



VISUALIZATION FOR EVERYONE

the joys of exploring and communicating data



Alberto Cairo @albertocairo • 7m

Being a journalist...



2



2



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(1) Every time I present to statisticians I feel like I'm going to be a non-cannibal character in Cannibal Holocaust



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(2) But then, invariably, this kind of audience
is nice and welcoming



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A visualization is any display
intended to reveal evidence, making
the invisible visible



New Techniques and Technologies for Statistics 2015

Reliable Evidence for a Society in Transition

Brussels
9-13 March 2015
www.NTTS2015.eu



Reliable Evidence for a Society in Transition

Commission

New Techniques and Technologies for Statistics 2015

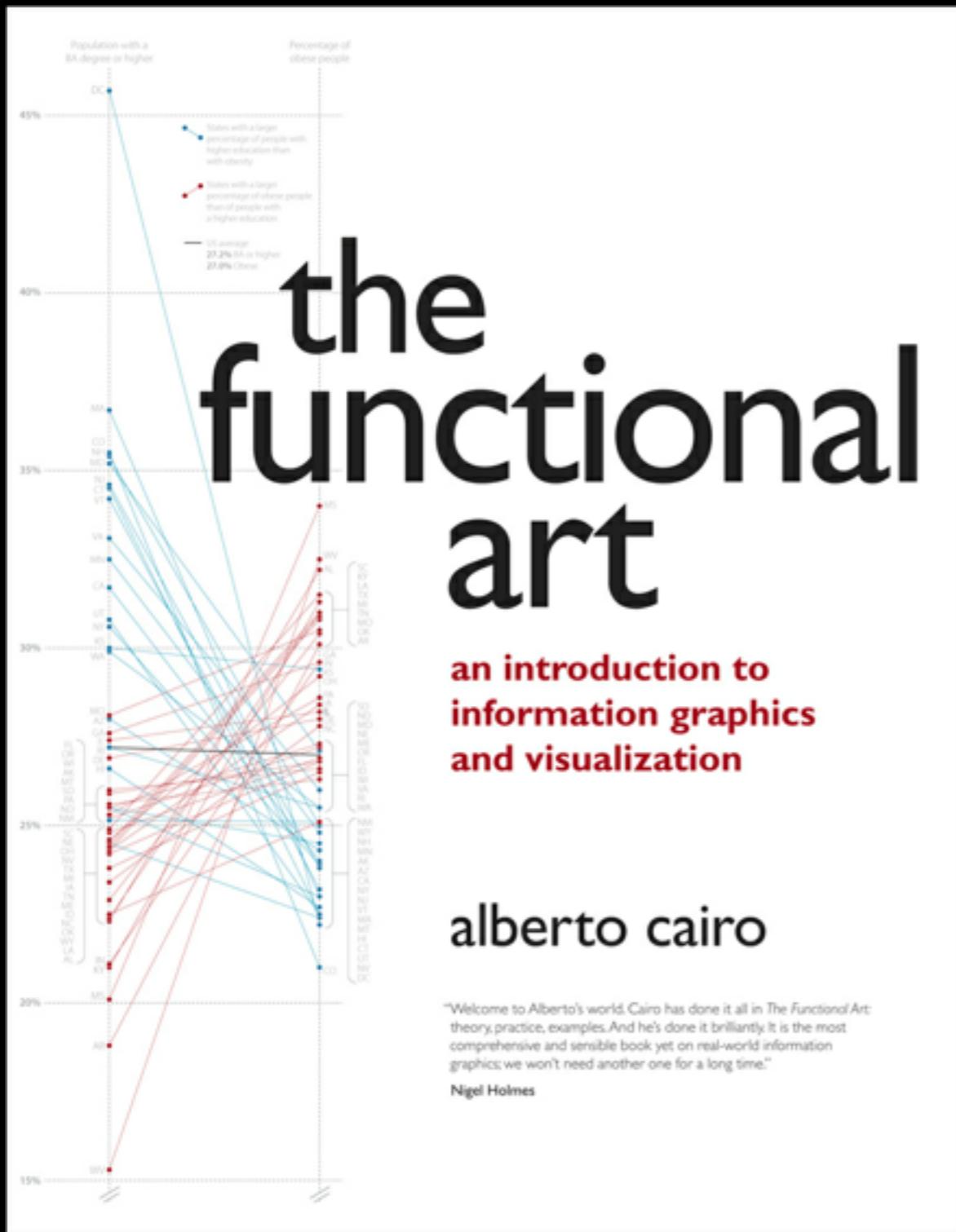
Reliable Evidence for a Society in Transition

Brussels
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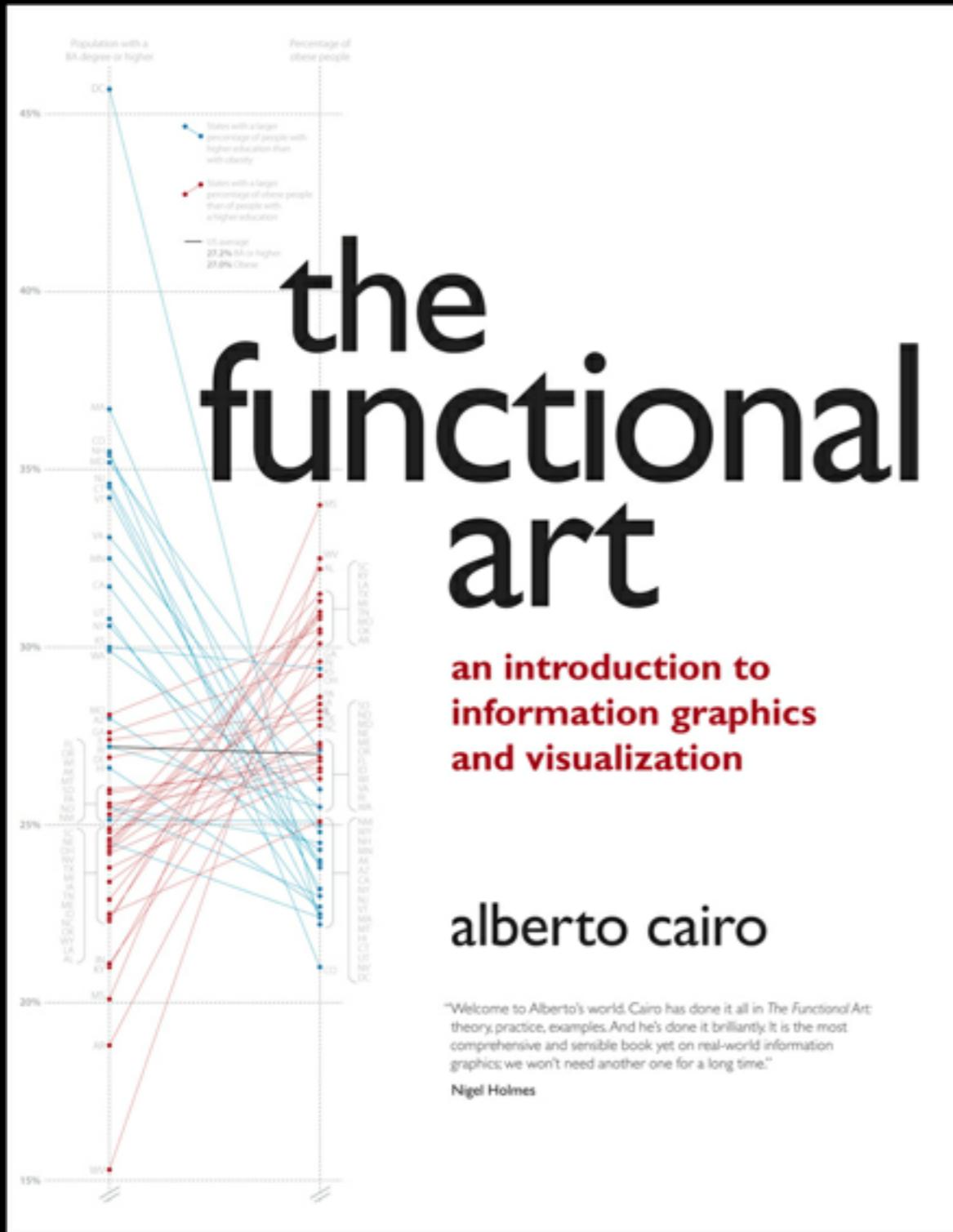
Reliable Evidence for a Society in Transition

2012

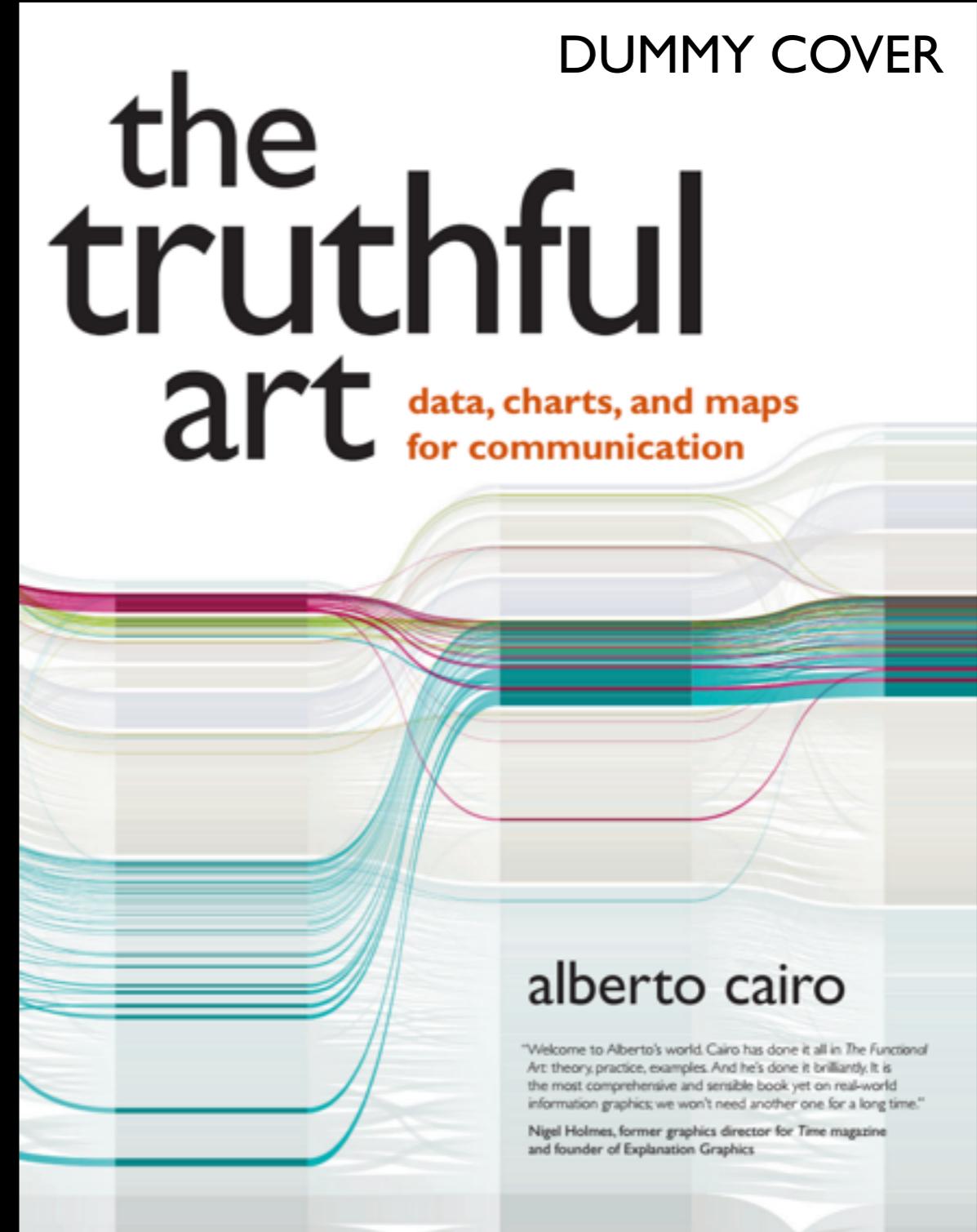


Reliable Evidence for a Society in Transition

2012



2016



How do we teach the general public
what “evidence” is?



How do we teach the general public
what “evidence” is?



How do we teach the general public
what “evidence” is?

