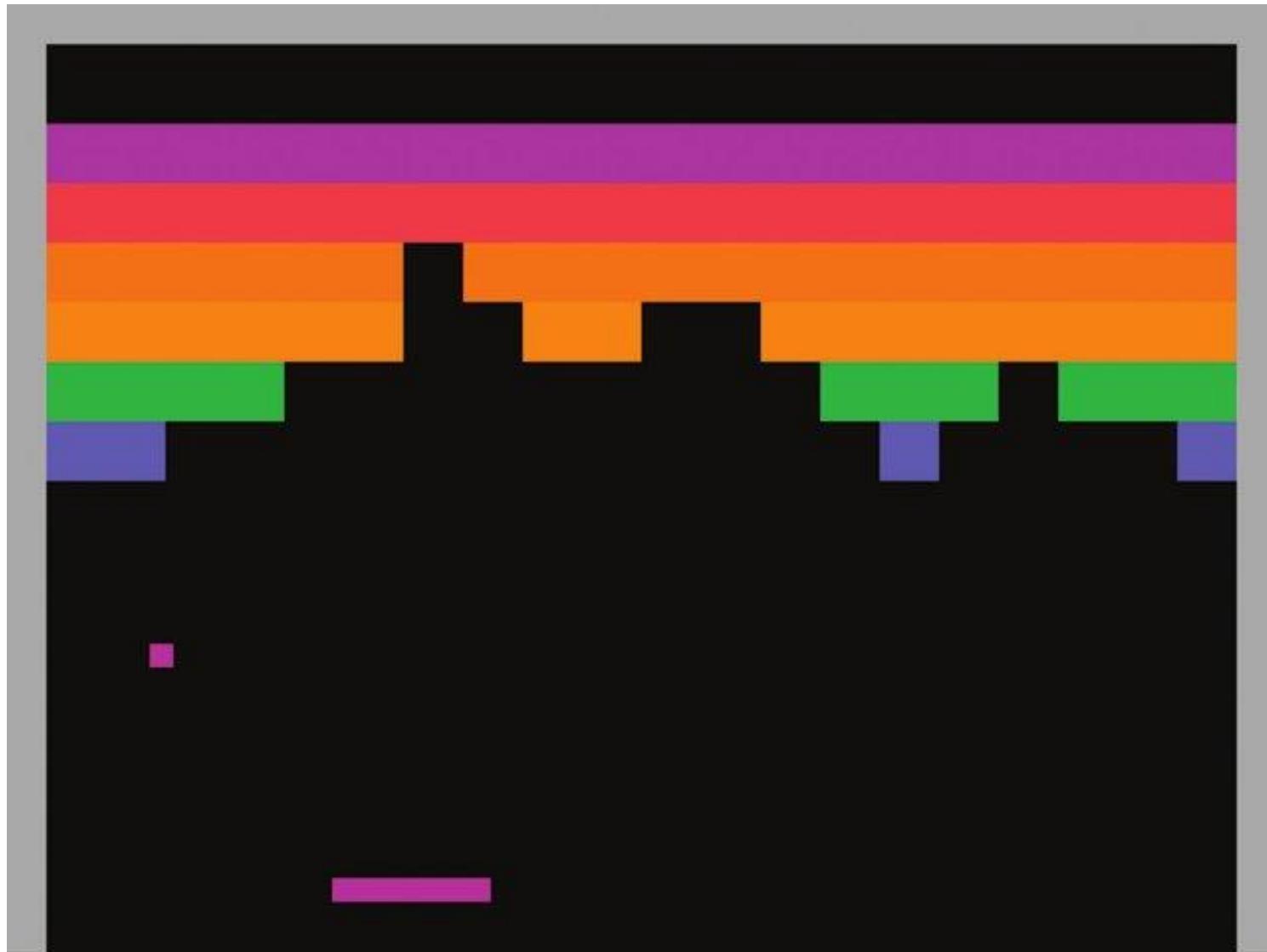
Source: U.S. Census Bureau





KEEP  
CALM  
  
TELL ME  
WHAT TO DO

# Breakout!



# There was this Washington Post story...

One 2006 study found that from the 1980s to the 2000s, every 10 percent decline in gun ownership in a census region accompanied a 2.5 percent drop in suicide rates. There are numerous other studies that show similar results.

This pattern becomes clear when looking state by state. The states that have higher rates of gun ownership, where people have more access to guns, also have higher rates of suicide. Suicides are twice as common in states with high gun ownership than those with low gun ownership, even after controlling for rates of mental illness and other factors, according to a 2007 study

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# There was this Washington Post story...

When **looking state by state**, states that have **higher rates of gun ownership also have higher rates of suicide**.

state	gun ownership	state	suicide rates
Alabama	60%	Alabama	3.4%
Alaska	55%	Alaska	4.7%
Arizona	48%	Arizona	2.2%
Arkansas	32%	Arkansas	1.1%
California	15%	California	2.2%
Colorado	25%	Colorado	2.7%
Connecticut	5%	Connecticut	3.1%
Delaware	12%	Delaware	1.2%
Florida	8%	Florida	1.4%
...		...	

(mockup data)

# Time to Break Out



**Discuss among yourselves**

**How would you represent the two datasets to support the story?**

**Meet you back in 10 minutes!**

<https://bit.ly/3LzxeCZ>



# Breakout!

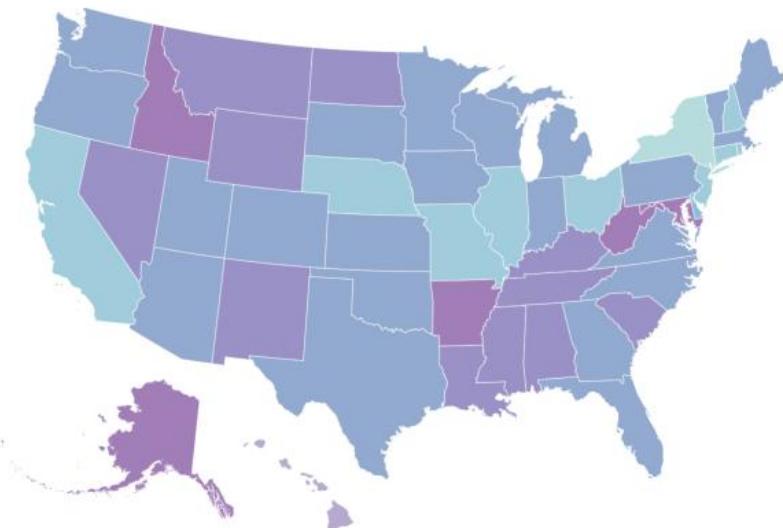
10:00

<https://bit.ly/3LzxeCZ>



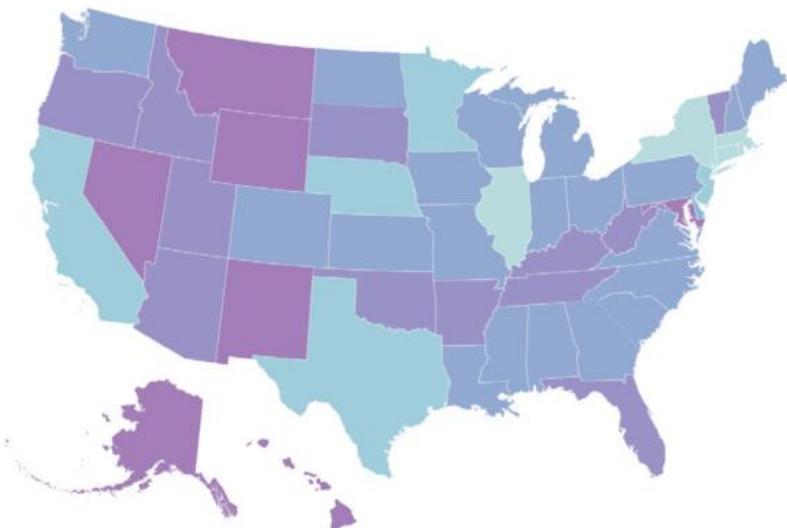
# The default...

