Investigating science

(with help from data)

Peter Aldhous,
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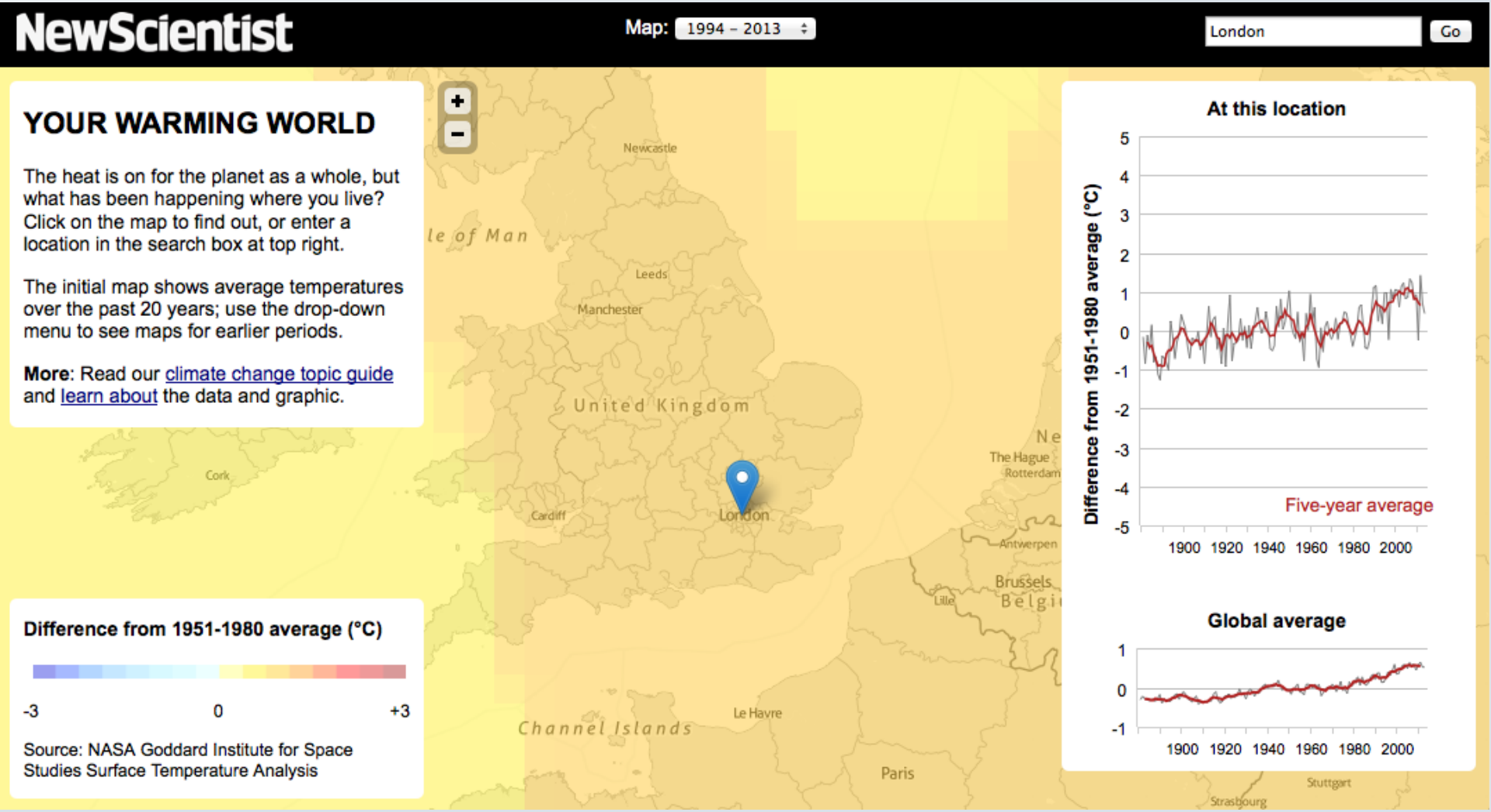
@paldhous