How do we convince them of how powerful
visualization can be to explore and present
that evidence?

The challenge:

Never before have we had so many tools to learn and to communicate. Yet the art of talking, listening, and ascertaining the truth seems more elusive than ever in this Internet and cable age, lost in a bitter stream of blather and misinformation.

—Maureen Dowd, “Toilet-Paper Barricades,” *The New York Times* (August 11, 2009)

We live in a world which is drowning in spin and myth

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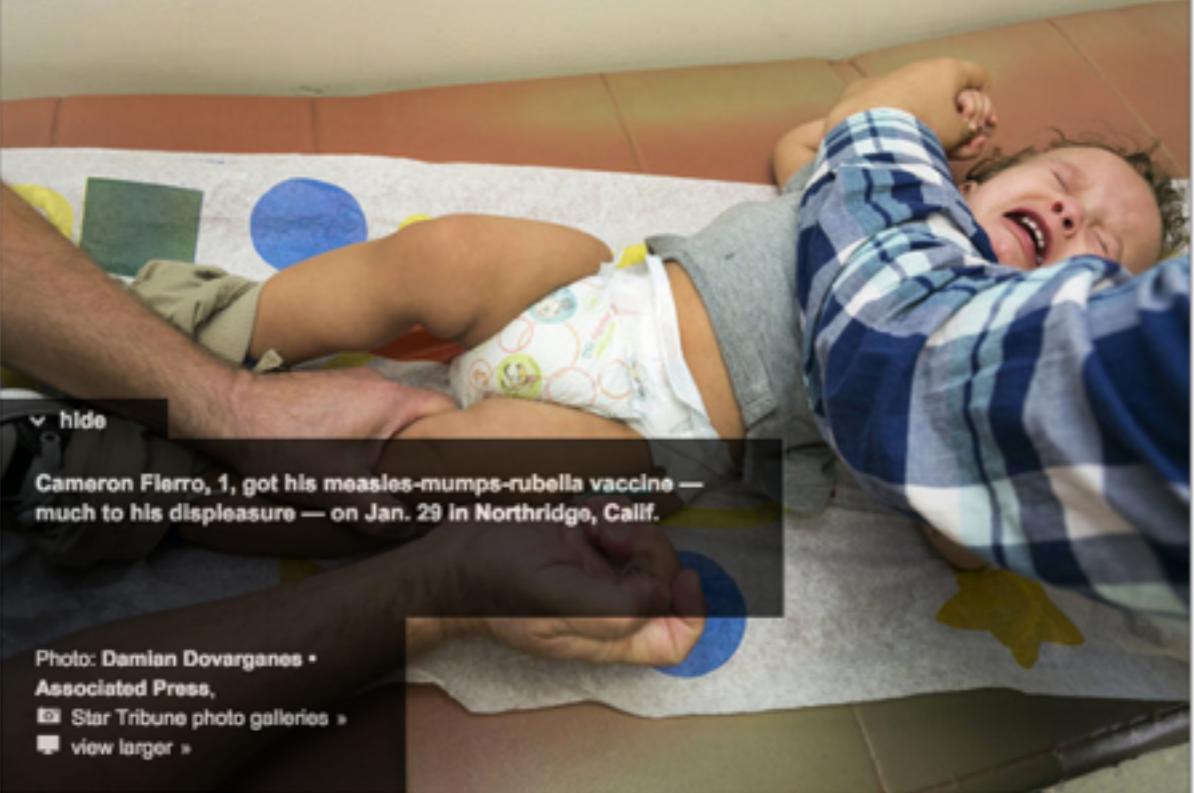
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Failure to vaccinate led to California's measles outbreak

Article by: ERIN ALLDAY , San Francisco Chronicle | Updated: March 8, 2015 - 6:39 PM

Outbreak of 132 cases, so far, is finally winding down



▼ hide

Cameron Fierro, 1, got his measles-mumps-rubella vaccine — much to his displeasure — on Jan. 29 in Northridge, Calif.

Photo: Damian Dovarganes • Associated Press
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In St. Paul, Selma anniversary becomes a rallying cry

The bone doctor: Hamline prof. helps authorities ID old bones

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 Knocked out of contention but not the All-Hockey Hair team?

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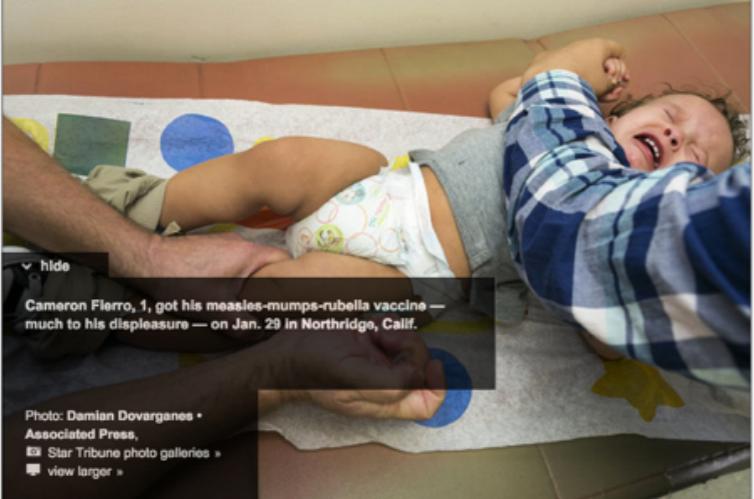
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The past:

1. The public knew very little about science and stats
2. There were just a few sources of information

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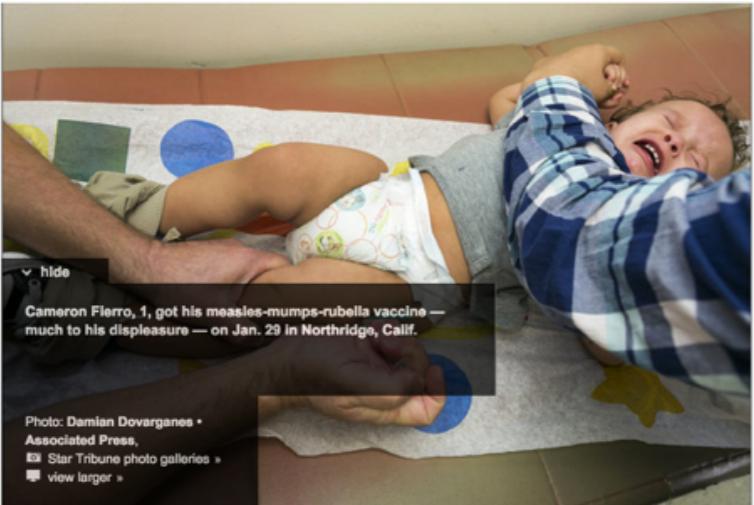
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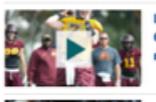
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The past:

1. The public knew very little about science and stats
2. There were just a few sources of information

The present:

1. The public still knows very little about science and stats
2. There are TONS of sources of “information”

A confirmation bias hell!

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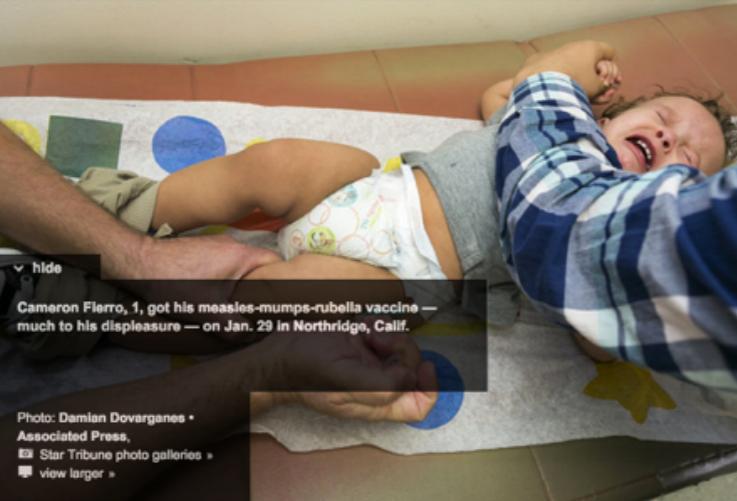
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How do we fight against that?

With evidence?