**GUN OWNERSHIP RATE**



Source: Kim Soffen via Miller et al 2007

**SUICIDE RATE**

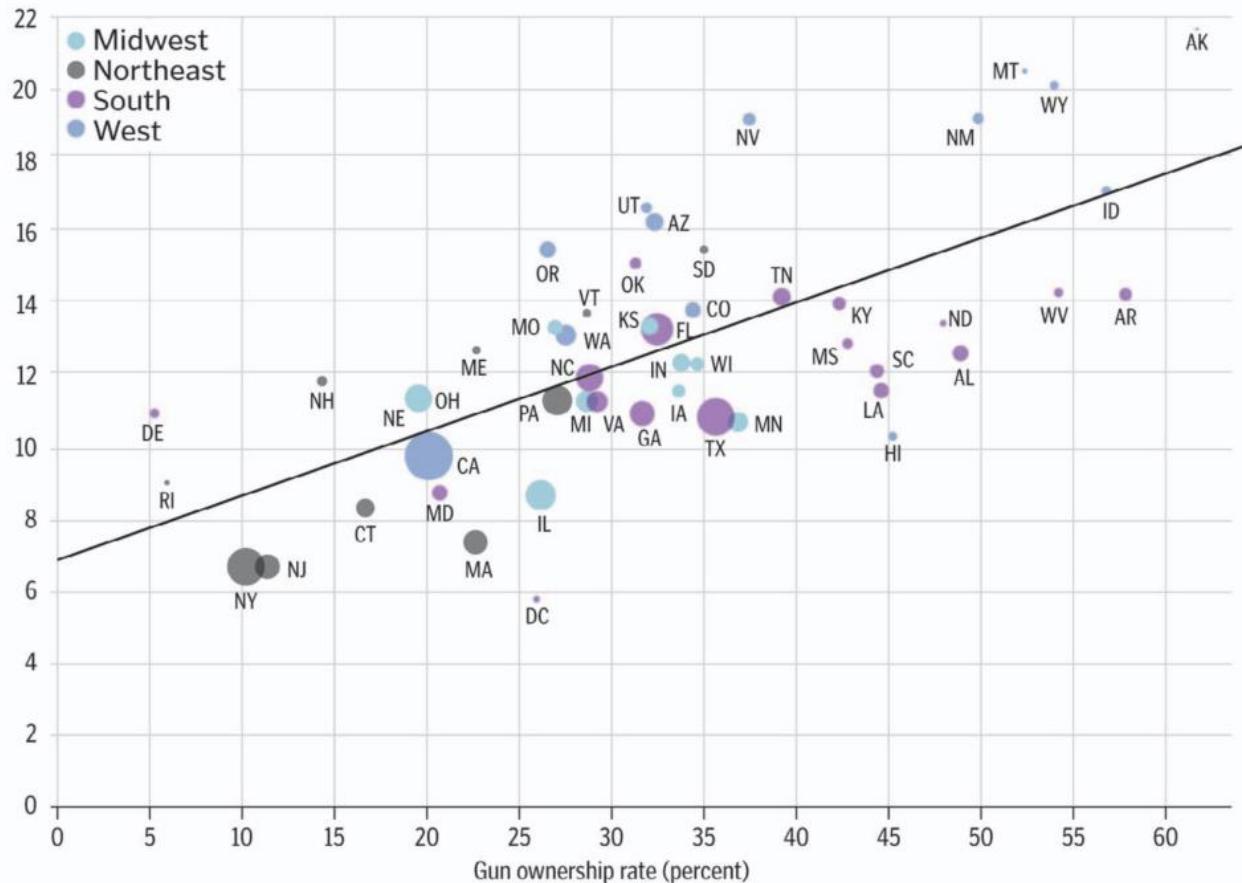


Source: Kim Soffen via Miller et al 2007

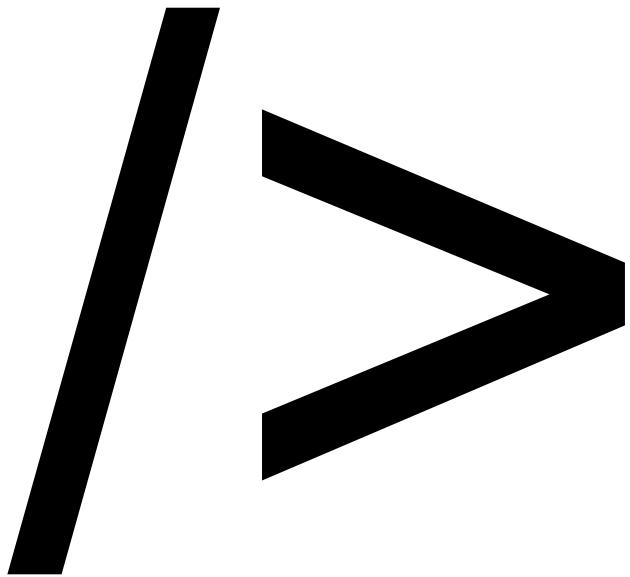
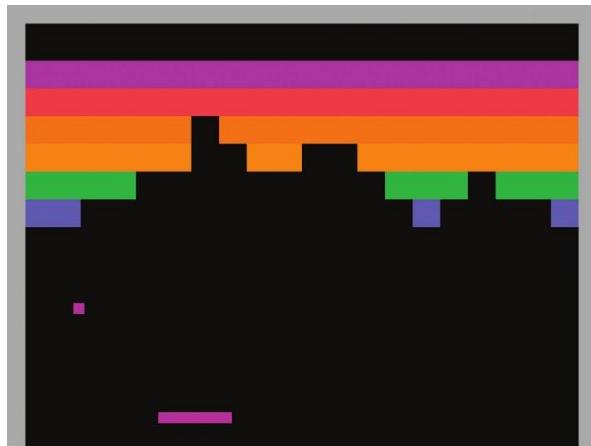
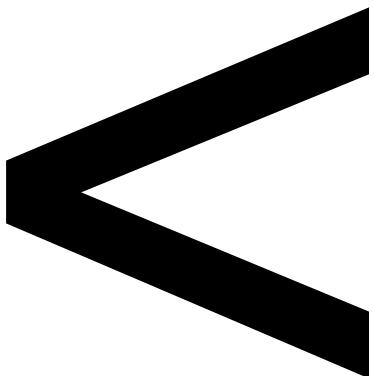
# The good solution!

## GUN OWNERSHIP AND SUICIDE RATES ARE POSITIVELY RELATED

(Suicide rate per 100,000)



# Breakout Over!



A cartoon illustration of a bald man with a large, bulbous nose. He is wearing a green turban and a purple feather in his hair. He has a mustache and is holding a white rectangular sign with both hands. The sign contains the text "THERE WILL NOW BE A BRIEF INTERMISSION".

**THERE WILL  
NOW BE A  
BRIEF  
INTERMISSION**

DAT FIGHT!  
©SKGRAFO





**THERE WILL  
NOW BE A  
BRIEF  
INTERMISSION**

# GOOD or EVIL?

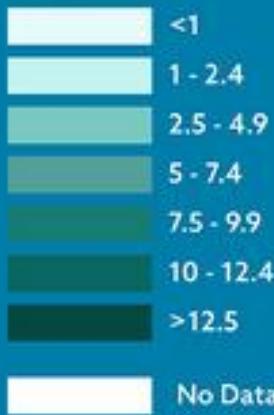


# EXIBIT A

[https://www.reddit.com/r/dataisugly/comments/9k1ebw/missing\\_new\\_zealand\\_and\\_portugal\\_no\\_data\\_colour/](https://www.reddit.com/r/dataisugly/comments/9k1ebw/missing_new_zealand_and_portugal_no_data_colour/)

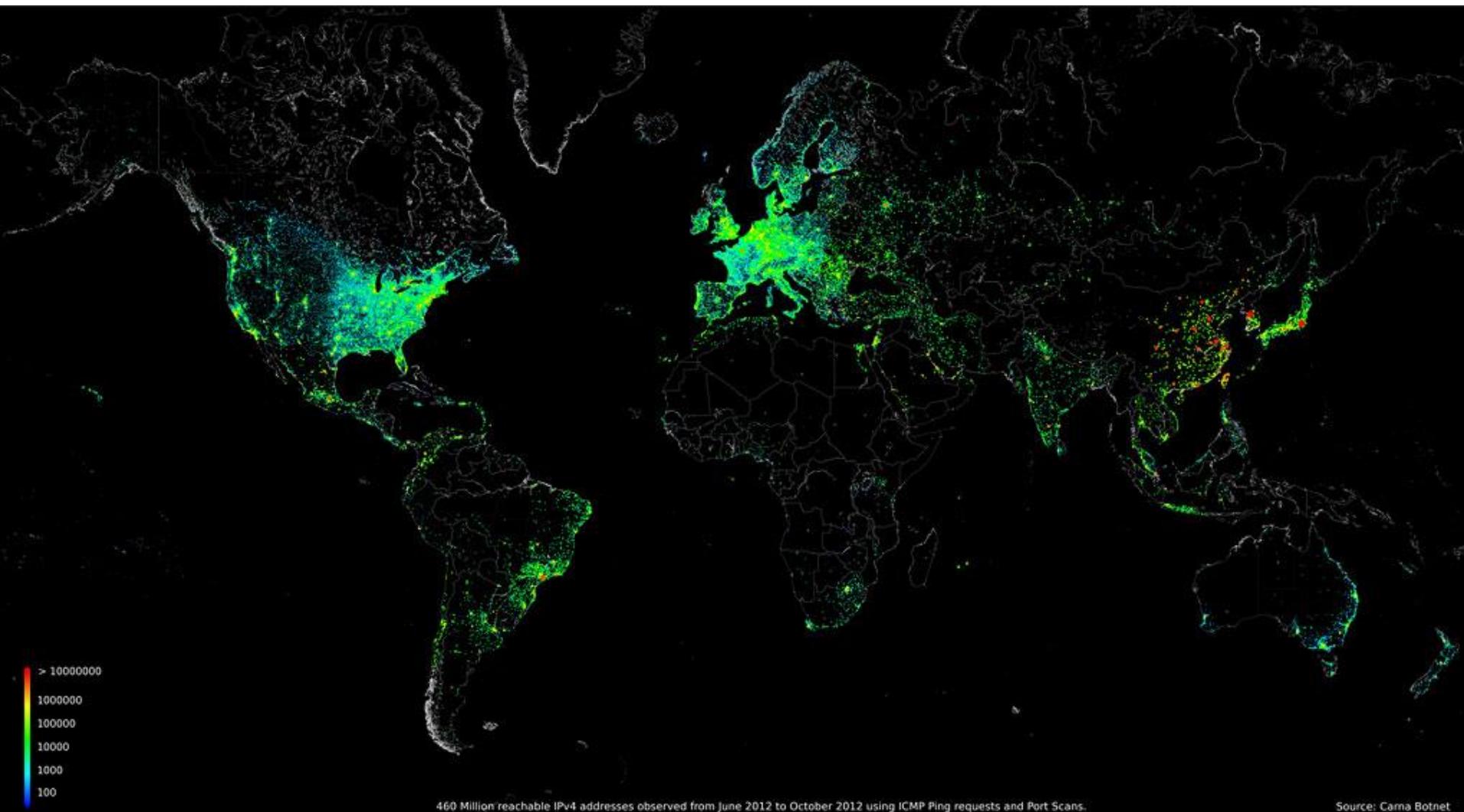
## How Much Alcohol Every Country Drinks