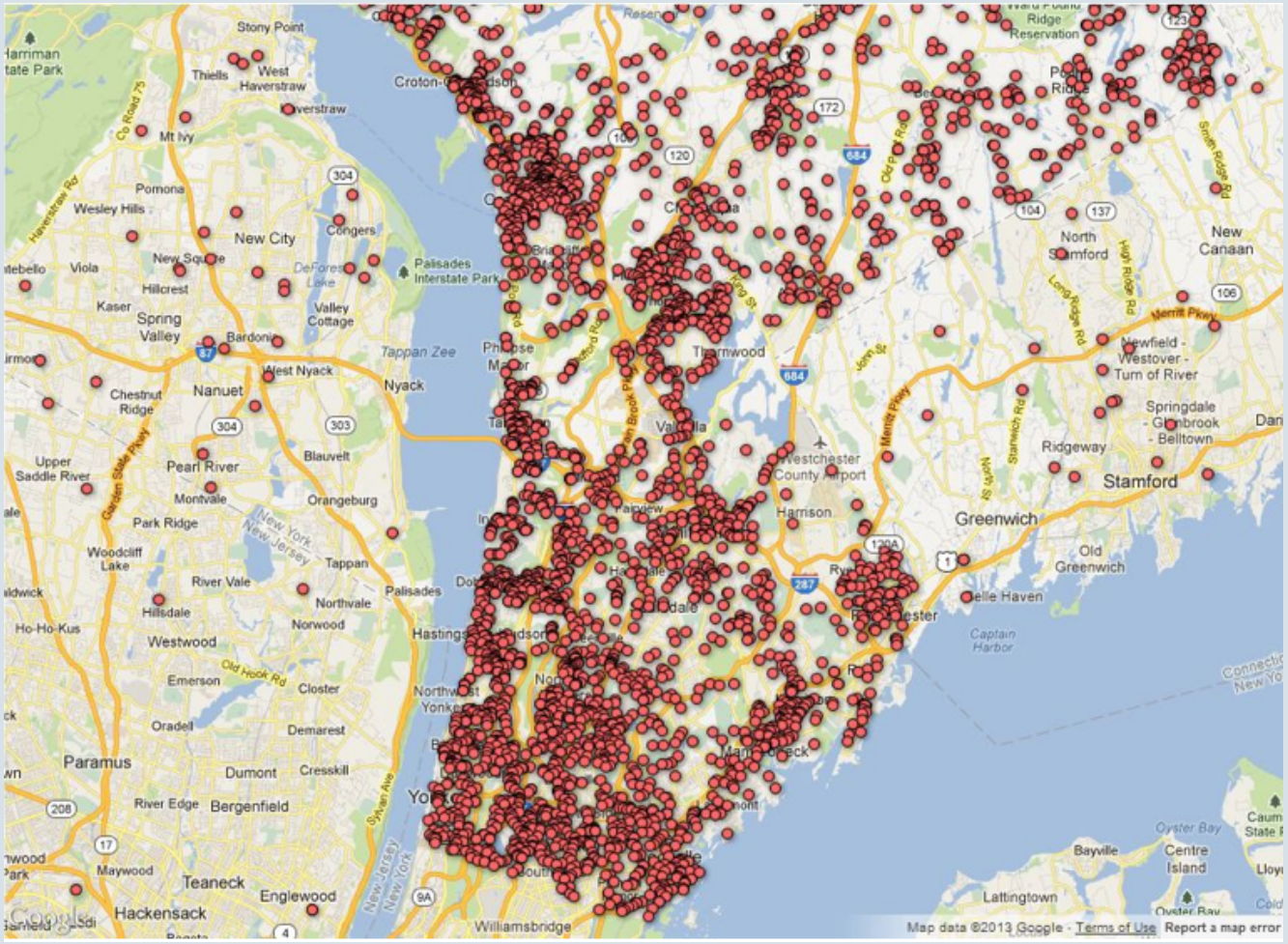
Is this data journalism?



Is this data journalism?

Map: Where are the gun permits in your neighborhood?

FILED UNDER - News / Local News | 3:51 PM, Dec. 22, 2012



Is this data journalism?

BREAKDOWN | *Death and disarray at America's racetracks*

Mangled Horses, Maimed Jockeys

The new economics of horse racing are making an always-dangerous game even more so, as lax oversight puts animal and rider at risk.

By WALT BOGDANICH, JOE DRAPE, DARA L. MILES and GRIFFIN PALMER
Published: March 24, 2012 | 481 Comments

RUIDOSO, N.M. — At 2:11 p.m., as two ambulances waited with motors running, 10 horses burst from the starting gate at Ruidoso Downs Race Track 6,900 feet up in New Mexico's Sacramento Mountains.

Nineteen seconds later, under a brilliant blue sky, a national champion jockey named Jacky Martin lay sprawled in the furrowed dirt just past the finish line, paralyzed, his neck broken in three places. On the ground next to him, his frightened horse, leg broken and chest heaving, was minutes away from being euthanized on the track.

For finishing fourth on this early September day last year, Jacky Martin got about $60 and possibly a lifetime tethered to a respirator.

A Jockey's Story

Jockeys are on the front lines of the risky business of horse racing. Twenty-four horses a week die at racetracks around the country.