Yes. Absolutely

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

By [Tynan DeBold](#) and Dov Friedman

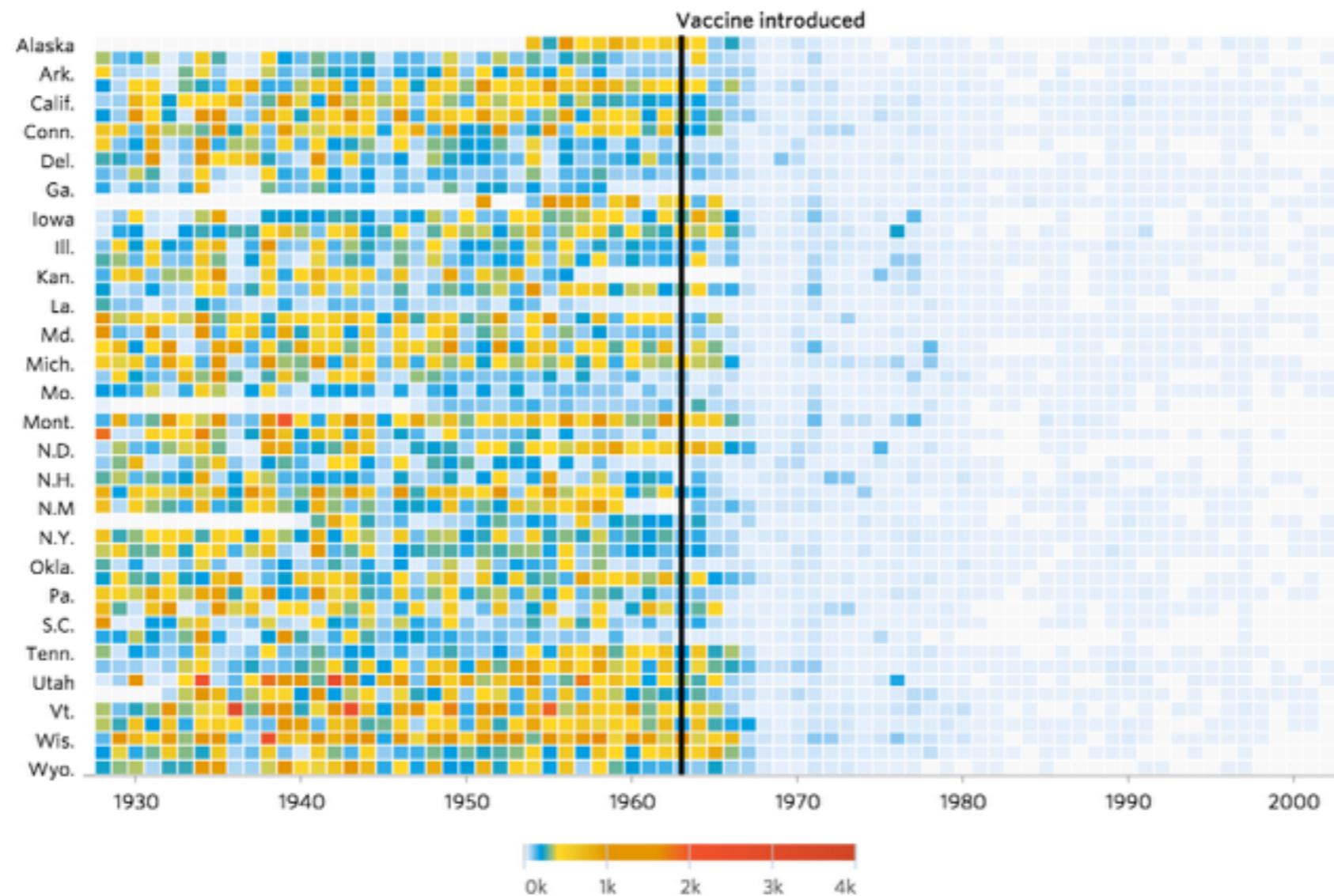
Published Feb. 11, 2015 at 3:45 p.m. ET

<http://graphics.wsj.com/infectious-diseases-and-vaccines/>

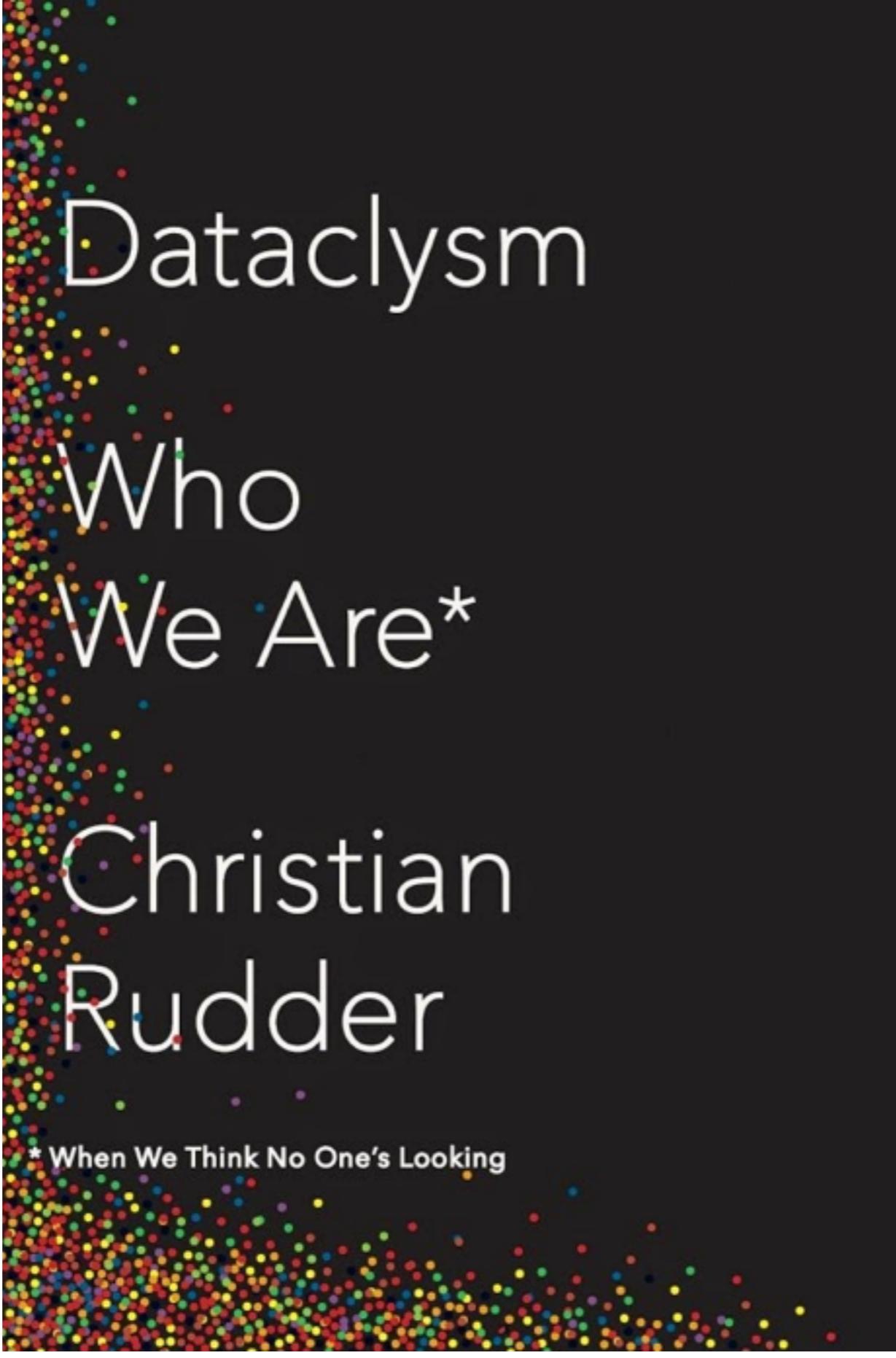
The number of infected people, measured over 70-some years and across all 50 states and the District of Columbia, generally declined after vaccines were introduced.

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

Measles



But evidence presented in a clear, persuasive, attractive, and fun way



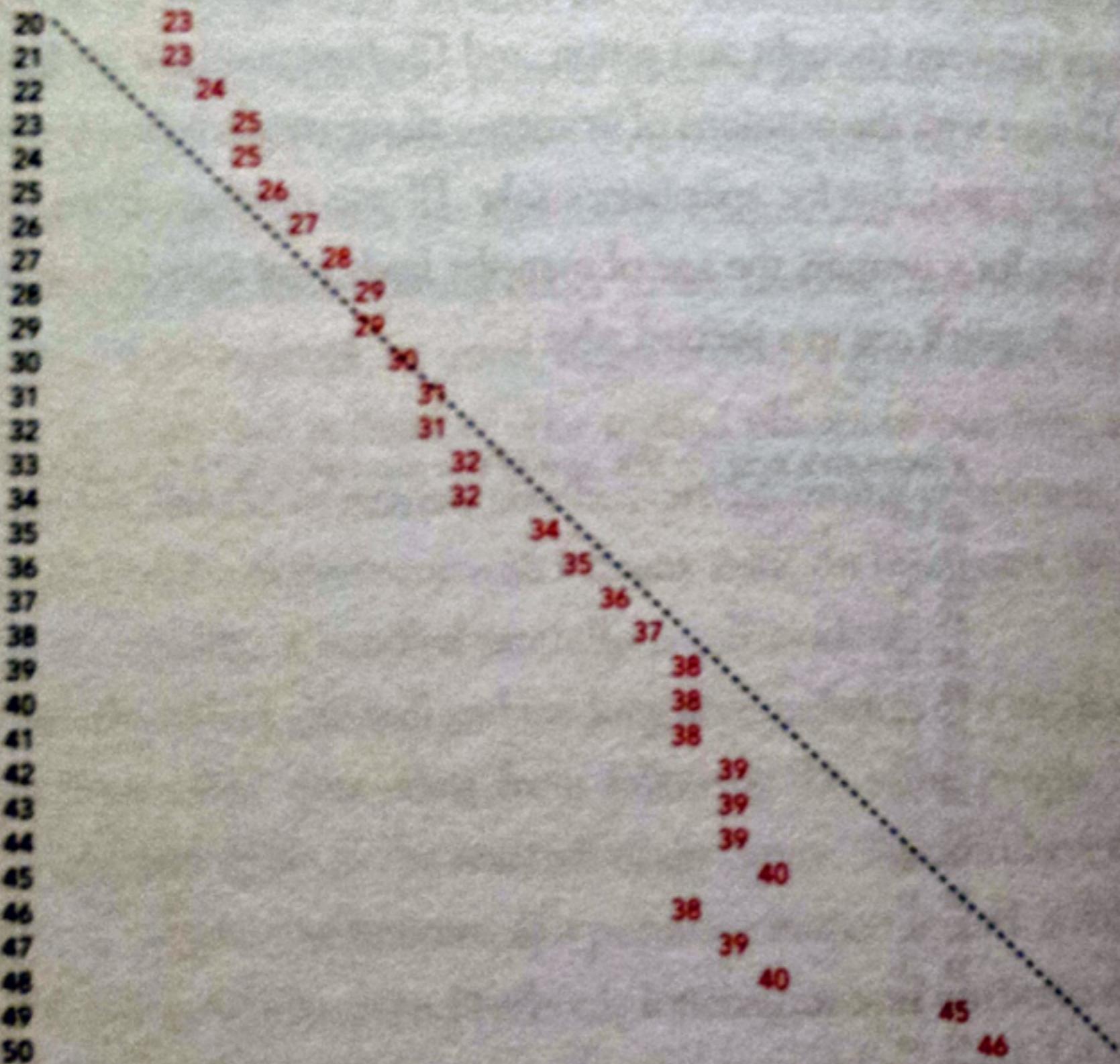
Dataclysm

Who We Are*

Christian Rudder

* When We Think No One's Looking

a woman's age vs. the age of the men who look best to her



a man's age vs. the age of the women who look best to him

20	20
21	20
22	21
23	21
24	21
25	21
26	22
27	21
28	20
29	20
30	20
31	20
32	20
33	20
34	20
35	20
36	20
37	22
38	20
39	20
40	21
41	21
42	20
43	23
44	21
45	24
46	20
47	20
48	23
49	20
50	22

This graph—and it's practically not even a graph, just a table with a couple



on the joys of discovery

(or: how to get non-statisticians become
interested in statistical thinking)

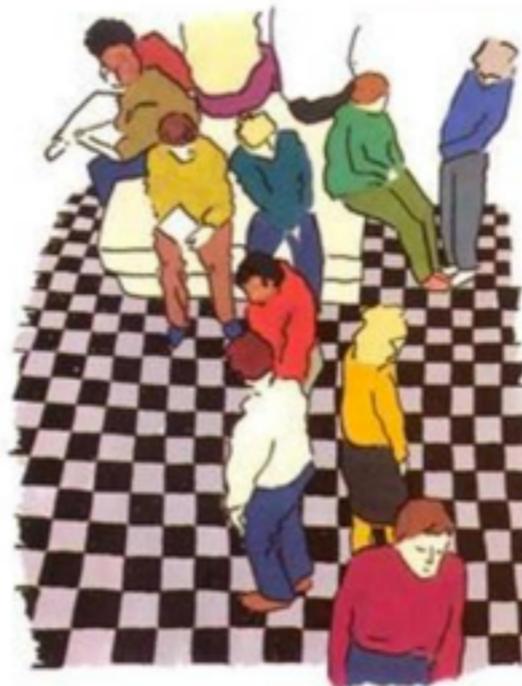
John W. Tukey

EXPLORATORY DATA ANALYSIS



UNDERSTANDING DATA

B.H. ERICKSON AND T.A. NOSANCHUK



SECOND EDITION

naked statistics

STRIPPING THE DEAD FROM THE DATA



charles wheelan

BEST SELLING AUTHOR OF PRIMED ECONOMICS

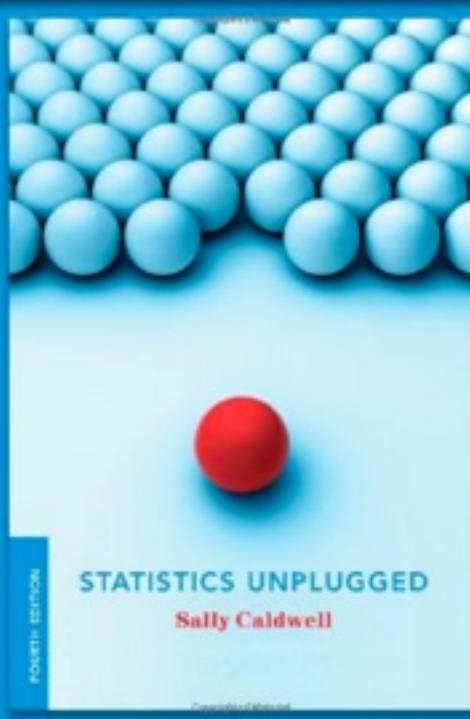
HOW NOT TO BE WRONG

THE POWER OF
MATHEMATICAL THINKING

JORDAN
ELLENBERG

STATISTICS UNPLUGGED
Sally Caldwell

FOURTH EDITION





SEARCH go

tableau public

HOW IT WORKS see the magic happen

GALLERY see what others visualized

COMMUNITY join the conversation

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Data in. Brilliance out.

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Tale of 100 by Christian Chabot

Are You Ready For Some Football? by Brett McMurry

Recession Job Growth by Anthony Calabrese

view more

The R Project for Statistical Computing

R

Getting Started:

- R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To [download R](#), please choose your preferred [CRAN mirror](#).
- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

News :

- R version 3.1.2 (Pumpkin Helmet) has been released on 2014-10-31.
- [The R Journal Volume 6/1](#) is available.
- useR! 2014, took place at the University of California, Los Angeles, USA June 30 - July 3, 2014.
- R version 3.0.3 (Warm Puppy) has been released on 2014-03-06.
- useR! 2015, will take place at the University of Aalborg, Denmark, June 30 - July 3, 2015.

This server is hosted by the [Institute for Statistics and Mathematics of WU \(Wirtschaftsuniversität Wien\)](#).

ggplot2

ggplot2 is a plotting system for R, based on the grammar of graphics, which tries to take care of the fiddly details that make plotting a hassle (like drawing legends) as well as providing a clean API for doing graphics in R.

Documentation

ggplot2 documentation is now available at [docs.ggplot2.org](#).