**KEY** consumption per capita (15+), in liters



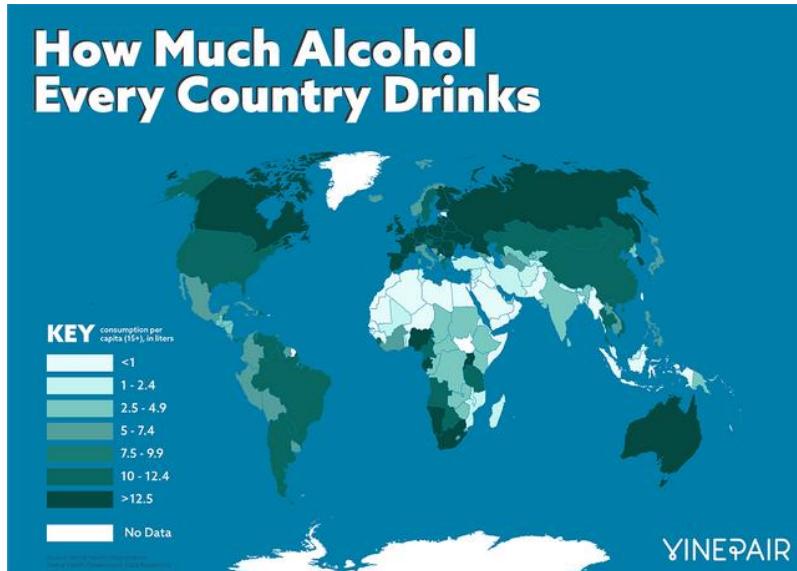
# EXIBIT B - Pinging all IP addresses

<http://www.technologyreview.com/news/514066/what-happened-when-one-man-pinged-the-whole-internet/>