Video by Matthew Orr/The New York Times

Data + journalism = story

BREAKDOWN | *Death and disarray at America's racetracks*

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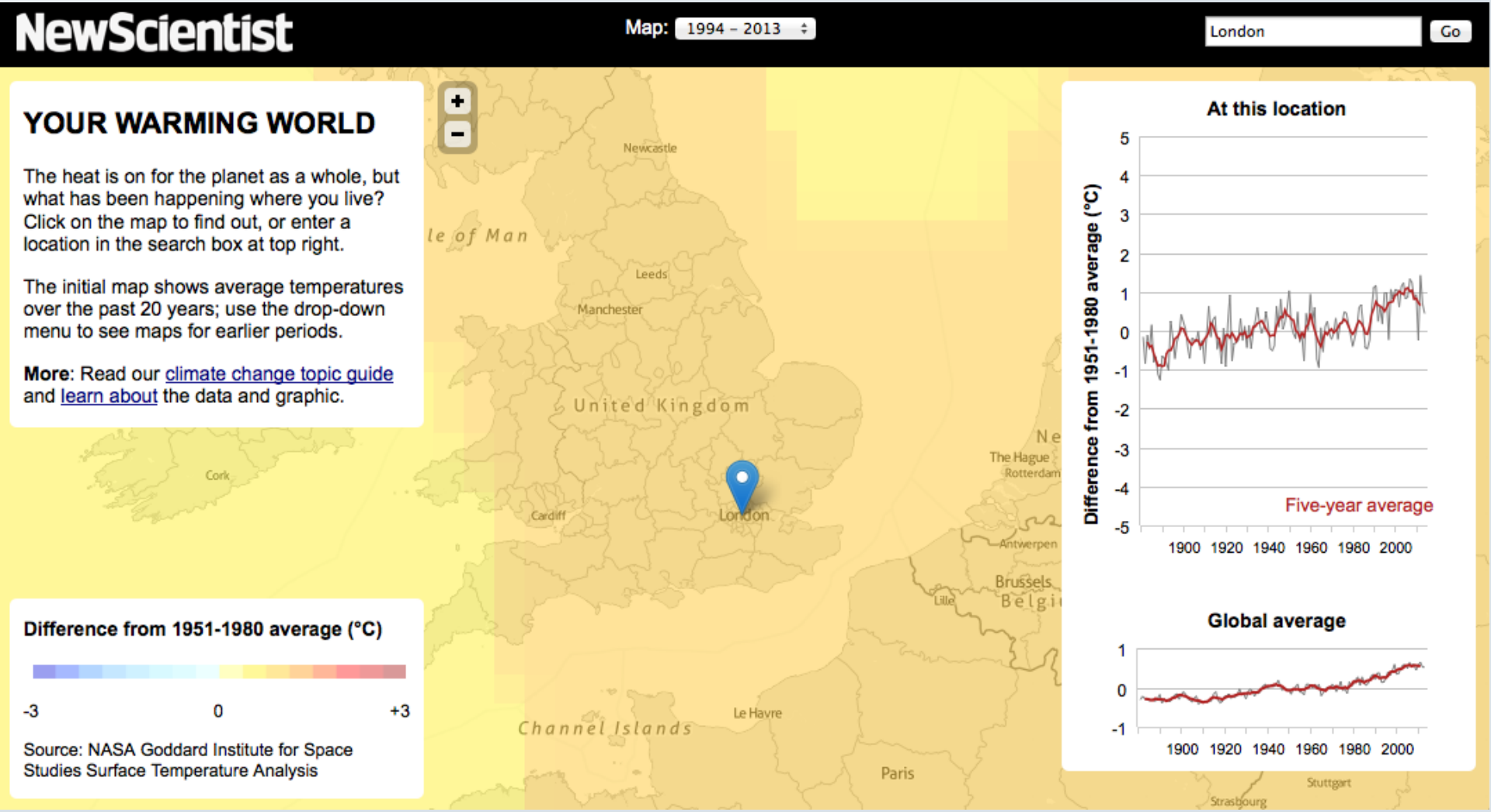
The new economics of horse racing are making an always-dangerous game even more so, as lax oversight puts animal and rider at risk.

But an investigation by The New York Times has found that industry practices continue to put animal and rider at risk. A computer analysis of data from more than 150,000 races, along with injury reports, drug test results and interviews, shows an industry still mired in a culture of drugs and lax regulation and a fatal breakdown rate that remains far worse than in most of the world.

… which can be told visually



But it’s not only maps and graphs!

Data can be used in both reporting and storytelling.