Mailing list

You are welcome to ask ggplot2 questions on R-help, but if you'd like to participate in a discussion, you must be a member of the ggplot2 mailing list.

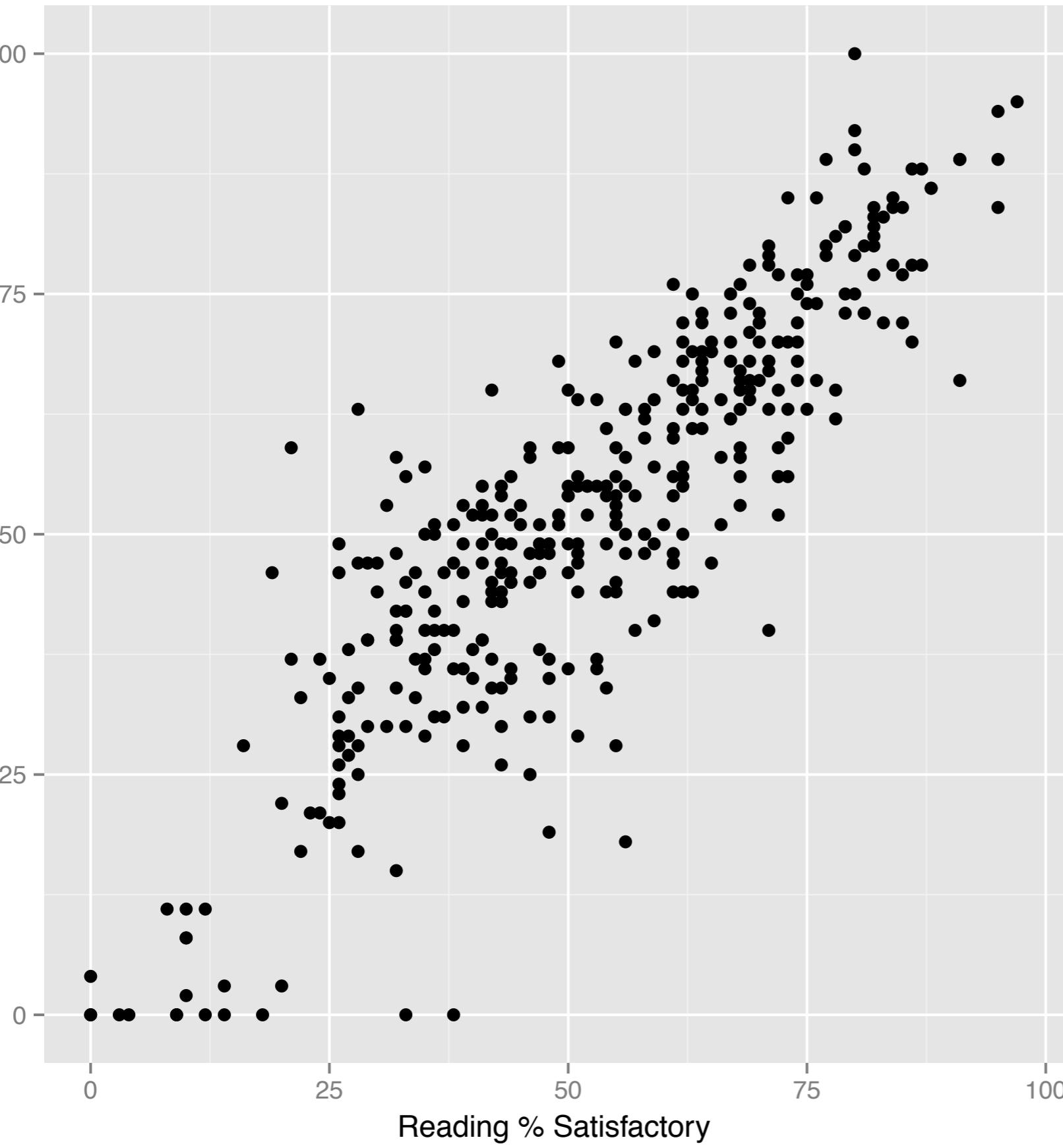
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You must be a member to post messages, but anyone can read the archived discussions.

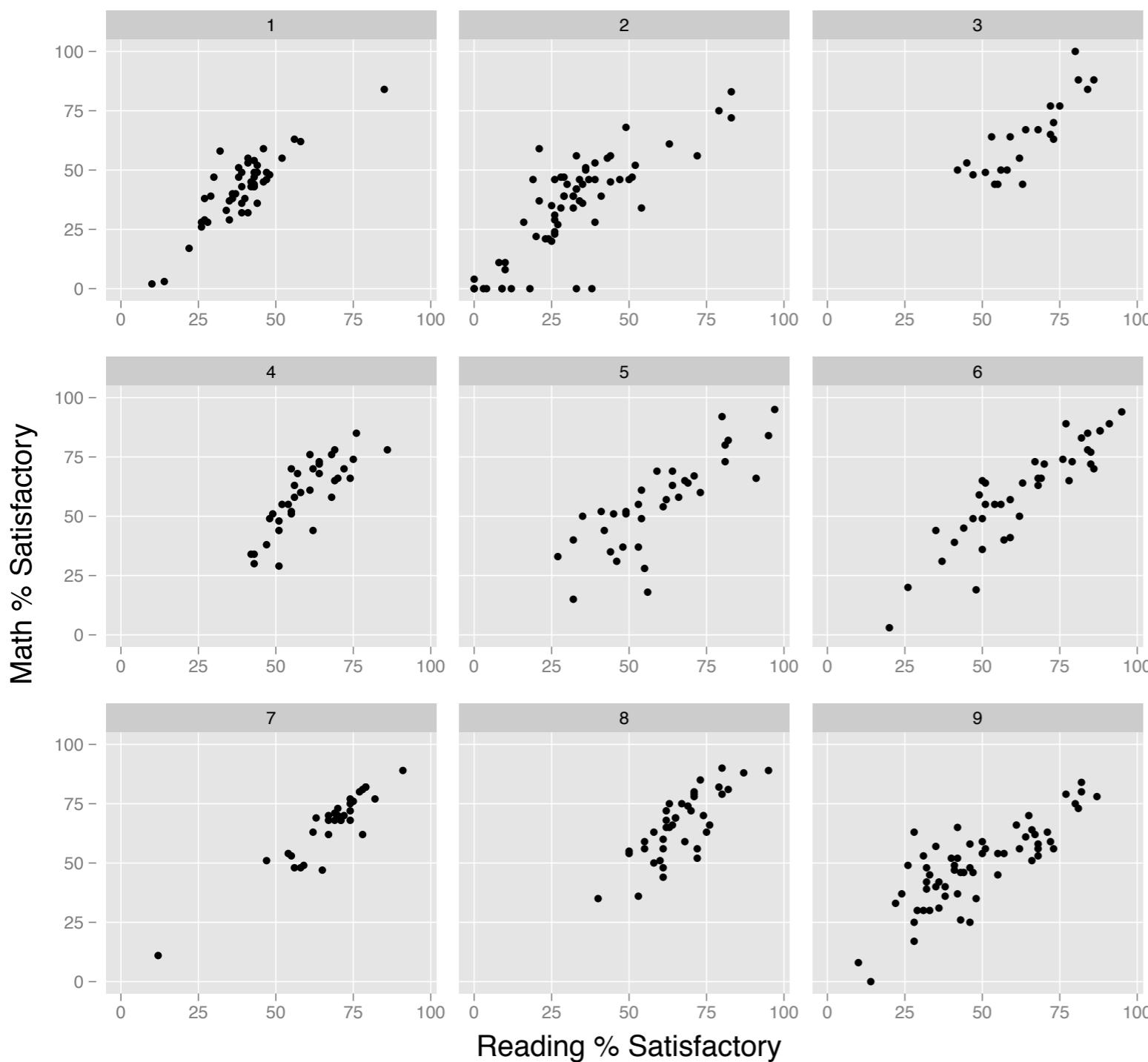
Region	SchoolName	Reading2012	Reading2013	ReadingDifference	Math2012	Math2013	MathDifference	SchoolGrade	BoardDistrict
5	0041 AIR BASE ELEMENTAR	82	80	-2	71	75	4	A	9
7	0070 CORAL REEF MONT AC	71	73	2	64	56	-8	A	9
4	0071 EUGENIA B THOMAS K	69	69	0	66	64	-2	A	5
7	0072 SUMMERTON ADVANT	57	50	-7	50	54	4	B	9
6	0073 MANDARIN LAKES K-8	34	32	-2	38	39	1	C	9
6	0081 LENORA BRAYNON SMI	28	29	1	26	47	21	F	2
1	0091 BOB GRAHAM EDUCATI	68	70	2	68	66	-2	A	4
1	0092 NORMAN S EDELCUP	73	72	-1	78	77	-1	A	3
7	0100 MATER ACADEMY	68	68	0	73	76	3	A	4
4	0101 ARCOLA LAKE ELEMEN	39	32	-7	41	39	-2	C	2
7	0102 MIAMI COMMUNITY CH	38	41	3	43	47	4	D	9
4	0111 MAYA ANGELOU ELEME	45	35	-10	59	50	-9	B	5
4	0121 AUBURNDALE ELEMENT	53	51	-2	56	55	-1	A	6
4	0122 DR ROLANDO ESPINOS	65	64	-1	66	63	-3	A	5
5	0125 NORMA BUTLER BOSSA	70	67	-3	74	70	-4	A	7
5	0161 AVOCADO ELEMENTARY	45	33	-12	45	45	0		9
4	0201 BANYAN ELEMENTARY	73	74	1	72	70	-2	A	8
5	0211 DR MANUEL C BARREI	71	71	0	74	68	-6	A	7
1	0231 AVENTURA WATERWAYS	68	68	0	67	67	0	A	3
1	0241 R K BROAD/BAY HARB	76	75	-1	81	77	-4	A	3
5	0251 ETHEL KOGER BECKHA	85	80	-5	89	90	1	A	8
6	0261 BEL-AIRE ELEMENTAR	32	32	0	36	48	12	D	9
5	0271 BENT TREE ELEMENTA	70	61	-9	69	60	-9	A	8
5	0311 GOULDS ELEMENTARY	36	40	4	51	52	1	B	9
7	0312 MATER GARDENS ACAD	75	76	1	84	85	1	A	4
1	0321 BISCAYNE ELEMENTAR	45	42	-3	52	50	-2	B	3
7	0332 SOMERSET ACAD -SIL	62	66	4	54	64	10	A	9
7	0339 SOMERSET ACAD -SO	67	57	-10	60	54	-6	B	9
1	0341 ARCH CREEK ELEMENT	47	48	1	47	48	1	B	1
7	0342 PINECREST ACADEMY	72	75	3	78	76	-2	A	7
6	0361 BISCAYNE GARDENS E	37	35	-2	39	37	-2	D	1
7	0400 RENAISSANCE ELEM C	80	82	2	76	82	6	A	5