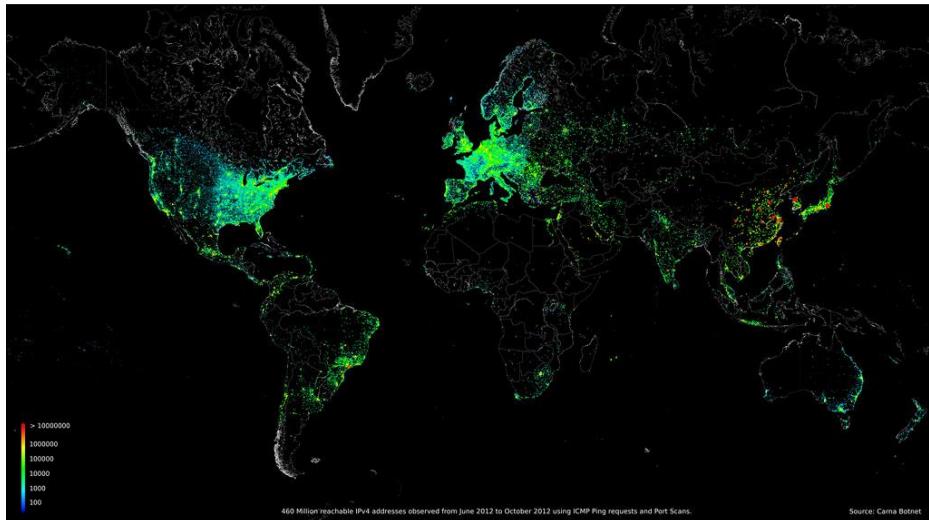


# Where does the Evil Hide?

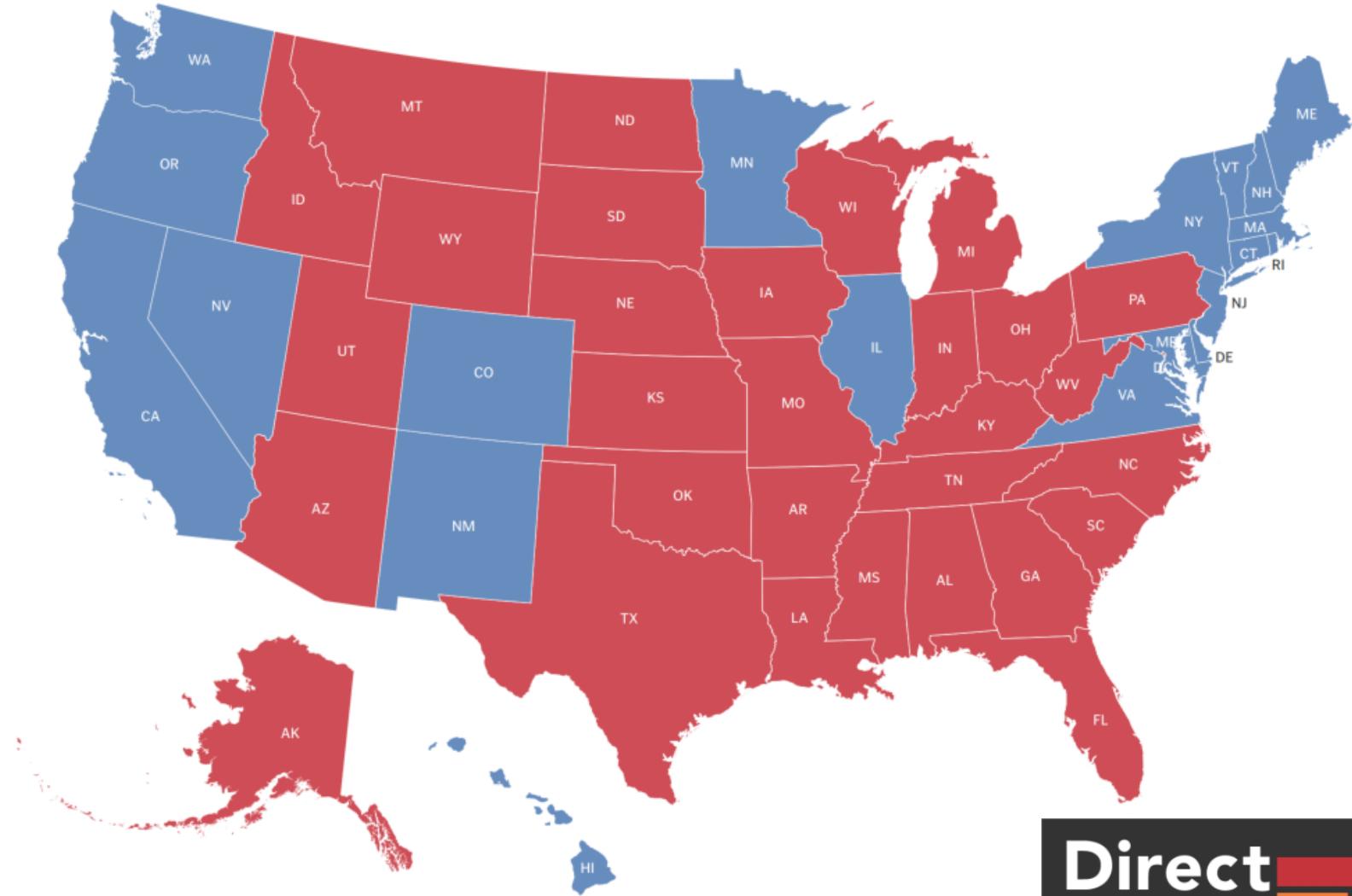
A



B



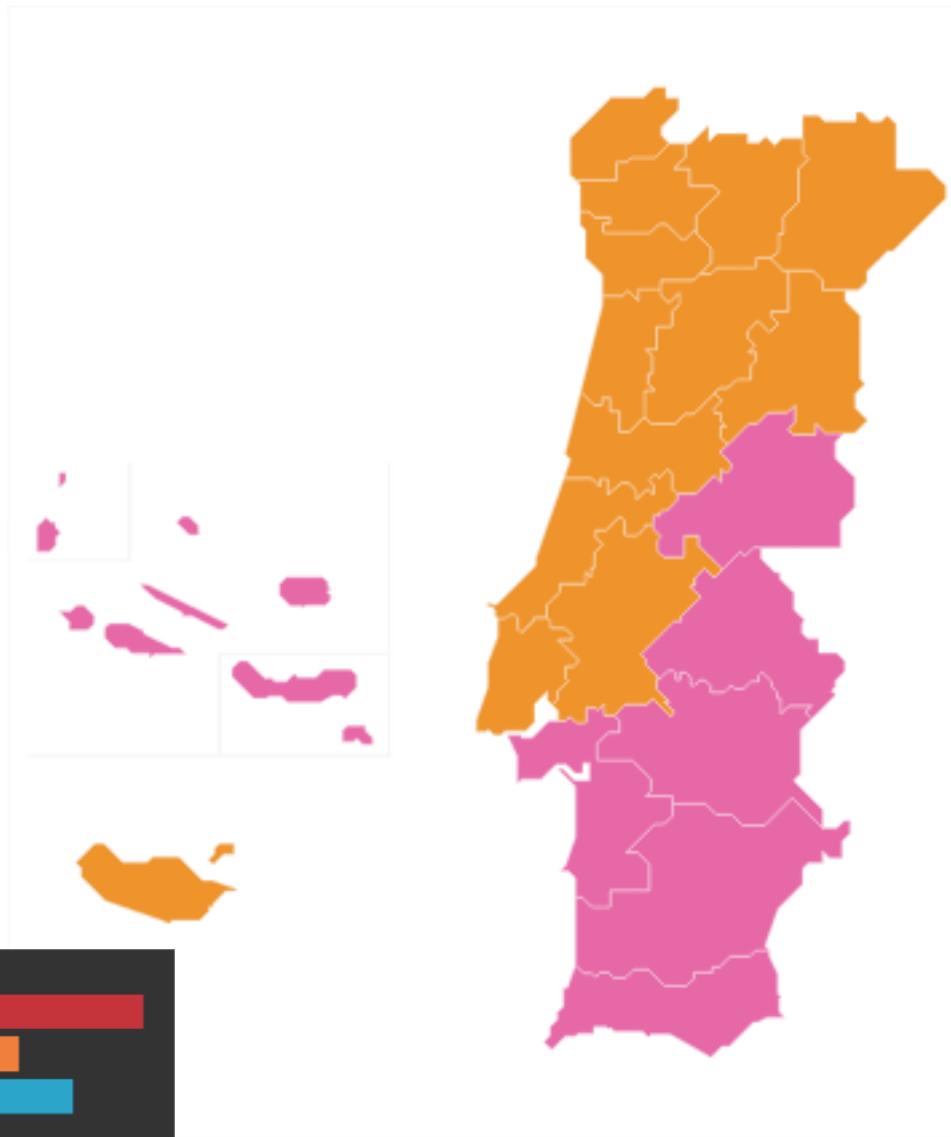
# Clinton vs. Bush, 2016



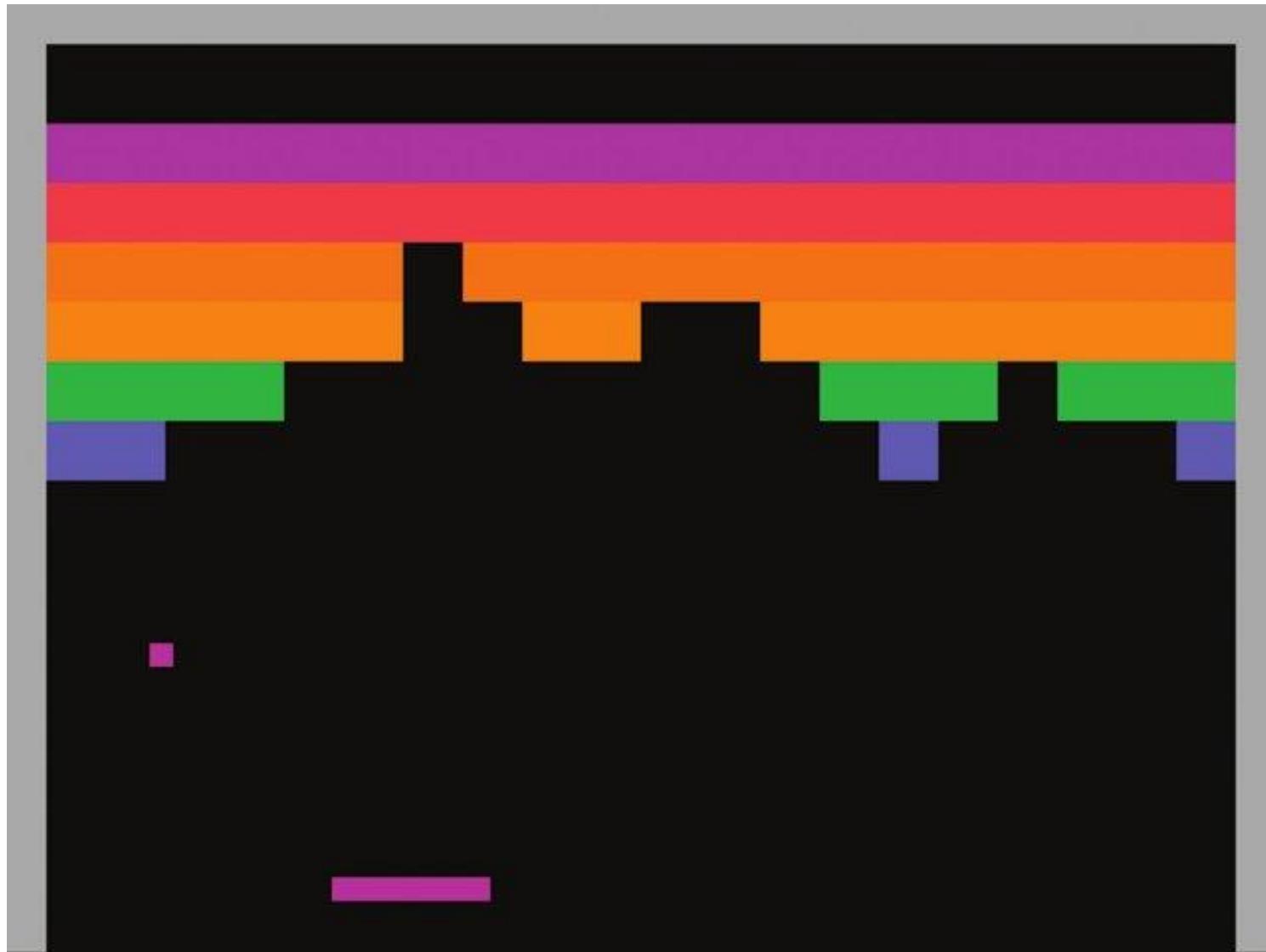
Direct  
Poll

# Choropleth

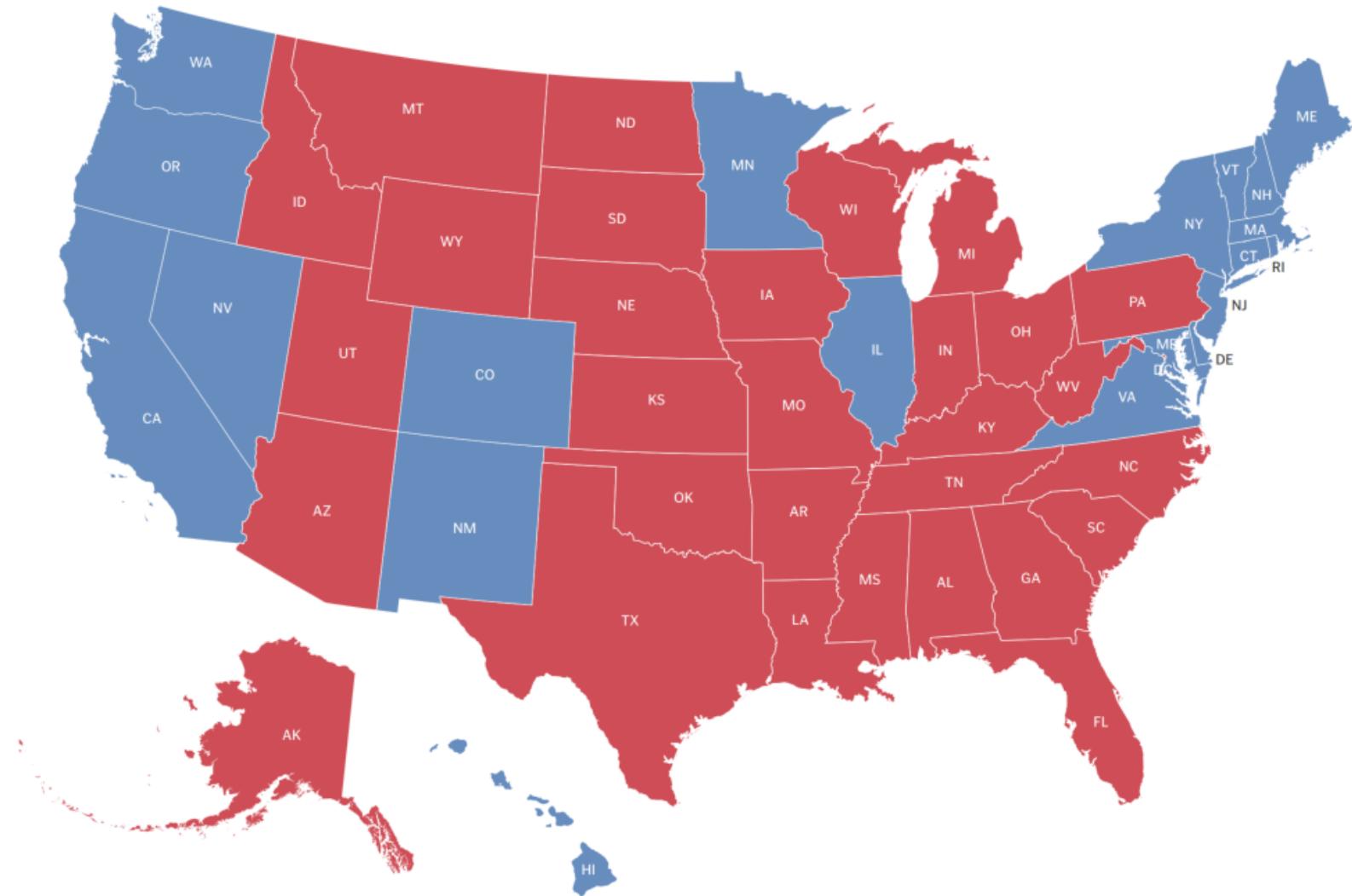
<http://www.publico.pt/legislativas2015/resultados>