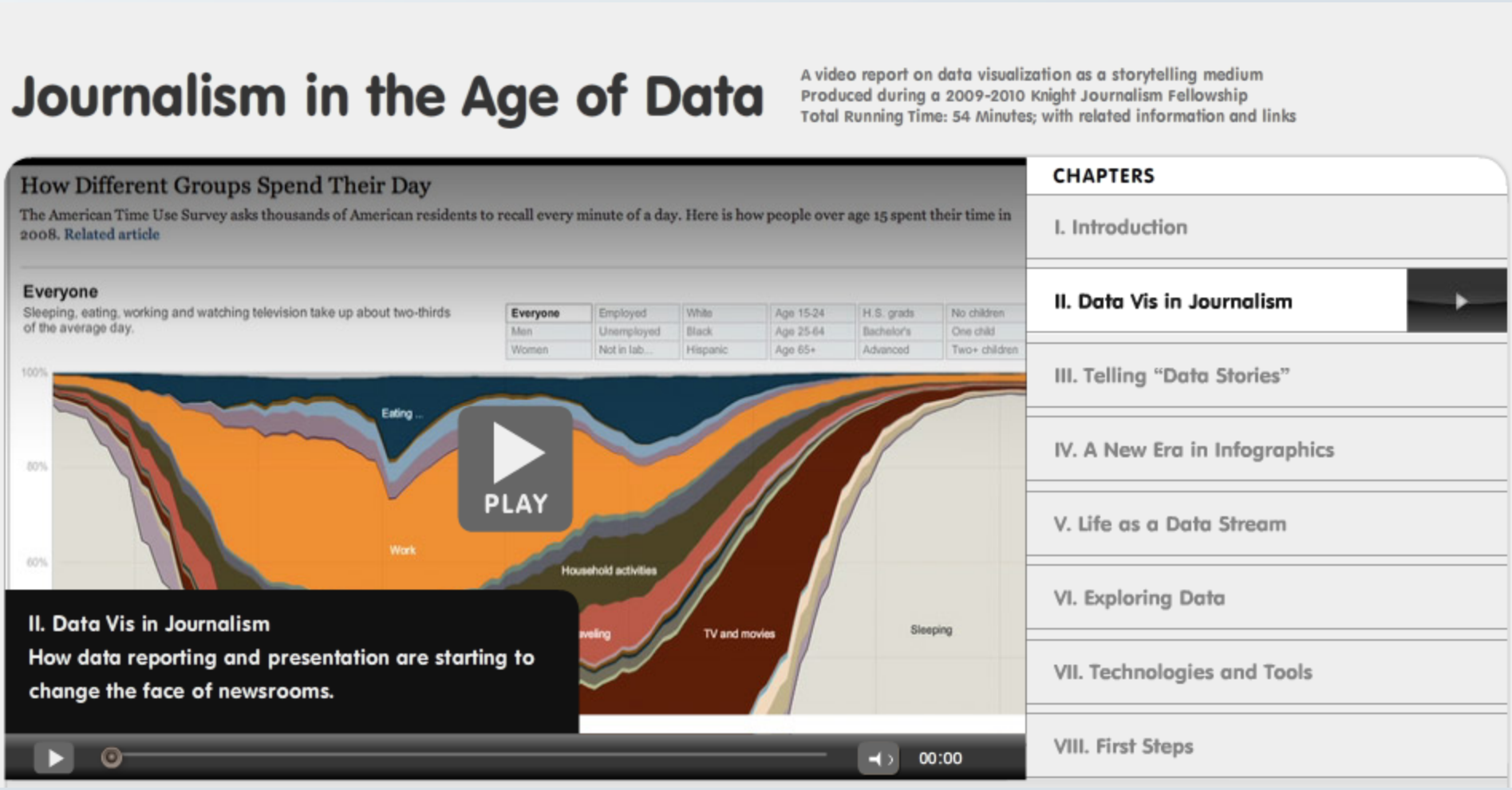
And visualization can be a powerful for both finding and telling stories.

But think carefully about what you need to show to your audience. Some of the best data-driven stories contain little in the way of numbers or graphs.

Have you ...

- Filed a request for public records?
- Worked on a story that required a spreadsheet to analyze data?
- Worked on a story that relied on querying an online database?
- Obtained a database and analyzed with database management software, or built your own database?
- Used mapping software for a story?
- Used statistical analysis for a story?
- Studied connections between people/organizations using network analysis?

A new thing?


Journalism in the Age of Data
A video report on data visualization as a storytelling medium
Produced during a 2009-2010 Knight Journalism Fellowship
Total Running Time: 54 Minutes; with related information and links
How Different Groups Spend Their Day
The American Time Use Survey asks thousands of American residents to recall every minute of a day. Here is how people over age 15 spent their time in 2008. Related article
Everyone
Sleeping, eating, working and watching television take up about two-thirds of the average day.
Everyone
Men
Women
Employed
Unemployed
Not in lab...
White
Black
Hispanic
Age 15-24
Age 25-64
Age 65+
H.S. grads
Bachelor's
Advanced
No children
One child
Two+ children
100%
80%
60%
Eating ...
Work
Household activities
TV and movies
Sleeping
PLAY
II. Data Vis in Journalism
How data reporting and presentation are starting to change the face of newsrooms.
00:00
CHAPTERS
I. Introduction
II. Data Vis in Journalism
III. Telling "Data Stories"
IV. A New Era in Infographics
V. Life as a Data Stream
VI. Exploring Data
VII. Technologies and Tools
VIII. First Steps

A thing of the future?

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News › Media › Digital media

Analysing data is the future for journalists, says Tim Berners-Lee

Inventor of the world wide web says reporters should be hunting for stories in datasets

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Comments (9)