<https://www.dropbox.com/sh/835wuh4d1z2xzic/AACugerZs8WRIMI5TBNytrGWA?dl=0>

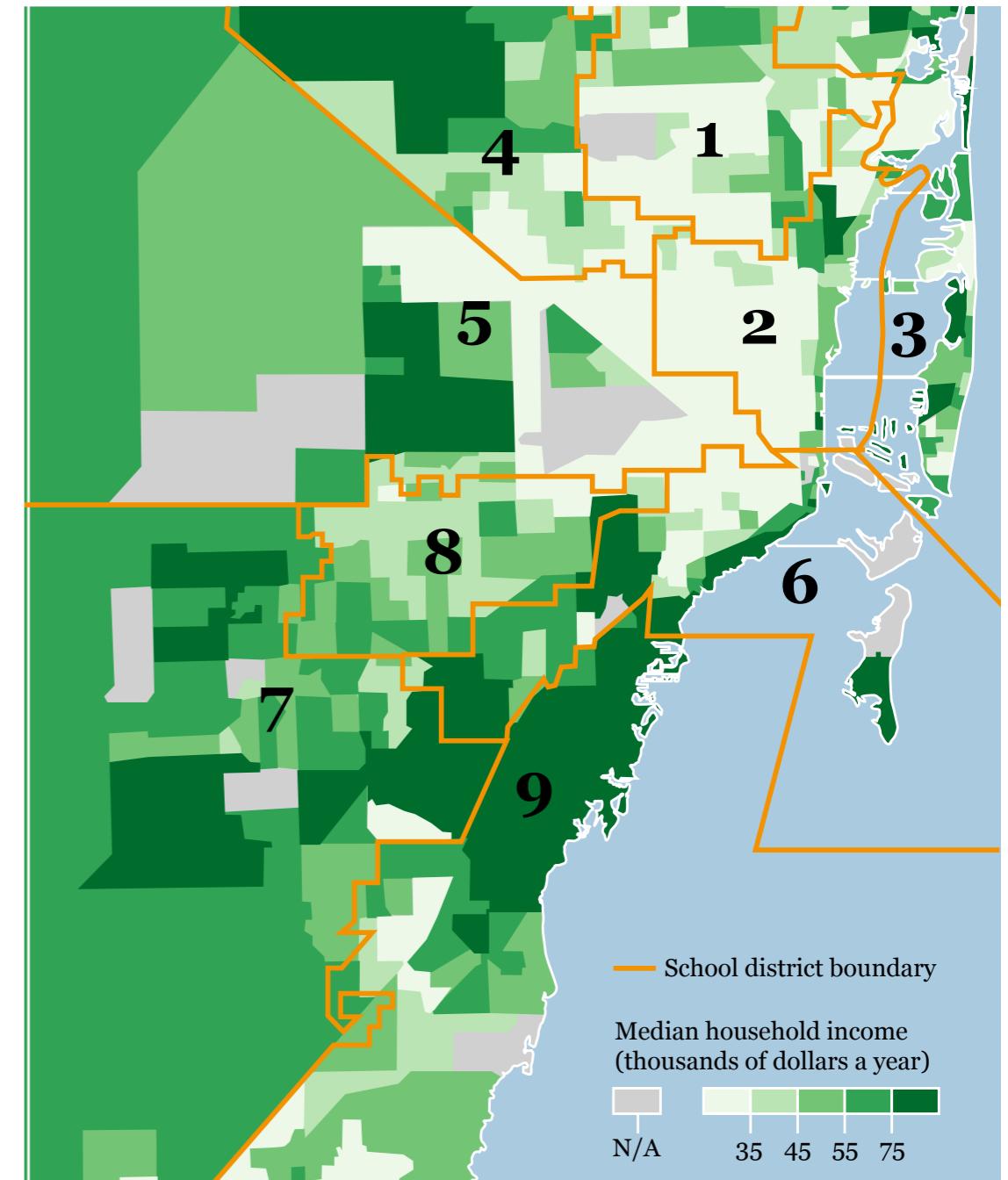
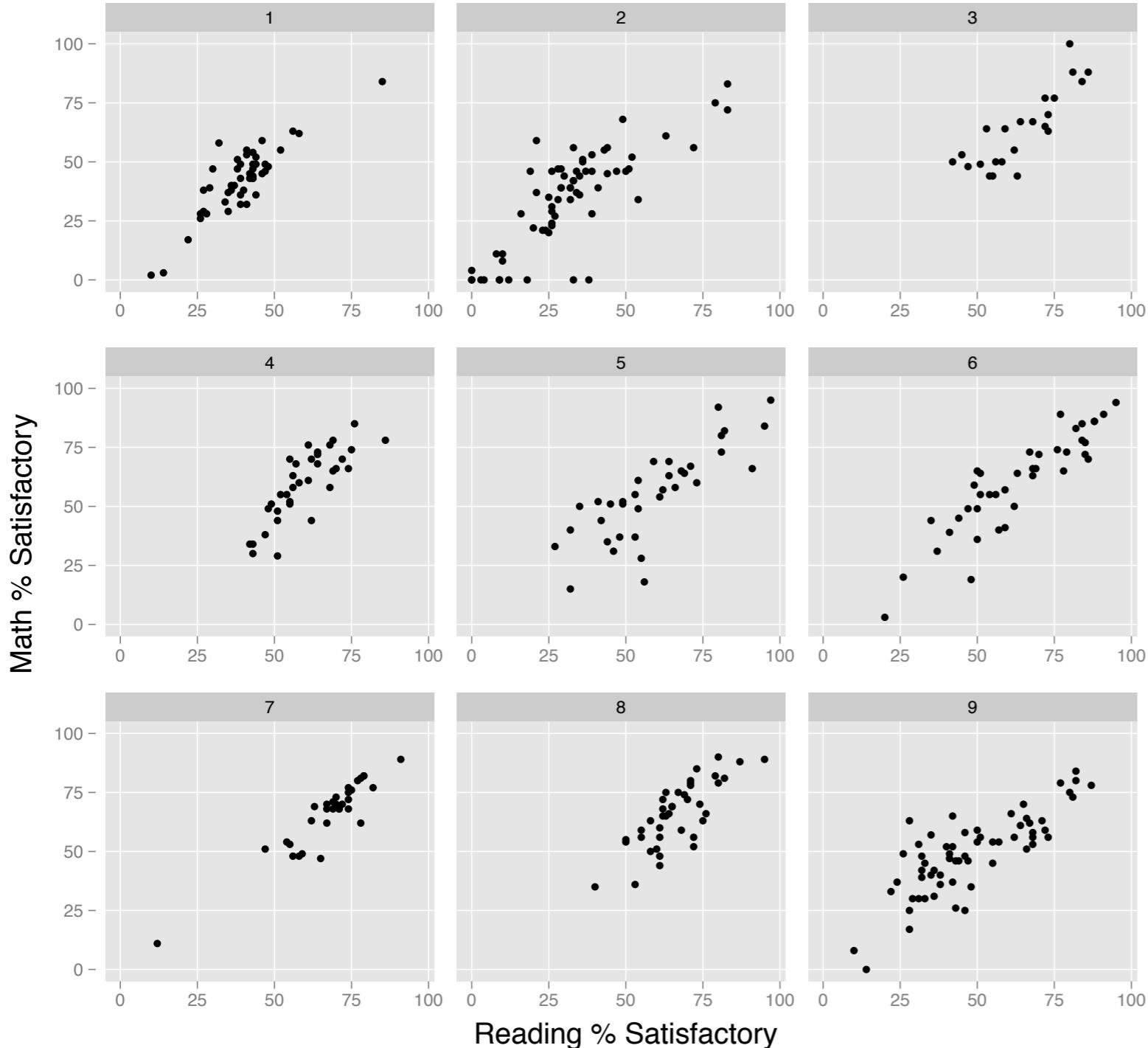
Math % Satisfactory



<https://www.dropbox.com/sh/835wuh4dlz2xzic/AACugerZs8WRIMI5TBNytrgWa?dl=0>



<https://www.dropbox.com/sh/835wuh4dlz2xzic/AACugerZs8WRIMI5TBNytRgWa?dl=0>



<https://www.dropbox.com/sh/835wuh4dlz2xzic/AACugerZs8WRIMI5TBNytrgWa?dl=0>



Put a mind in motion and
curiosity won't let it stop moving



seeing bullshit

NCTA
POSITIONS

NEWS &
EVENTS

WHO WE ARE

INDUSTRY
DATA

BLOG

SEARCH

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DELIVERING THE FUTURE

Explore the world created by America's Internet and television innovators.



CHECK THE NUMBERS

Get the Facts About Broadband Investment and Innovation

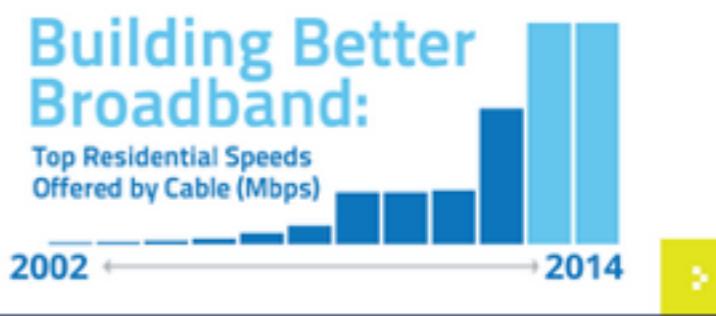


Total U.S. Broadband Industry Investment since 1999

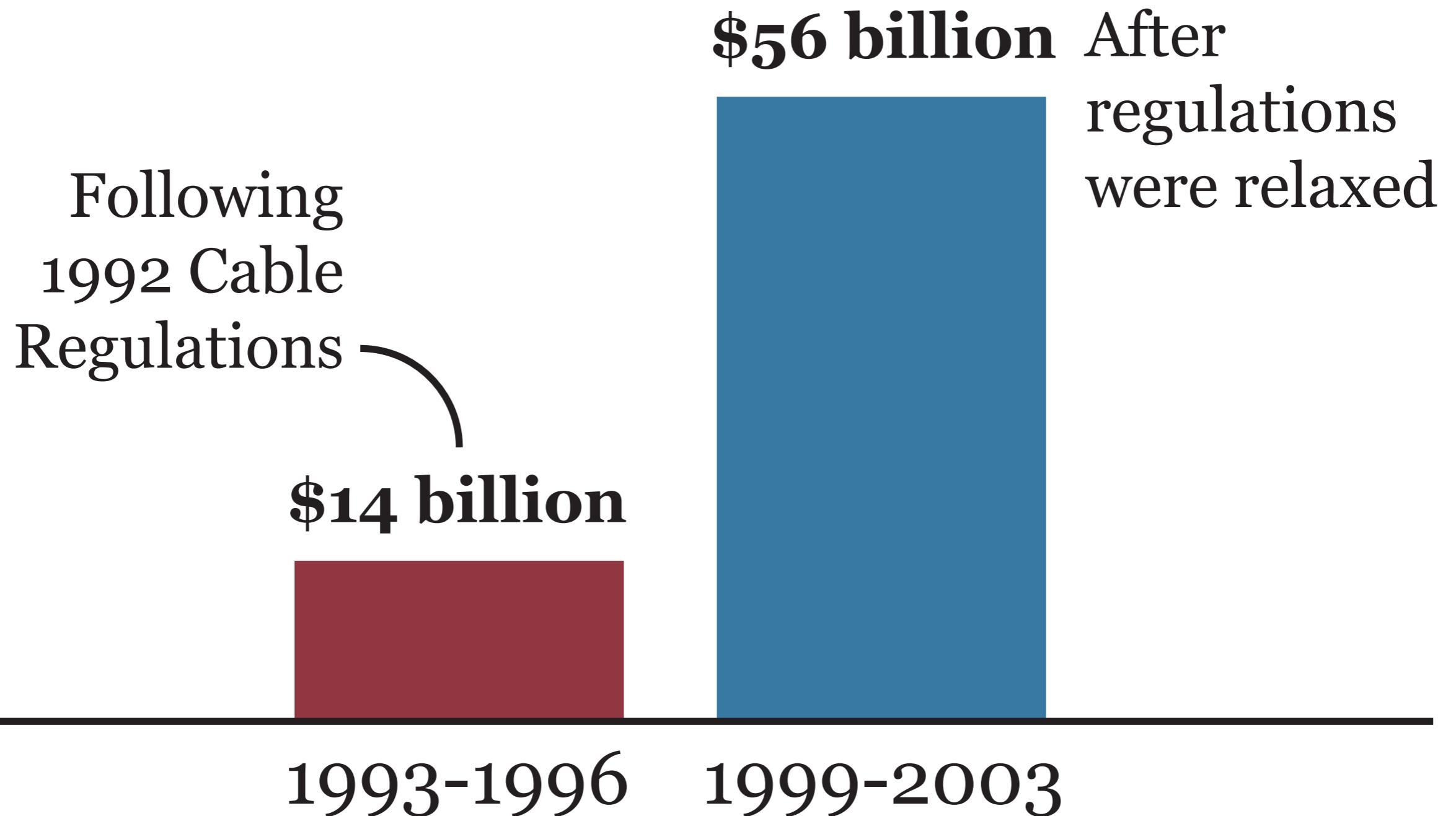


Building Better Broadband:

Top Residential Speeds Offered by Cable (Mbps)