# Breakout!



# Take a look at this one again



# Time to Break Out



**Discuss among yourselves**

**Fix it! Use a map-based viz, but solve the  
choropleth map problem**

**Meet you back in 10 minutes!**

<https://bit.ly/3eWTees>



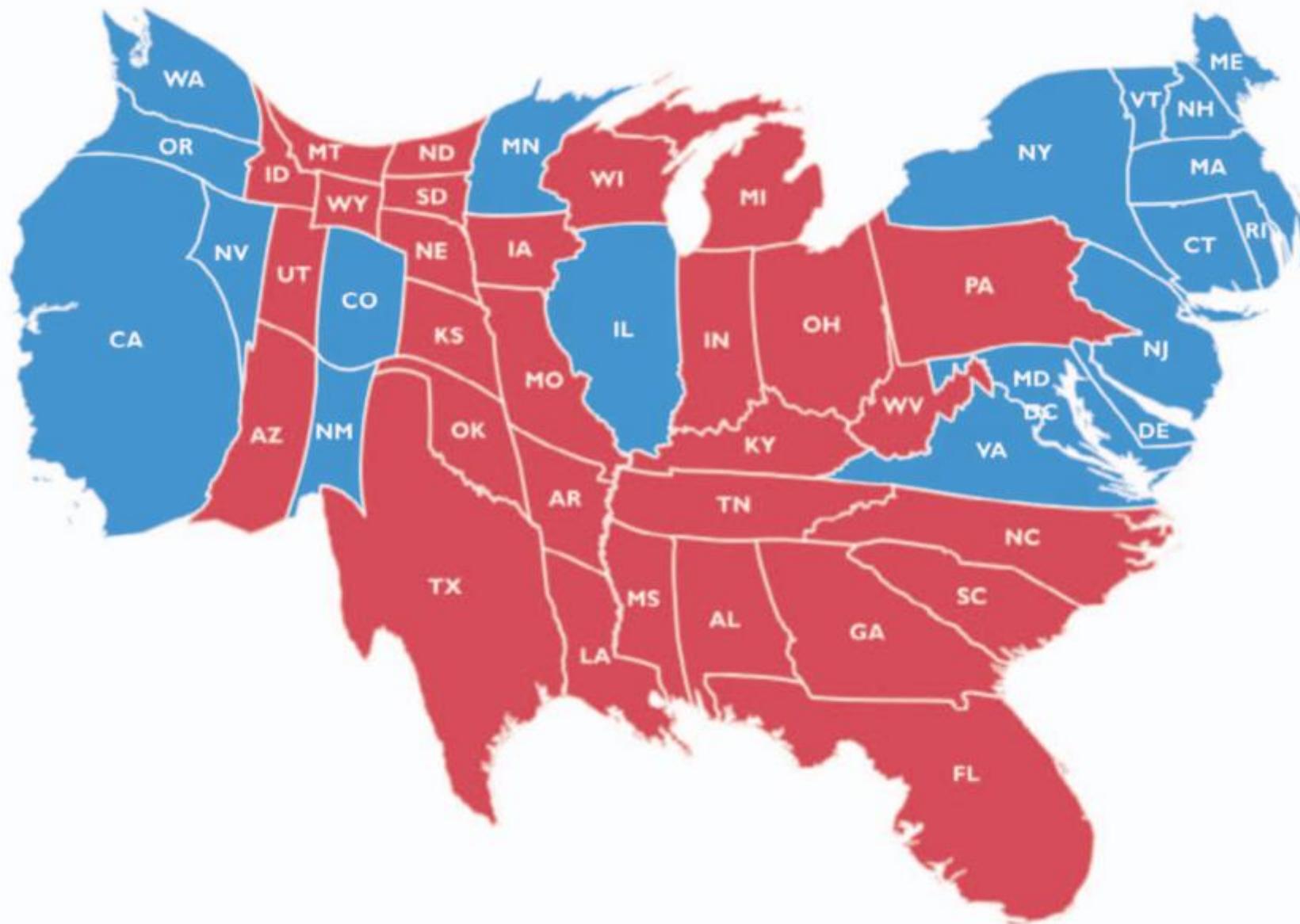
# Breakout!

10:00

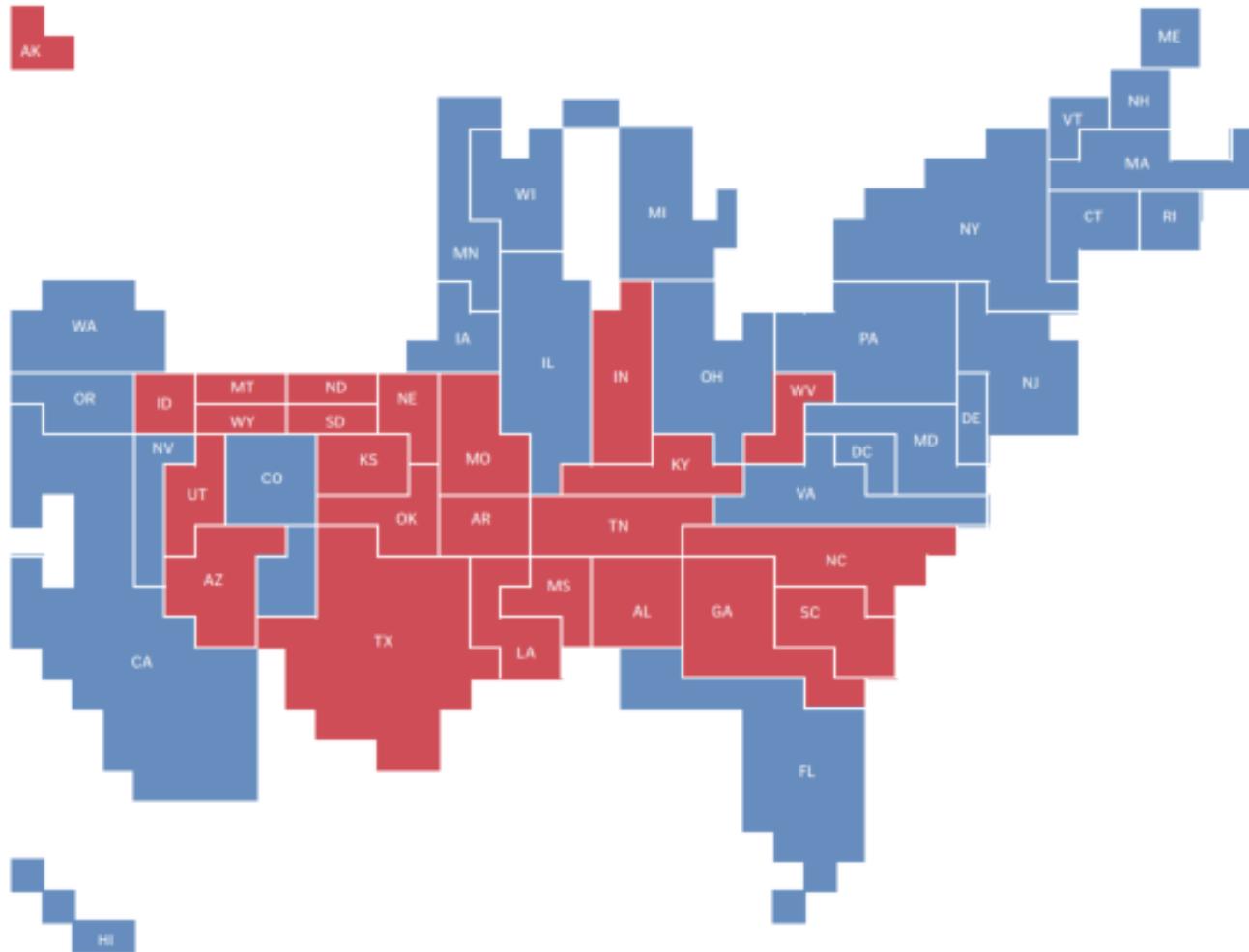
<https://bit.ly/3eWTees>

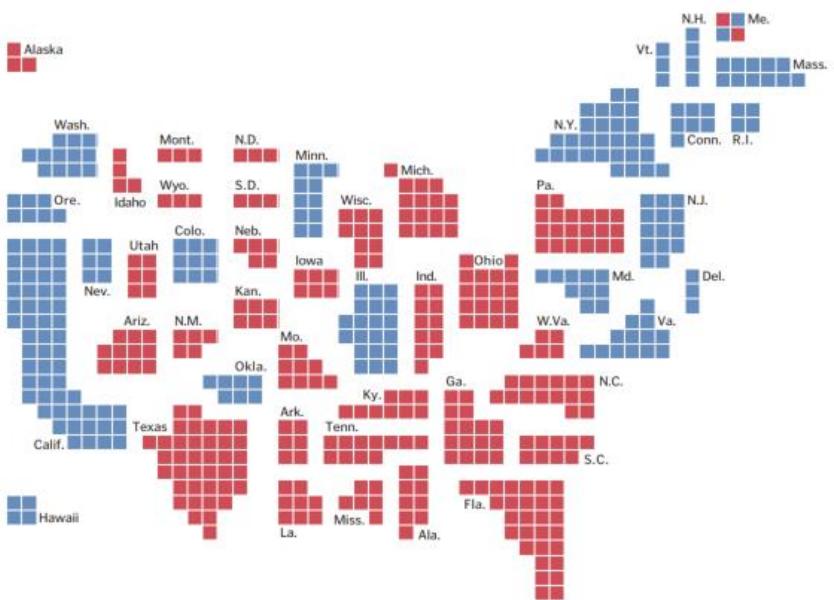
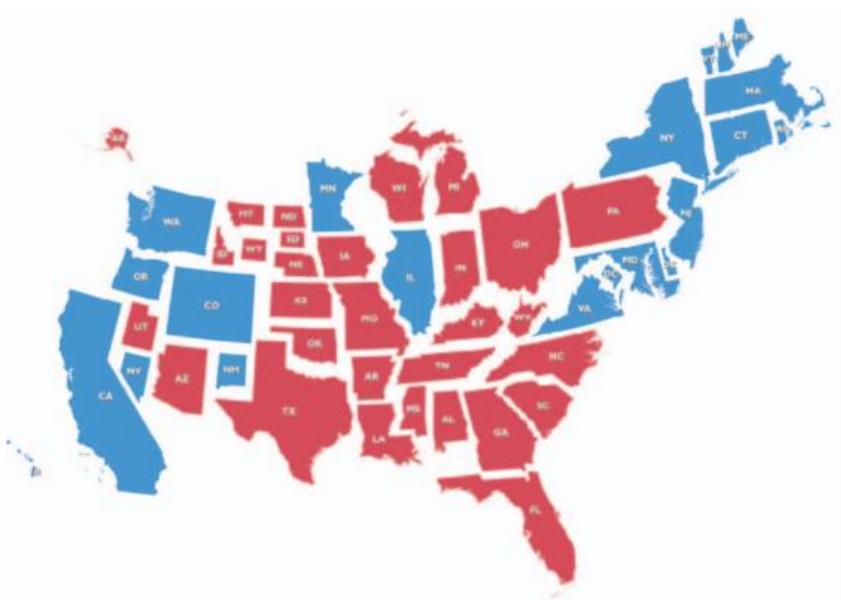