Charles Arthur
The Guardian, Monday 22 November 2010
Article history

Tim Berners-Lee. Photograph: Guardian

A larger | smaller

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Founder of world wide

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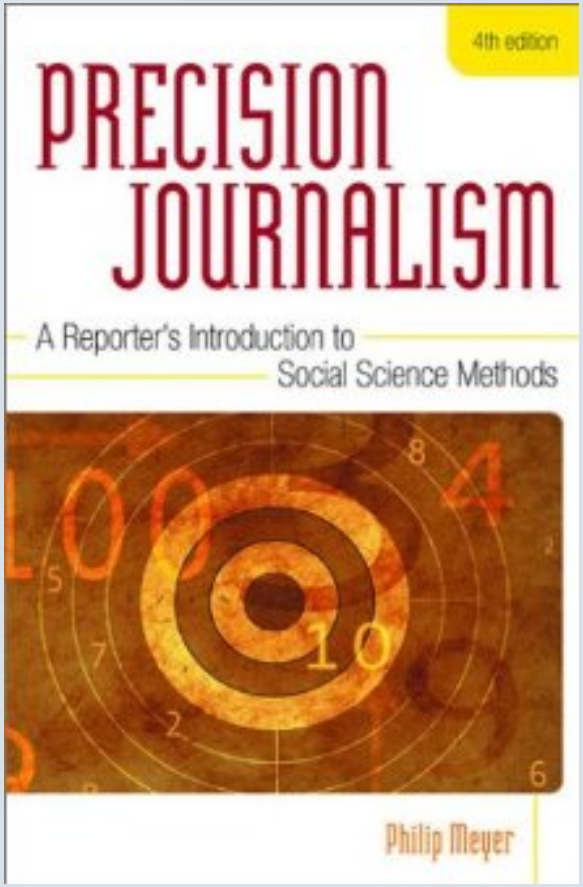
1. Julian Assange: Whoever leaked US

The pioneer: Philip Meyer

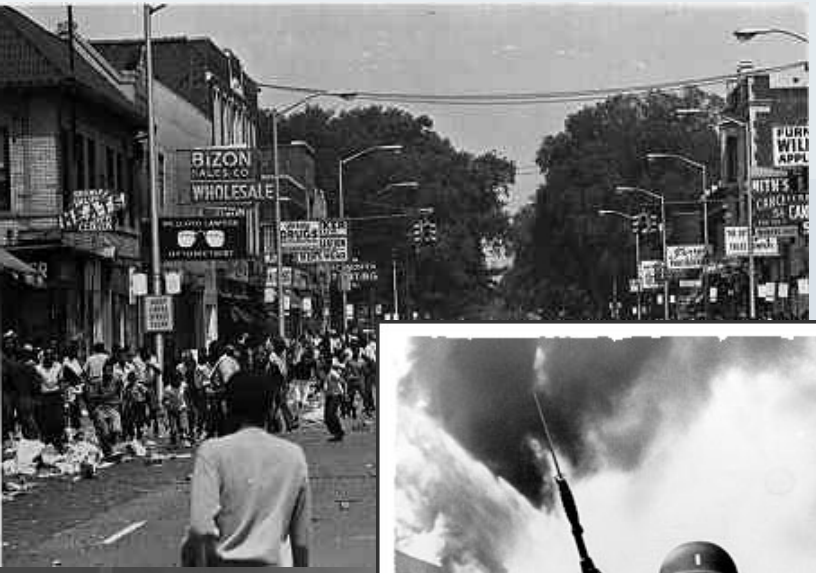


Now emeritus professor of journalism, University of North Carolina at Chapel Hill.

Pioneered use of quantitative methods in journalism with Knight Newspapers in 1960s.

Author of *Precision Journalism*, first published 1973.

A Pulitzer for data journalism: 1967 Detroit riot



- 43 dead
- 467 injured
- 7231 arrests

Detroit Free Press

Data: Survey conducted in the immediate aftermath of the riot.

Findings: One theory held that the rioters were reacting to being stuck at the foot of the economic ladder. Another blamed southern blacks who had moved to Detroit. But Philip Meyer showed that college graduates were as likely to have rioted as high-school dropouts, and that those born in the South were less likely to have participated.

Attention turned instead to pervasive racial discrimination in policing and housing in Detroit.

What's in it for me?

- Place your other reporting in context. Less "he said; she said."
- Visualize complex stories: Fresh understanding; new points of entry
- Find original stories, new angles

Where do I start?

Usually, with a question you want to answer, or a point you want to demonstrate.

Good data journalism rarely starts by aimlessly poking at a dataset.

Approach data like you would an interview: What do you and your audience want to know?

The data frame of mind

- When you start working on a story, think "What sources of data are available?" as well as "Who can I speak to about this?"
- Assume the data you need exists and is open to the public until proven otherwise.
- Make it a regular practice to learn about sources of data related to your beat.
- If necessary, have a plan for acquiring data at regular intervals. Some data may require public records requests.

The data frame of mind

This very different to:

"I've written my story. Now I'd better find some numbers for a graph."

A note of caution: data is often ‘dirty’

Data can be seductive, but never simply assume that it is correct and consistent. Examine any data you obtain to see how it is organized, and scan for potential errors.

You will almost always need to reformat and edit data to suit your purposes; frequently you will have to do extensive data “cleaning”.

Please clean me!