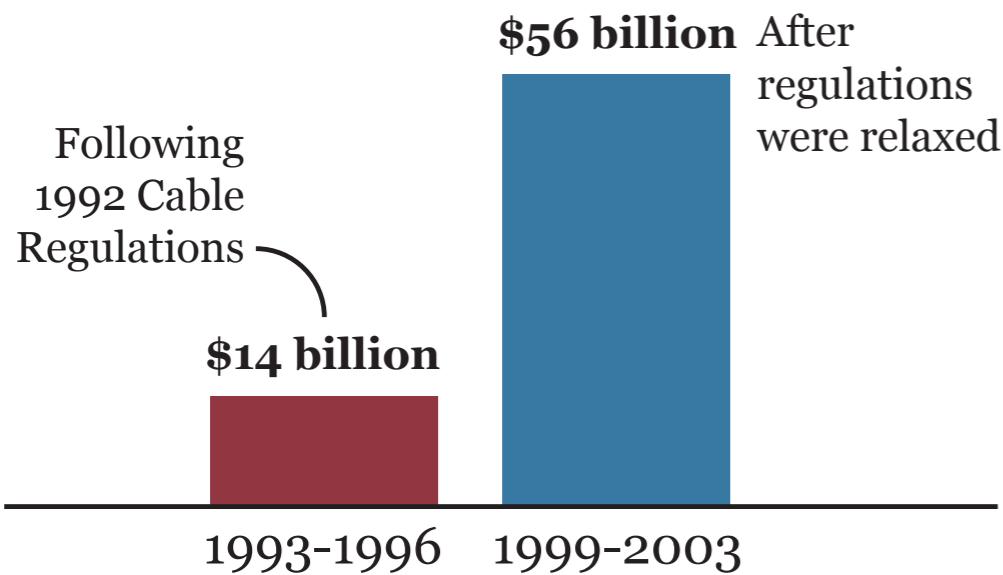


Less regulation = More Industry Investment



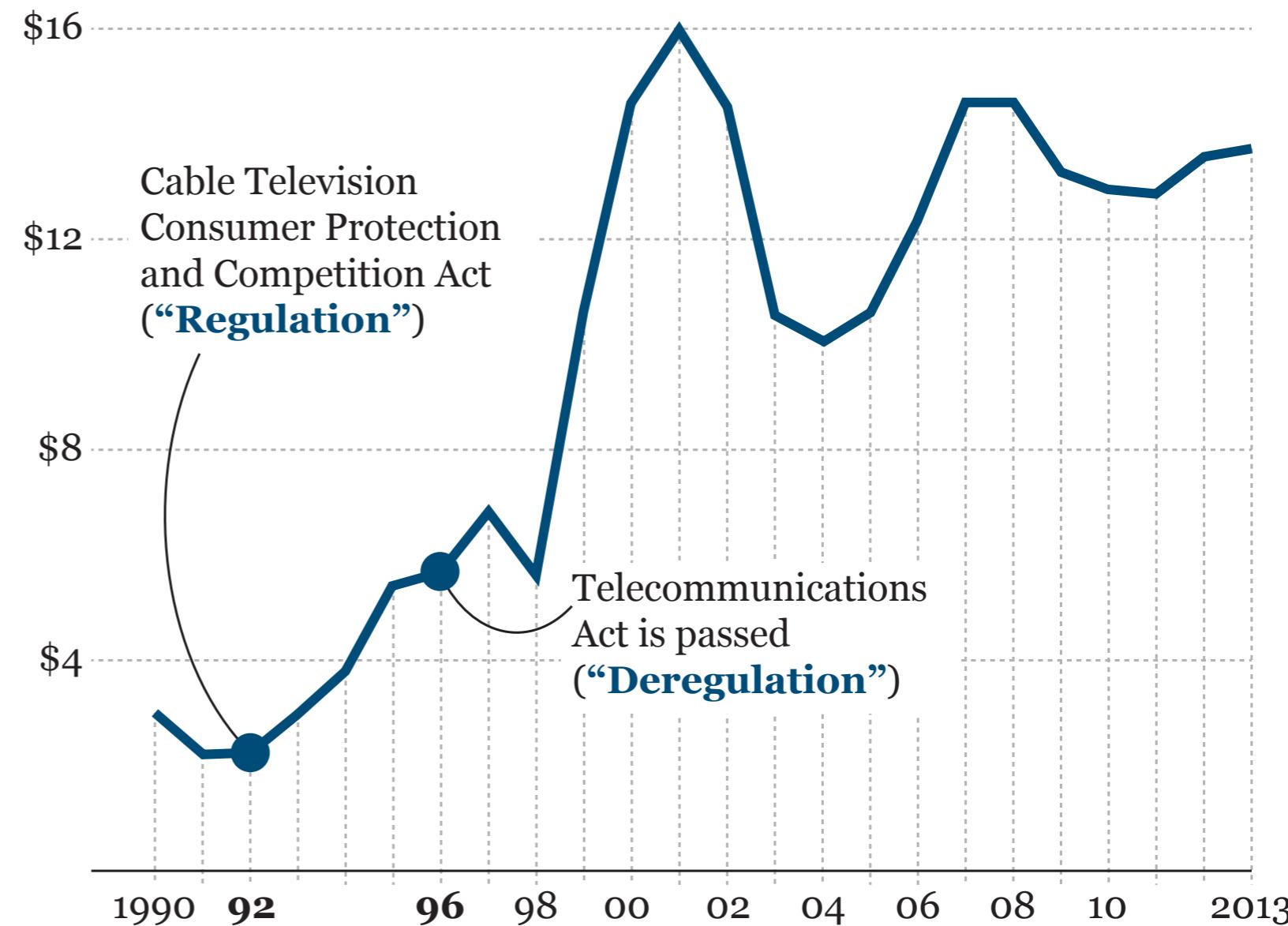
Based on a chart by the National Cable & Telecommunications Association

Less regulation = More Industry Investment



Cable Industry Infrastructure Expenditures

In billions

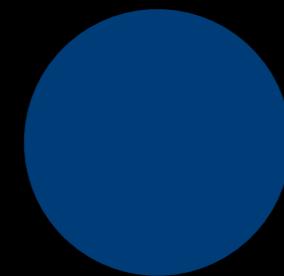


Kiev, Ukraine

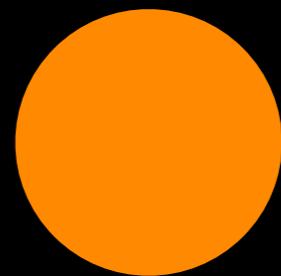


I'm about to show you a proportional symbol map

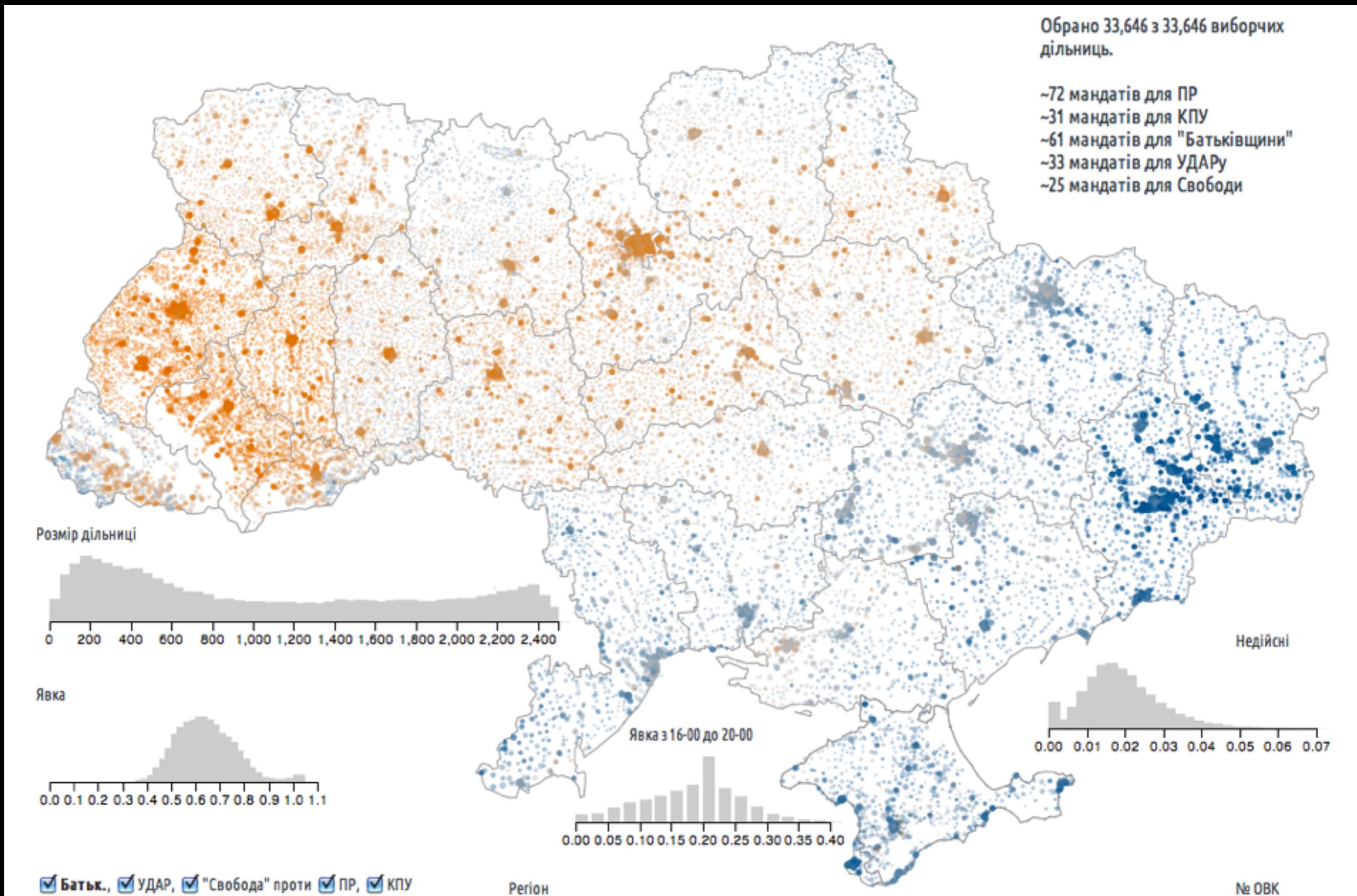
Color corresponds to the party that won more votes
on each district in the 2012 Parliamentary elections