# The default...

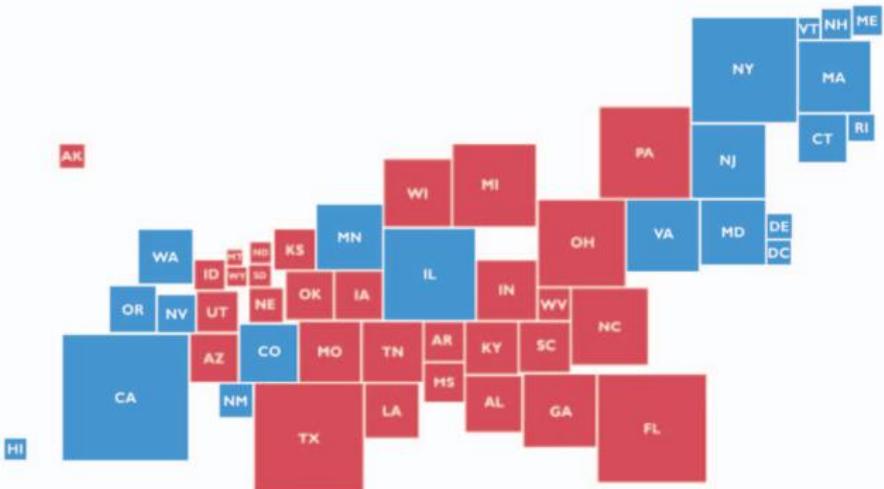
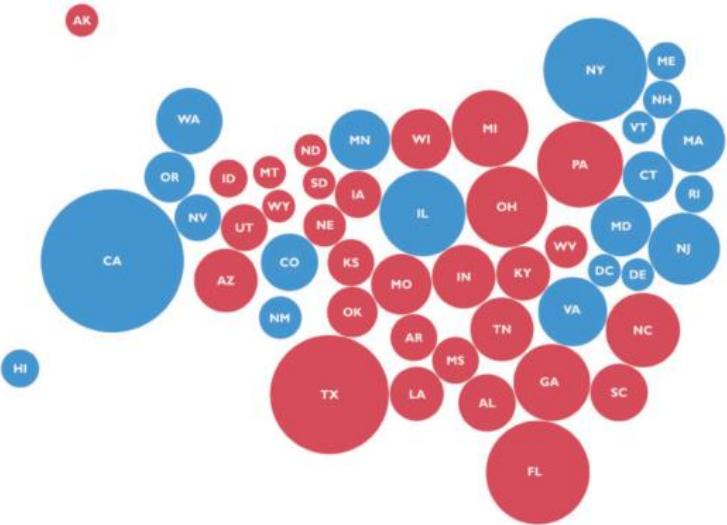


# The good solution!

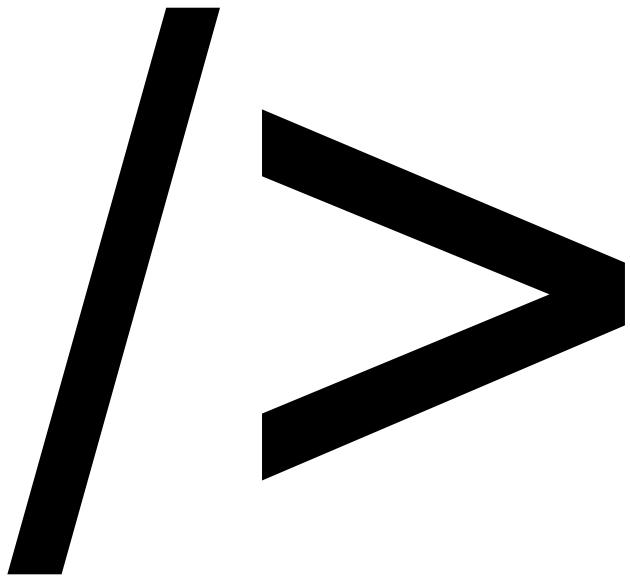
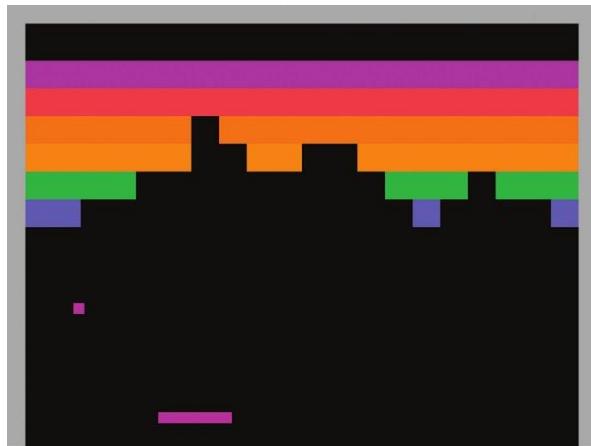
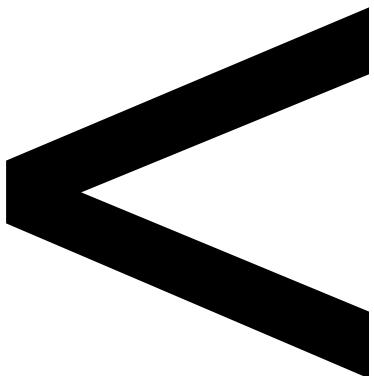




Source: Courtesy Kenneth Field, Esri Inc.