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	REVIEWER ID	LAST NAME	FIRST NAME	MIDDLE INITIAL	RANK	DEGREE	SITE	STREET ADDRESS	CITY	STATE	ZIP CODE	COUNTRY	RECEIPT DATE	TYPE
2	459203	%BENN%	TERRY	L	NG	MD	RANDOLPH FAMILY PRACTICE	1918 RANDOLPH RD STE 275	CHARLOTTE	NC	28207	US	12/5/2001	DEM
3	533704	%EL-GHOROURY%	MOHAMMAD		NG	MD	NG	22201 MOROSS STE 150	DETROIT	MI	48236	US	2/11/2011	DEM
4	512096	%GUENTHER	RAINER		NG	MD	UNIVERSITATSKLINIKUM SCHLE	SCHITTENHELMSTR 12	KIEL	NG	24105	GM	11/19/2007	DEM
5	16648	%RIBOT%	THOMAS	L	NG	MD	ARNETT	2600 GREENBUSH ST	LAFAYETTE	IN	47904	US	3/7/2000	DEM
6	16648	%RIBOT%	THOMAS	L	NG	MD	ARNETT	2600 GREENBUSH ST	LAFAYETTE	IN	47904	US	5/5/2000	DEM
7	16648	%RIBOT%	THOMAS	L	NG	MD	ARNETT	2600 GREENBUSH ST	LAFAYETTE	IN	47904	US	8/21/1981	DEM
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11	16648	%RIBOT%	THOMAS	L	NG	MD	ARNETT	2600 GREENBUSH ST	LAFAYETTE	IN	47904	US	3/12/2003	DEM
12	499673	%RICHARDSON	MARTIN	D	NG	MD	THE ROYAL MELBOURNE HOSP/	GRATTAN ST	PARKVILLE	NG	3050	AS	5/12/2006	DEM
13	534551	%TAUTH	JEFFREY		NG	MD	NG	180 MEDICAL PARK DRIVE	HOT SPRINGS	AR	71901	US	4/11/2011	DEM
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19	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	1/9/2009	IRB
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21	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	4/27/2010	IRB
22	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	11/5/2009	IRB
23	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	3/10/2011	IRB
24	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	2/18/2011	IRB
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28	514421	.WENS	SHEMETRA		NG	NG	MCLEAN HOSP	115 MILL STREET	BELMONT	MA	2478	US	7/2/2009	IRB
29	532708	;AW	IAN		NG	MD	RIGSHOPITALET COPENHAGEN,	9 BLEGDAMSVEJ	COPENHAGEN	NG	2100	DA	11/15/2010	DEM
30	307380	??	ADAM	R	NG	MD	UNIV COLORADO/COLORADO I	4200/4700 E 9TH AVE BOX C2	DENVER	CO	80262	US	6/9/1999	DEM
31	307380	??	ADAM	R	NG	MD	UNIV COLORADO/COLORADO I	4200/4700 E 9TH AVE BOX C2	DENVER	CO	80262	US	12/10/1998	DEM

But science journalists are lucky: Lots of clean, well curated data ...

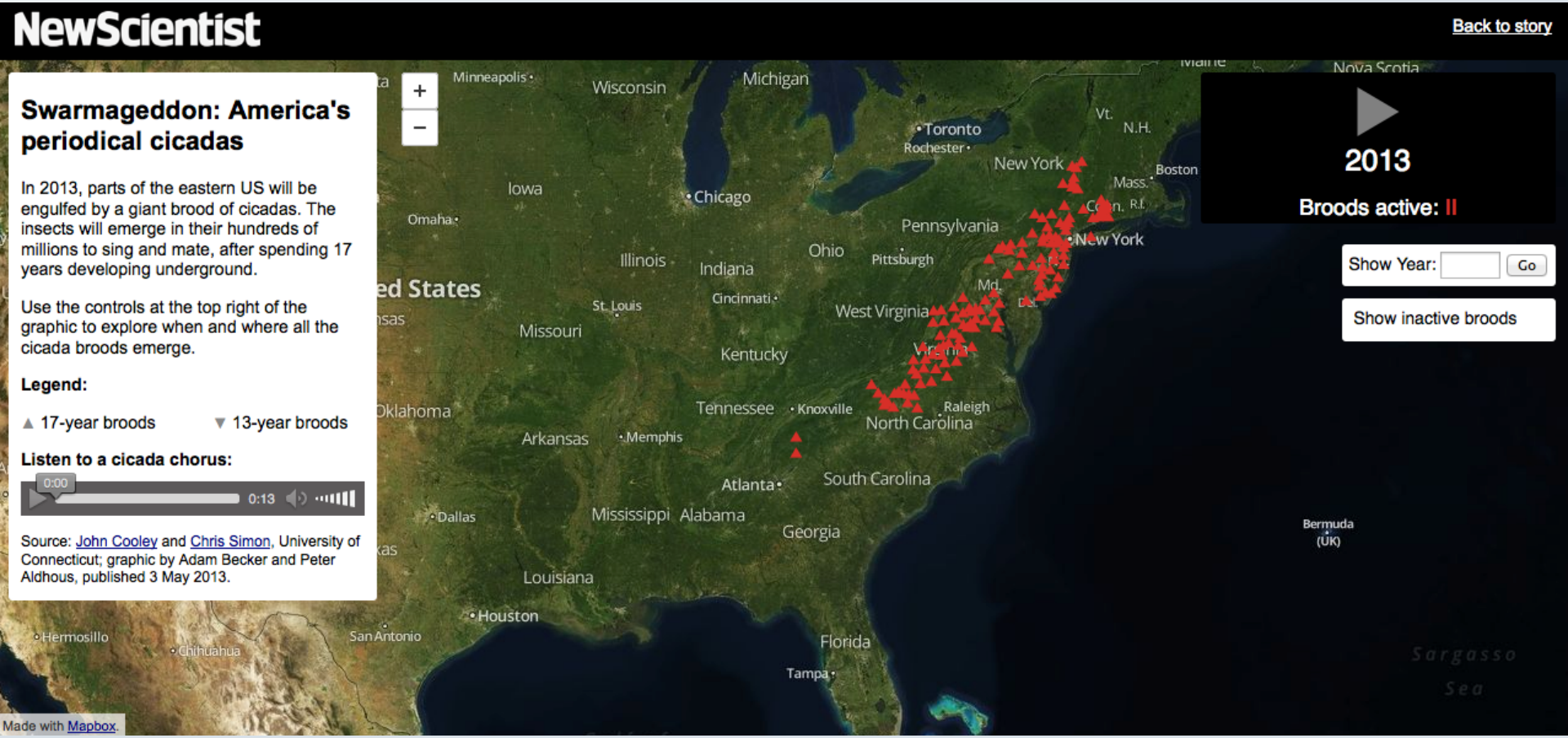
Storm ARLENE is number 1 of the year 2011