Pro-Russian coalition



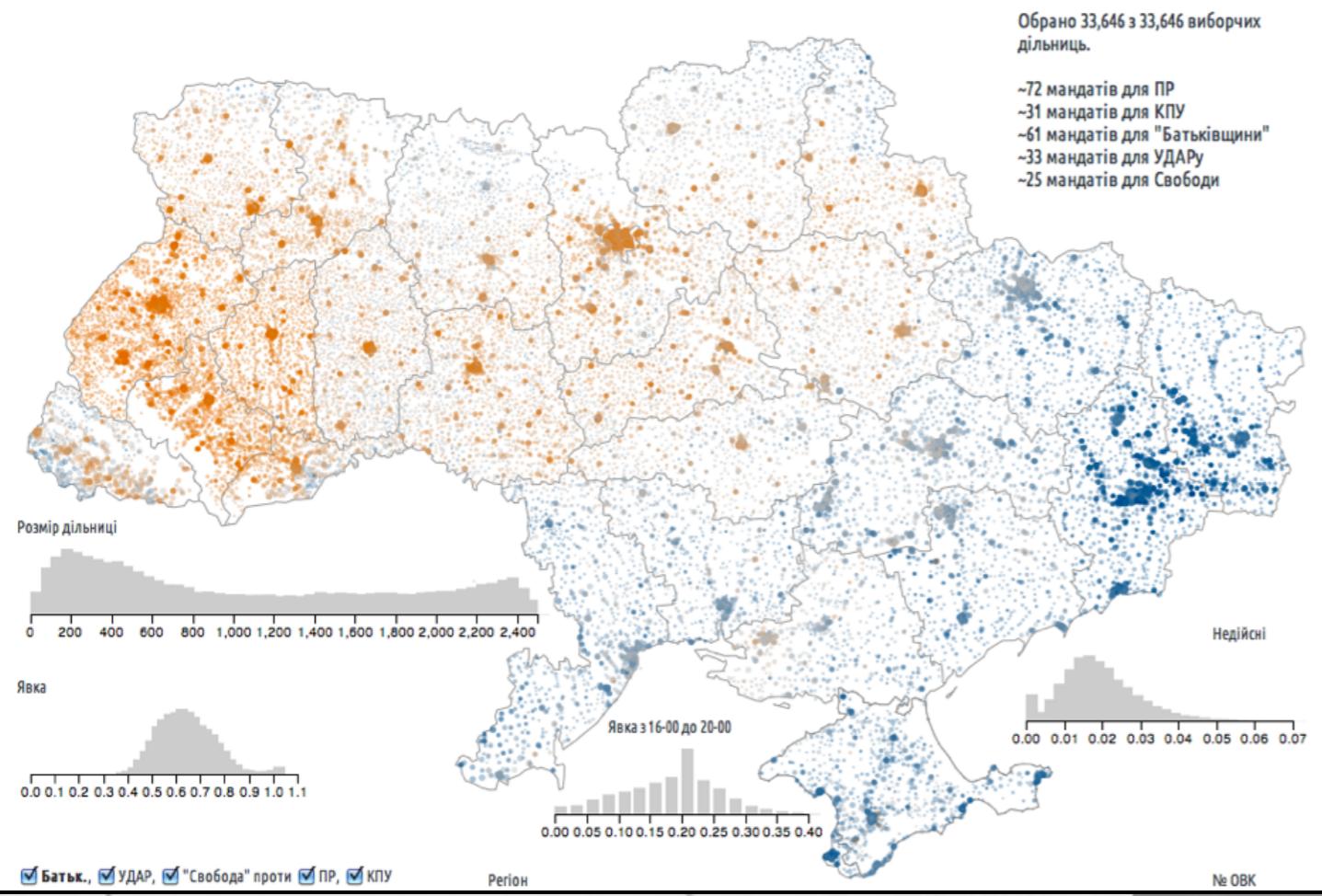
Pro-Western coalition

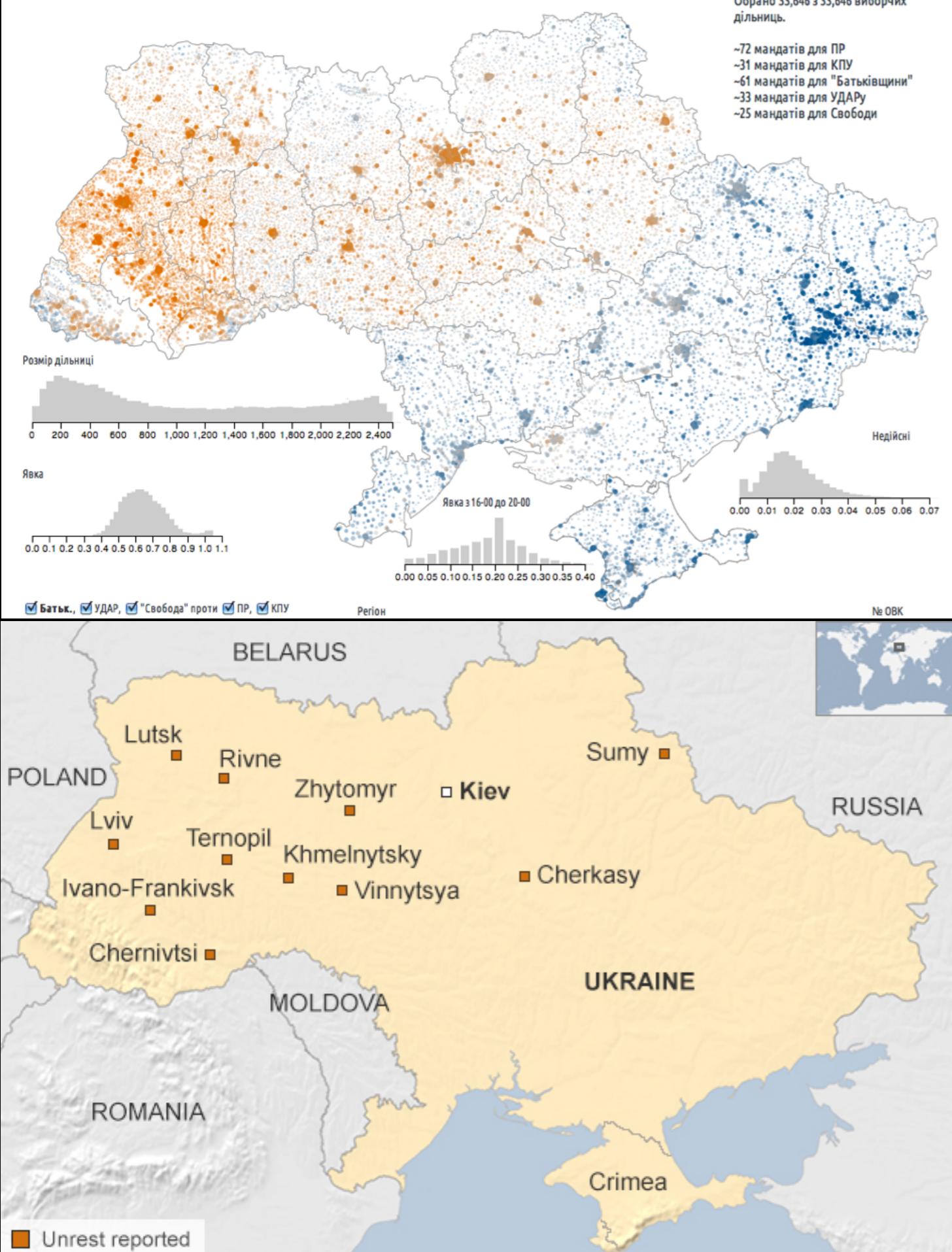


BBC

<http://www.bbc.co.uk/news/world-europe-25182823>







The Washington Post

Ukraine's deepening political crisis

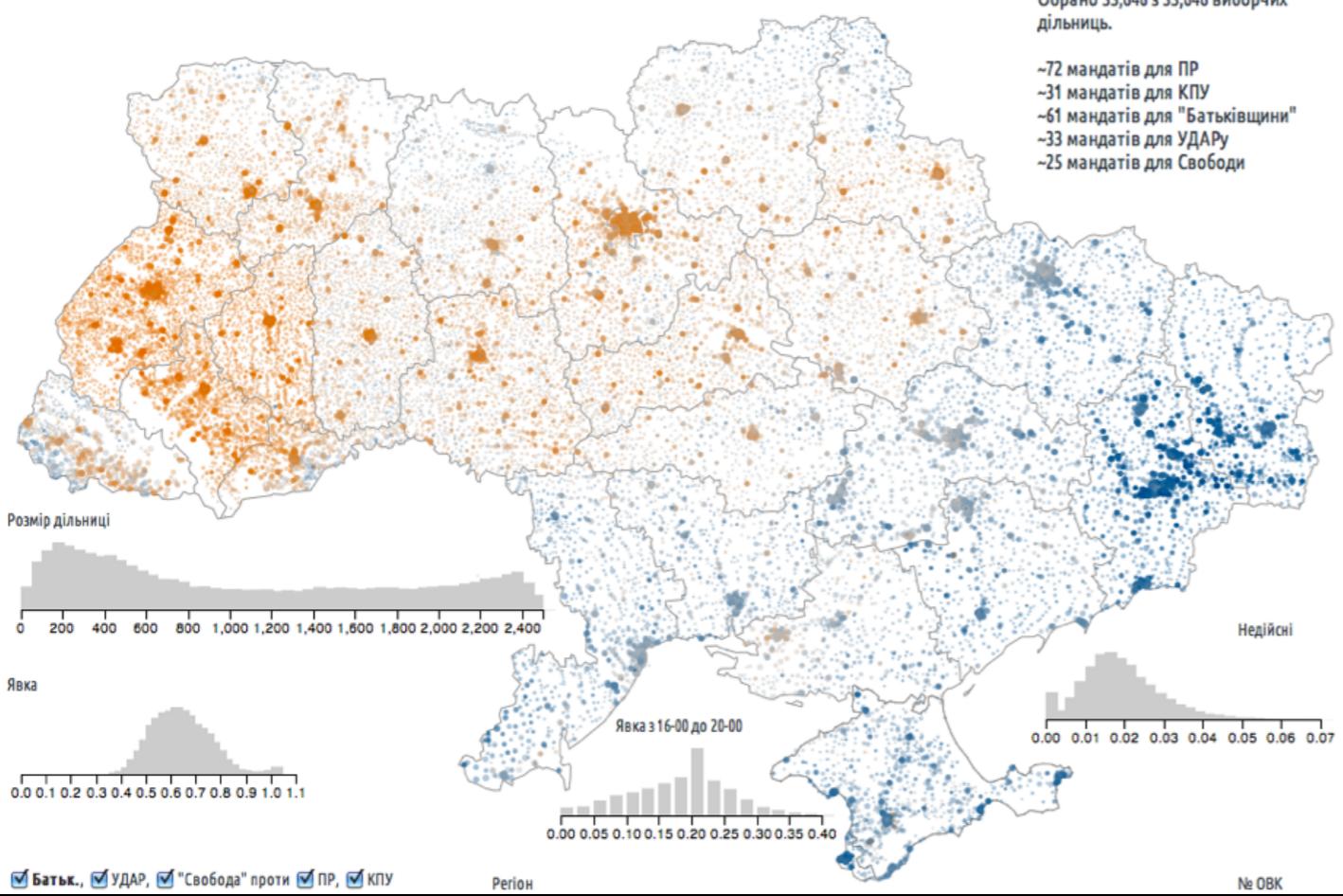
Although President Viktor Yanukovych's pro-Russian government is located in Kiev, the city and surrounding countryside are predominantly Western-leaning. Tuesday's violent clashes underscore the difficulties Ukrainians face as both sides struggle to control the nation's identity. [Read related article](#).

Protesters seize a number of government administration buildings in Lviv.

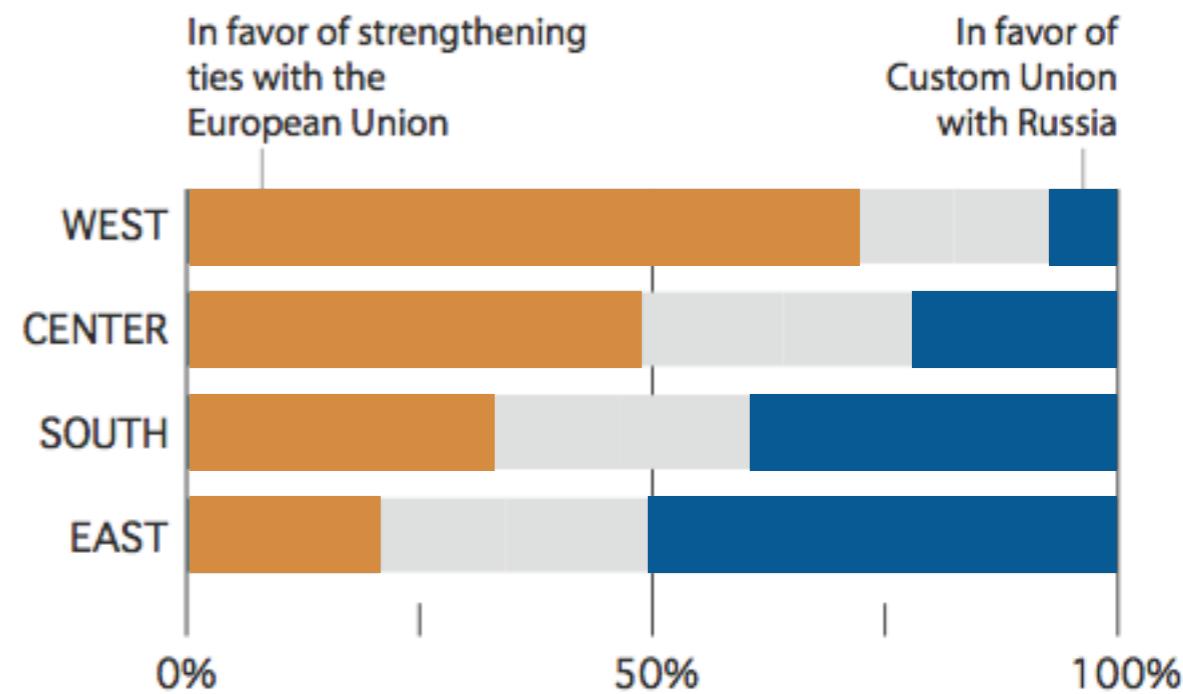


The Crimean parliament declares the fighting in Kiev as the beginning of a civil war and officially asks Yanukovych to escalate his response accordingly. Crimea's largest city, Sevastopol, is home to Russia's Black Sea fleet.