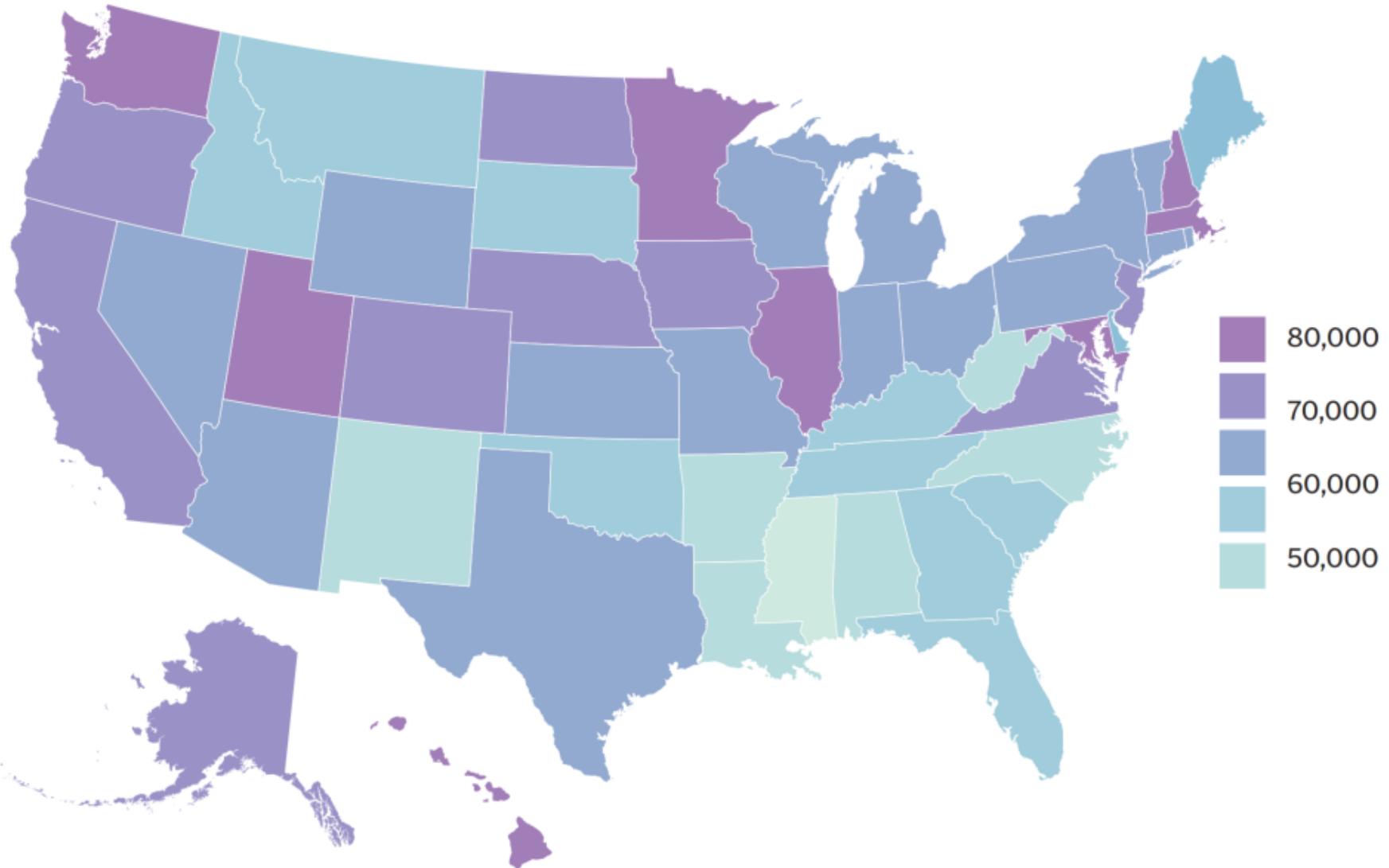


# Breakout Over!



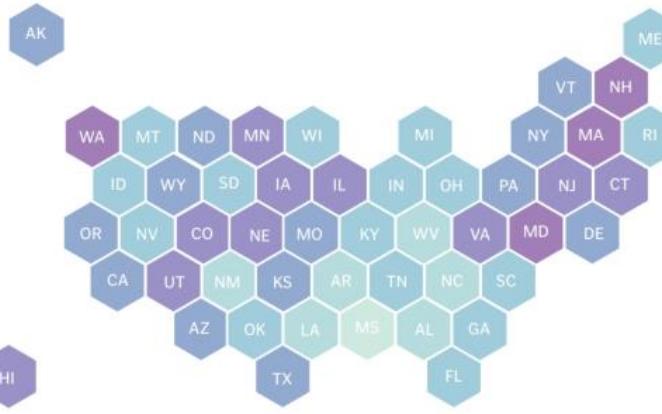
# Back to this

## MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES IN 2018



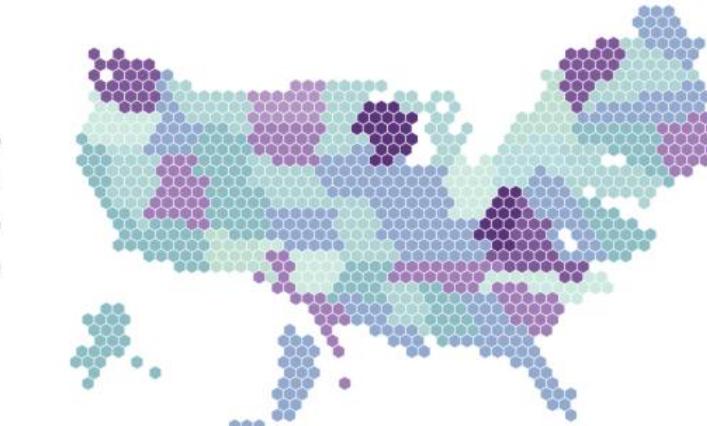
# Some other solutions

MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES, 2018



Source: U.S. Census Bureau

MEDIAN HOUSEHOLD INCOME IN THE UNITED STATES, 2018



Source: U.S. Census Bureau





KEEP  
CALM

TELL ME  
WHAT TO DO

# Tell me what to do!



KEEP  
CALM  
TELL ME  
WHAT TO DO

## Median household income per state

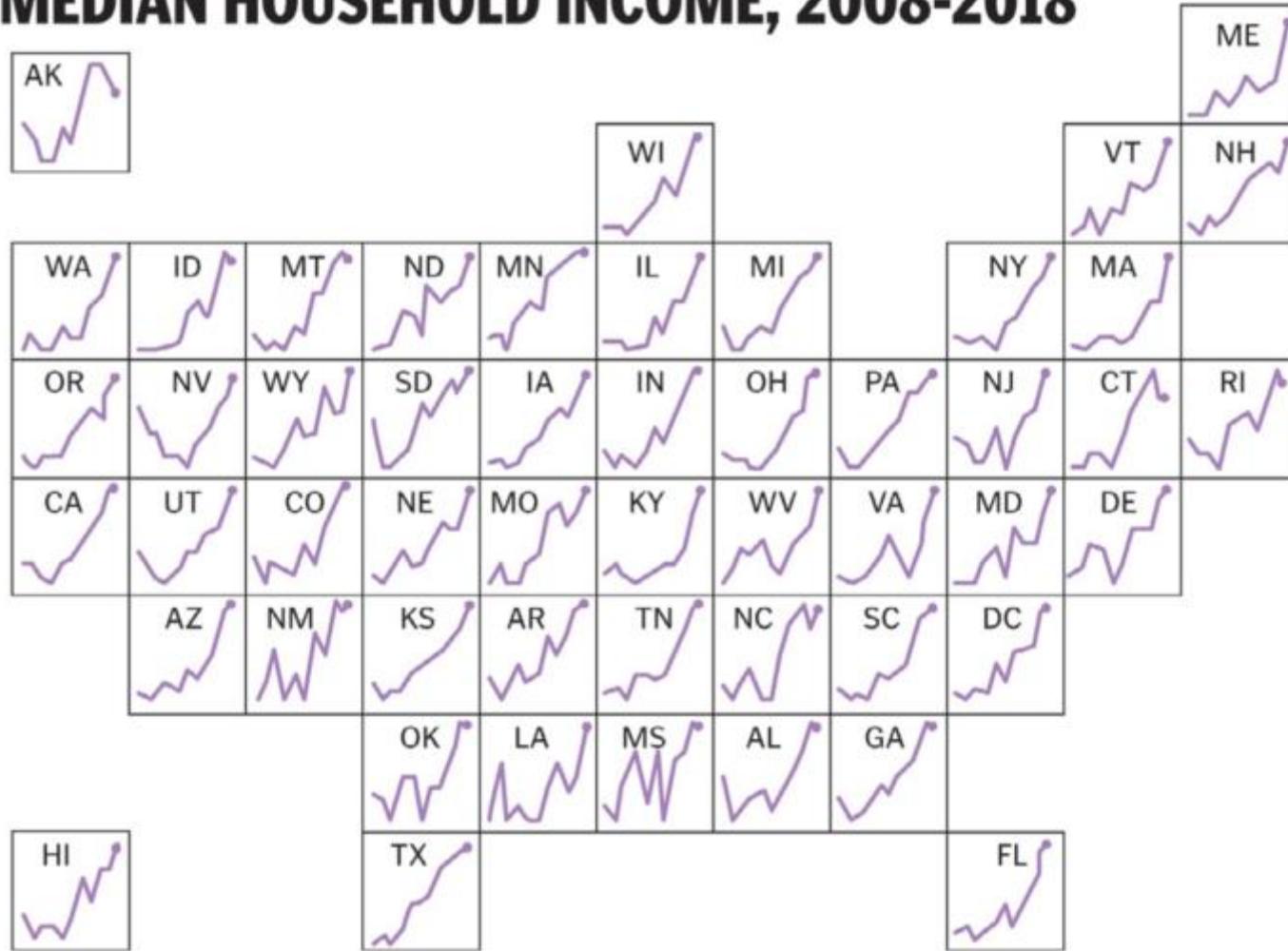
Show the evolution over 11 years!

state	2008	2009	...	2018
Alabama	73,321	73,432	...	77,432
Alaska	86,463	88,432	...	93,432
Arizona	71,432	...	...	...
Arkansas	65,675	...	...	...
California	120,742	...	...	...
Colorado	54,542	...	...	...
Connecticut	84,432	...	...	...
Delaware	76,437	...	...	...
Florida	58,432	...	...	...
...	...	...	...	...

(mockup data)