Month	Day	Hour	Lat.	Long.	Dir.	Speed		Wind		Pressure	Type
						mph	kph	mph	kph		
June	28	6 UTC	19.9N	92.8W	-- deg	--	--	30 mph	45 kph	1007 mb	
June	28	12 UTC	20.3N	93.1W	325 deg	4	7	35 mph	55 kph	1006 mb	
June	28	18 UTC	20.7N	93.5W	315 deg	5	9	40 mph	65 kph	1006 mb	Tropical Storm
June	29	0 UTC	21.0N	93.9W	310 deg	4	7	40 mph	65 kph	1005 mb	Tropical Storm
June	29	6 UTC	21.2N	94.5W	290 deg	5	9	40 mph	65 kph	1003 mb	Tropical Storm
June	29	12 UTC	21.3N	95.3W	280 deg	8	12	50 mph	85 kph	1000 mb	Tropical Storm
June	29	18 UTC	21.4N	95.6W	290 deg	2	3	60 mph	95 kph	998 mb	Tropical Storm
June	30	0 UTC	21.6N	96.1W	295 deg	5	9	60 mph	95 kph	996 mb	Tropical Storm
June	30	6 UTC	21.6N	97.0W	270 deg	9	14	65 mph	100 kph	994 mb	Tropical Storm
June	30	12 UTC	21.6N	97.3W	270 deg	2	3	65 mph	100 kph	993 mb	Tropical Storm
June	30	18 UTC	21.5N	98.1W	260 deg	8	12	50 mph	85 kph	998 mb	Tropical Storm
July	1	0 UTC	21.1N	98.7W	235 deg	6	11	35 mph	55 kph	1002 mb	Tropical Depression

Storm BRET is number 2 of the year 2011

Month	Day	Hour	Lat.	Long.	Dir.	Speed		Wind		Pressure	Type
						mph	kph	mph	kph		
July	16	6 UTC	30.7N	79.7W	-- deg	--	--	25 mph	35 kph	1014 mb	
July	16	12 UTC	30.3N	79.4W	145 deg	4	7	25 mph	35 kph	1014 mb	

…which scientists may be willing to share



The basics
(OK, I have some data. What now?)

- **Sort**

Largest to smallest; Alphabetical etc

- **Aggregate**

Count, Sum, Mean, Median, Maximum, Minimum etc

- **Filter**

Select a defined subset of the data

- **Join**

Merge entries from two or more datasets based on common field(s), e.g. unique ID number, last name and first name

Think of those operations as ‘interviewing’ the data

Tools and stories: online databases

Special report Bioterror

FRIEND OR FOE?

Efforts to combat killer pathogens with new vaccines and drugs could be inadvertently writing a handbook for biowarfare. The US, home to many such "dual-use" projects, faces a tough dilemma

"At what point, if any, does working on how pathogens evade immunity become a threat to national security?"