Source: Ukraine Census 2001. Map: Gene Thorp and Laris Karklis/The Washington Post. Published on February 19, 2014, 5:56 p.m.



It's more complicated than that...





learn the rules

(we are surrounded by bad design)





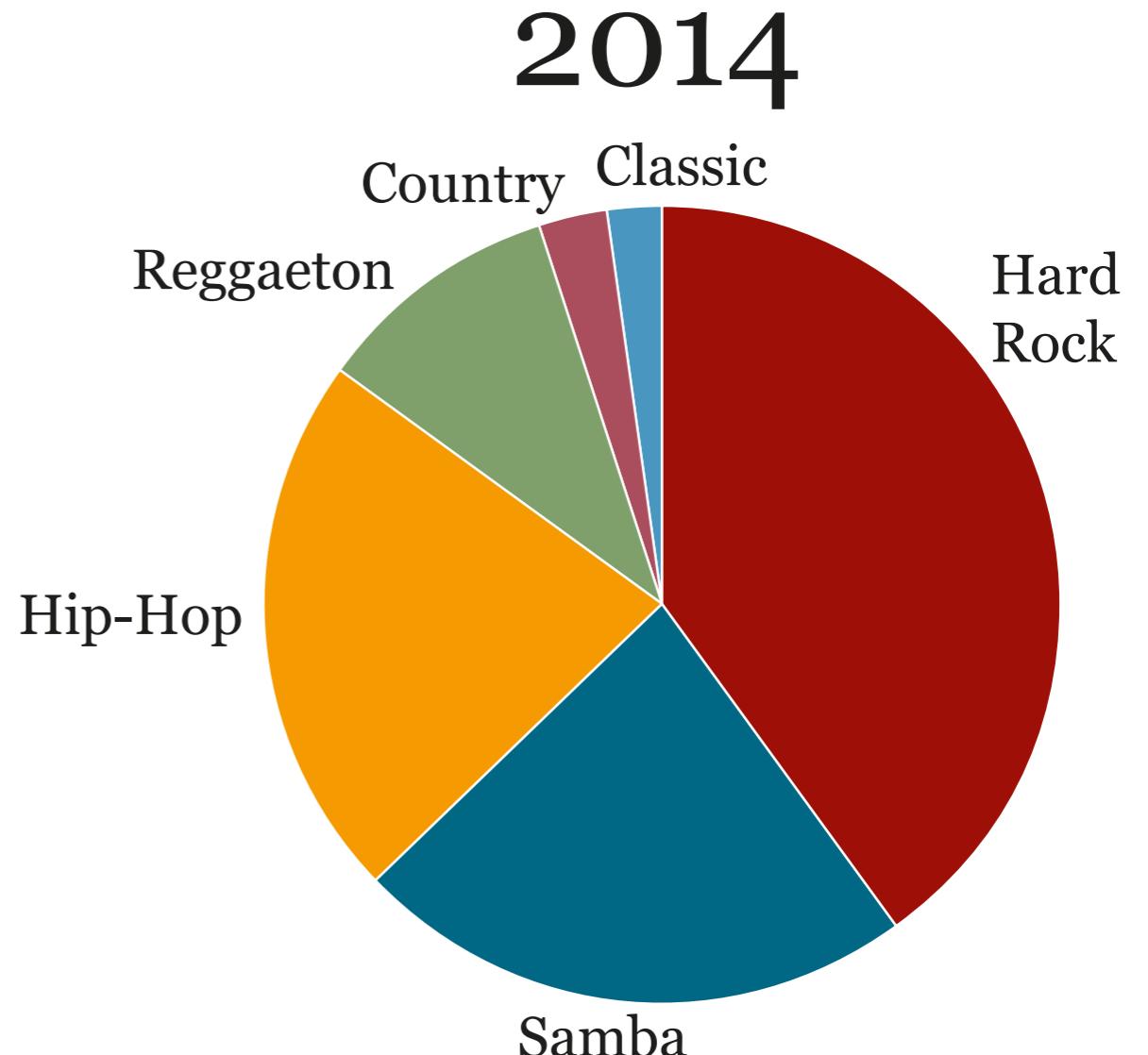
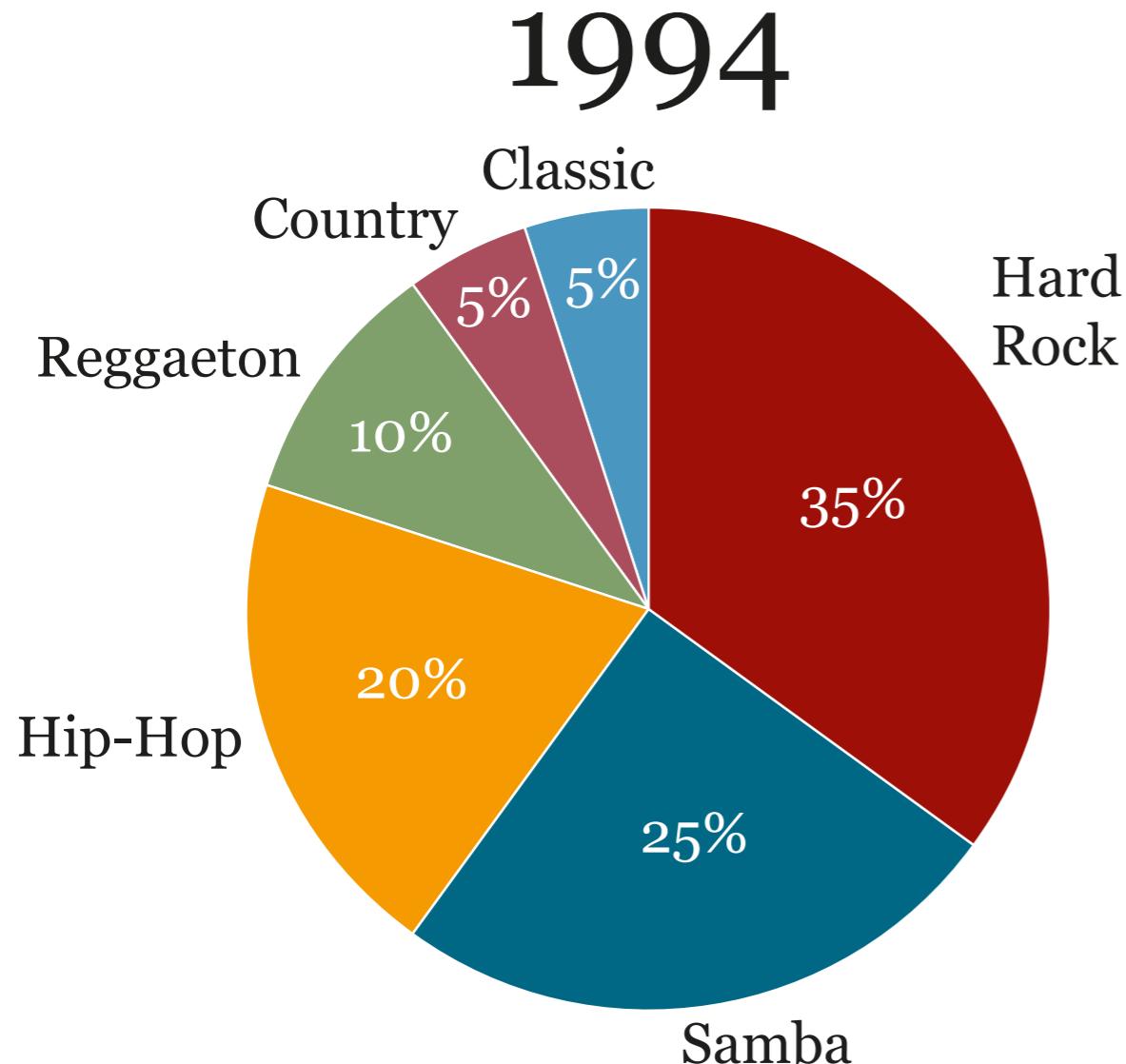




How Music Preferences Have Changed in Two Decades

Music styles preferred by University of Miami students. Survey based on interviews with 1,000 students.

SOURCE: WishfulThinkingData Inc.

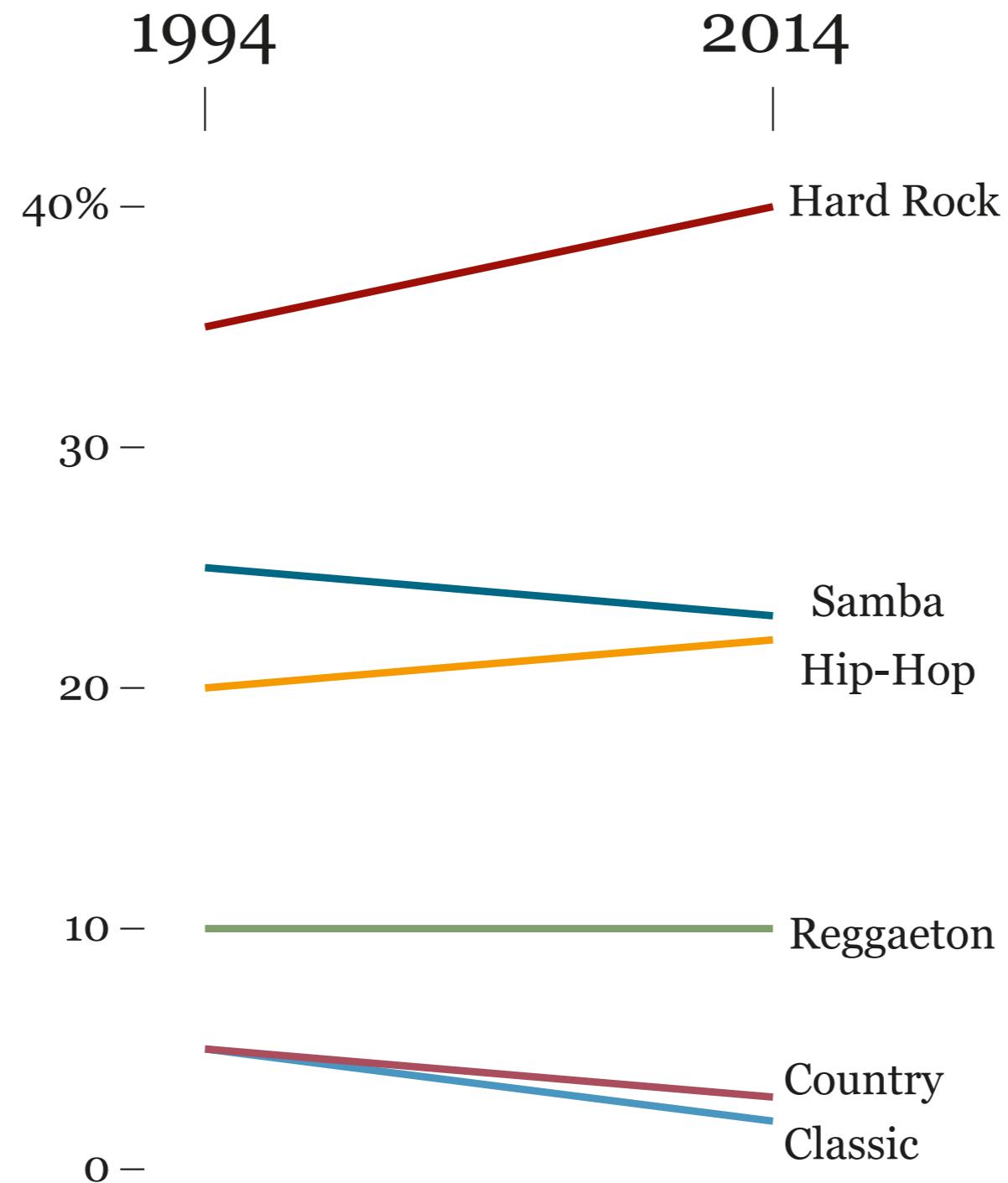


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New Techniques and Technologies for Statistics 2015

Reliable Evidence for a Society in Transition

Brussels

20-21 November 2014

Reliable Evidence for a Society in Transition





New Techniques and Technologies for Statistics 2015

Reliable Evidence for a Society in Transition

Brussels

20–21 November 2014

Reliable Evidence for a Society in Transition

“Reliable” isn’t enough

It needs to be presented well

So, one of those “new techniques” is effective communication



THANK YOU

alberto.cairo@gmail.com

www.thefunctionalart.com

Twitter: @albertocairo