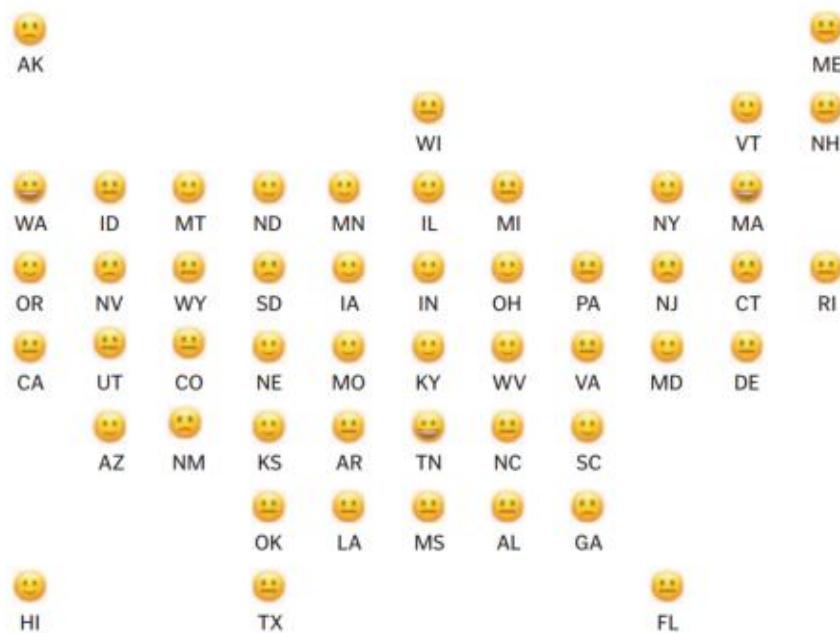
# MEDIAN HOUSEHOLD INCOME, 2008-2018



Source: U.S. Census Bureau

## GROWTH IN MEDIAN HOUSEHOLD INCOME, 2008-2018

😊 >20%      😊 10%-20%      😐 0%-10%      😕 <10%



## GROWTH IN MEDIAN HOUSEHOLD INCOME, 2008-2018

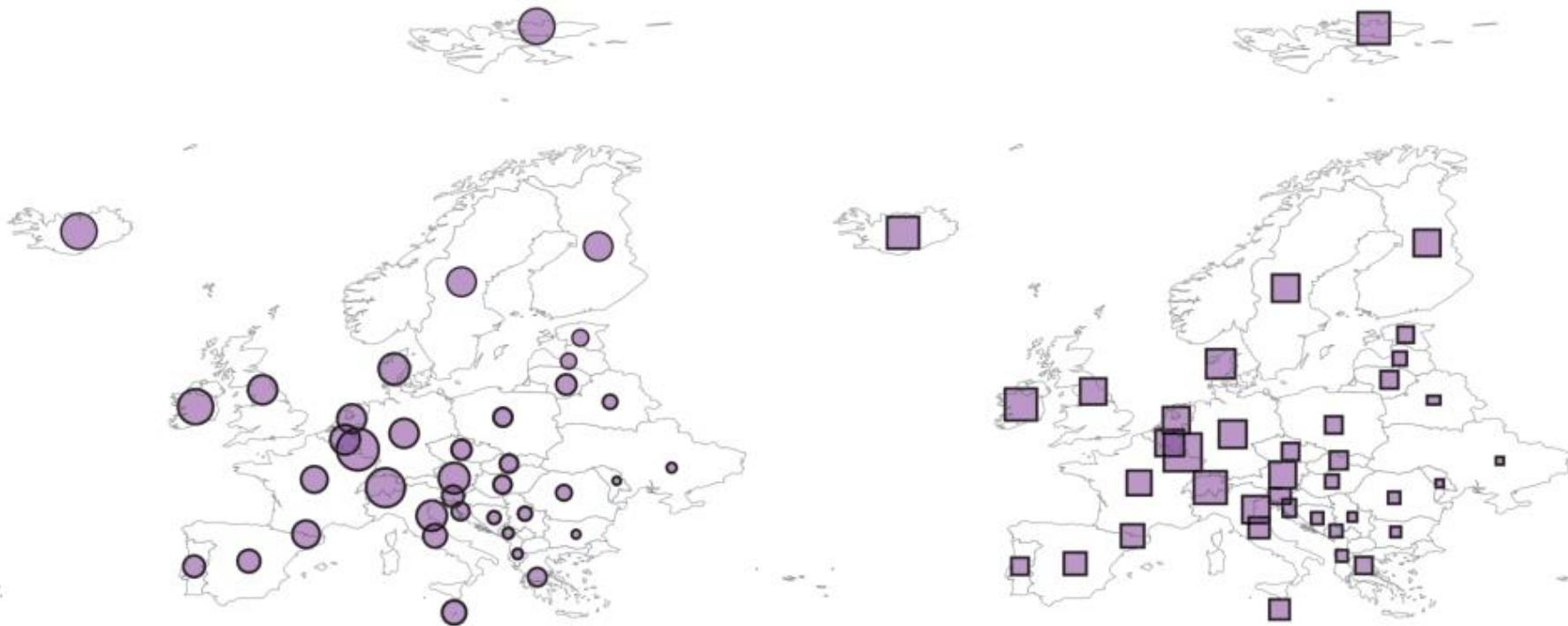
😊 >20%      😊 10%-20%      😐 0%-10%      😕 <10%



Source: U.S. Census Bureau

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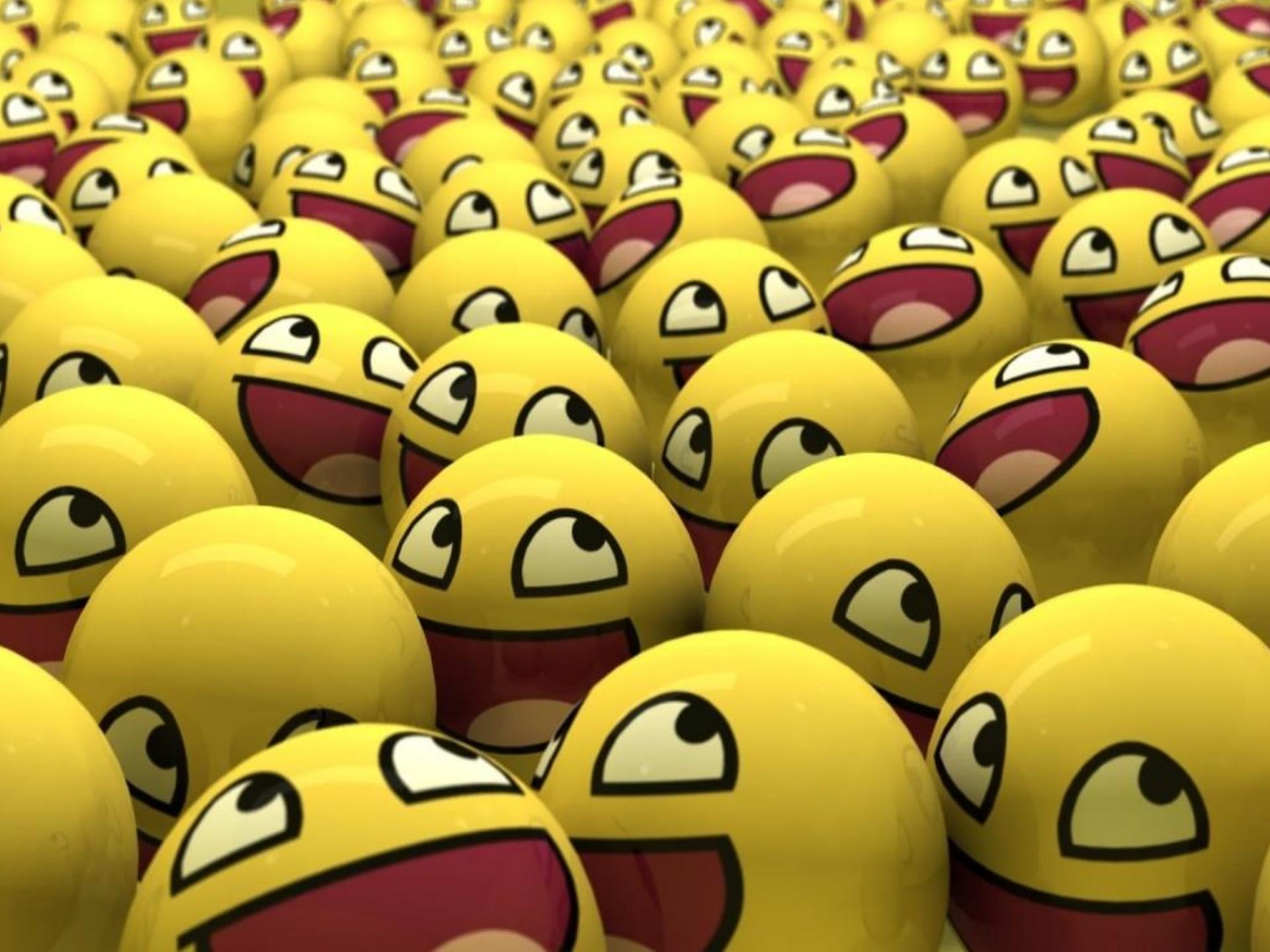
# PER CAPITA GDP IN EUROPE, 2017



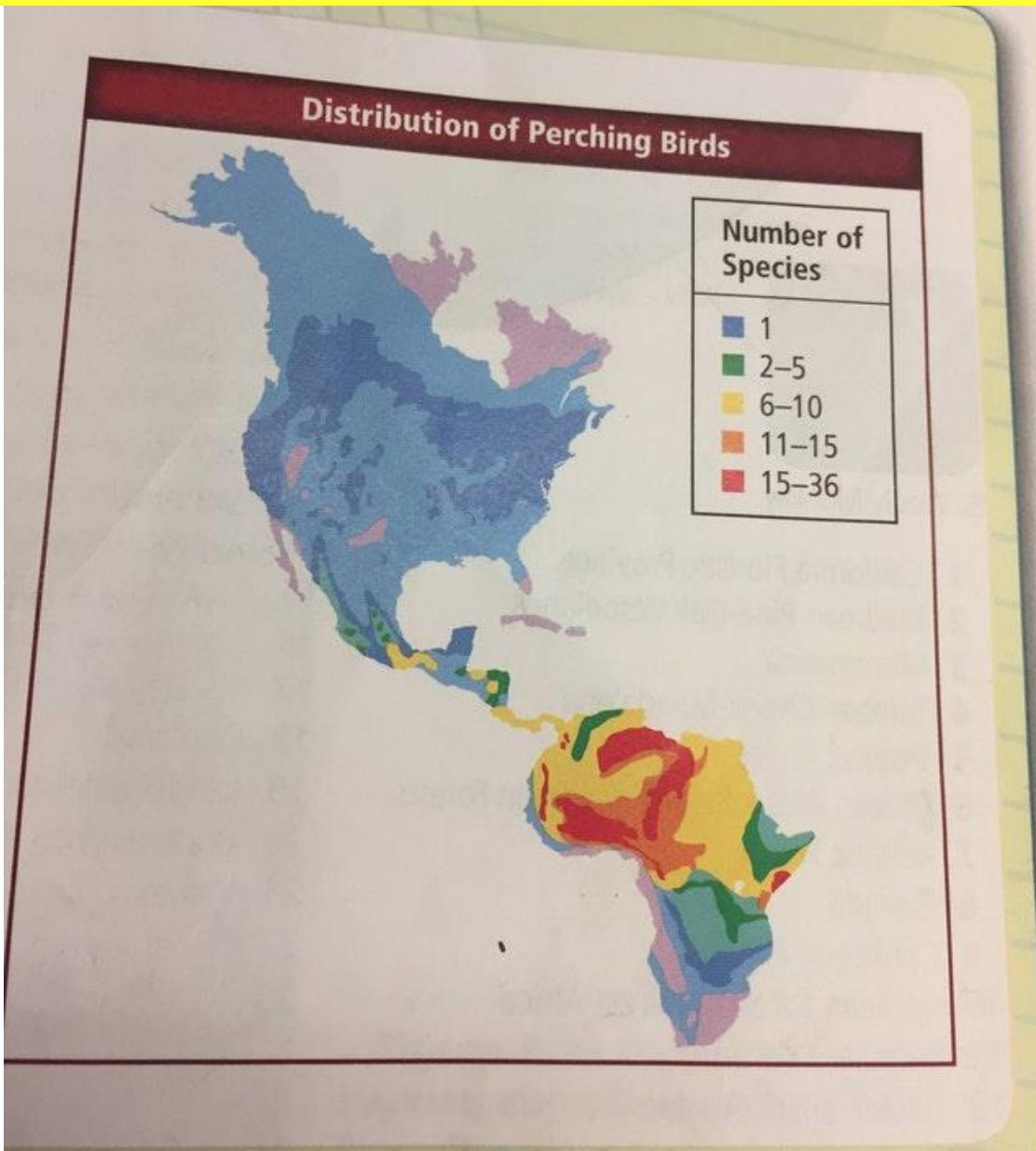


KEEP  
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# A New World...



# QUESTIONS?