PETER ALDHOUS

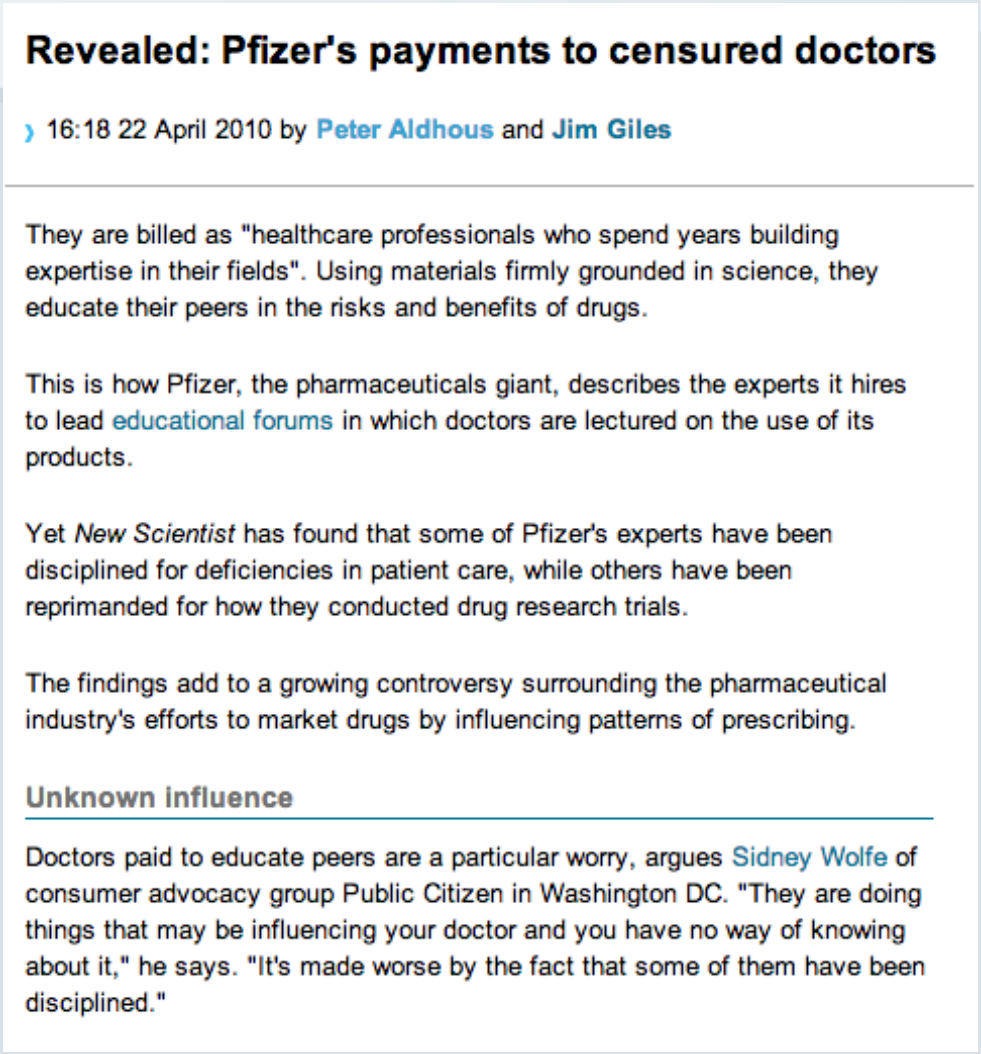
TWEAKING the anthrax toxin to render experimental drugs ineffective. Turning a harmless rodent virus into a deadly pathogen. Enhancing the potency of botulinum toxins – already the most lethal poisons known. Transferring genes that help viruses evade the human immune system from one pathogen to another.

These projects may sound like the clandestine activities of a hostile bioweapons programme. But in fact, all are in progress or being planned in US academic labs. They were identified by *New Scientist* in a database that documents research funded by the US Department of Health and Human Services (DHHS). And while each project may sound alarming to the uninitiated, most won the qualified support of the biosecurity specialists we asked to consider their risks and benefits. Only one of those mentioned above – the anthrax project – generated serious objections from some of our experts.

This survey illustrates the difficulties facing the National Science Advisory Board for Biosecurity (NSABB), which the US government has asked to draw up a system for regulating "dual-use" biology – research intended to combat disease, but which could also be misused by bioterrorists or enemy states. The problem is that it is difficult to pursue such work without potentially helping others design bioweapons. "This is the very nature of infectious disease and toxin research," says Michael Stebbins, director of biology policy with the Federation of American Scientists in Washington DC. NSABB will have to tread very carefully if it is to avoid tying up in red tape scientists' ability to respond to emerging diseases.

Dual-use biology hit the headlines in 2001, when *New Scientist* revealed that researchers in Australia had created a strain of mousepox that killed even animals that had been vaccinated (13 January 2001, p 4). The scientists, hoping to control plagues of mice, engineered a mousepox virus ■

Tools and stories: work with databases on your own computer



Revealed: Pfizer's payments to censured doctors

› 16:18 22 April 2010 by Peter Aldhous and Jim Giles

They are billed as "healthcare professionals who spend years building expertise in their fields". Using materials firmly grounded in science, they educate their peers in the risks and benefits of drugs.

This is how Pfizer, the pharmaceuticals giant, describes the experts it hires to lead educational forums in which doctors are lectured on the use of its products.

Yet *New Scientist* has found that some of Pfizer's experts have been disciplined for deficiencies in patient care, while others have been reprimanded for how they conducted drug research trials.

The findings add to a growing controversy surrounding the pharmaceutical industry's efforts to market drugs by influencing patterns of prescribing.

Unknown influence

Doctors paid to educate peers are a particular worry, argues Sidney Wolfe of consumer advocacy group Public Citizen in Washington DC. "They are doing things that may be influencing your doctor and you have no way of knowing about it," he says. "It's made worse by the fact that some of them have been disciplined."

Data: Pfizer's records of payments to doctors, scraped from the web. Data on disciplinary actions from state medical boards in four largest states; FDA warning letters to clinical investigators

Findings: Some of Pfizer's "experts" had questionable records for patient safety

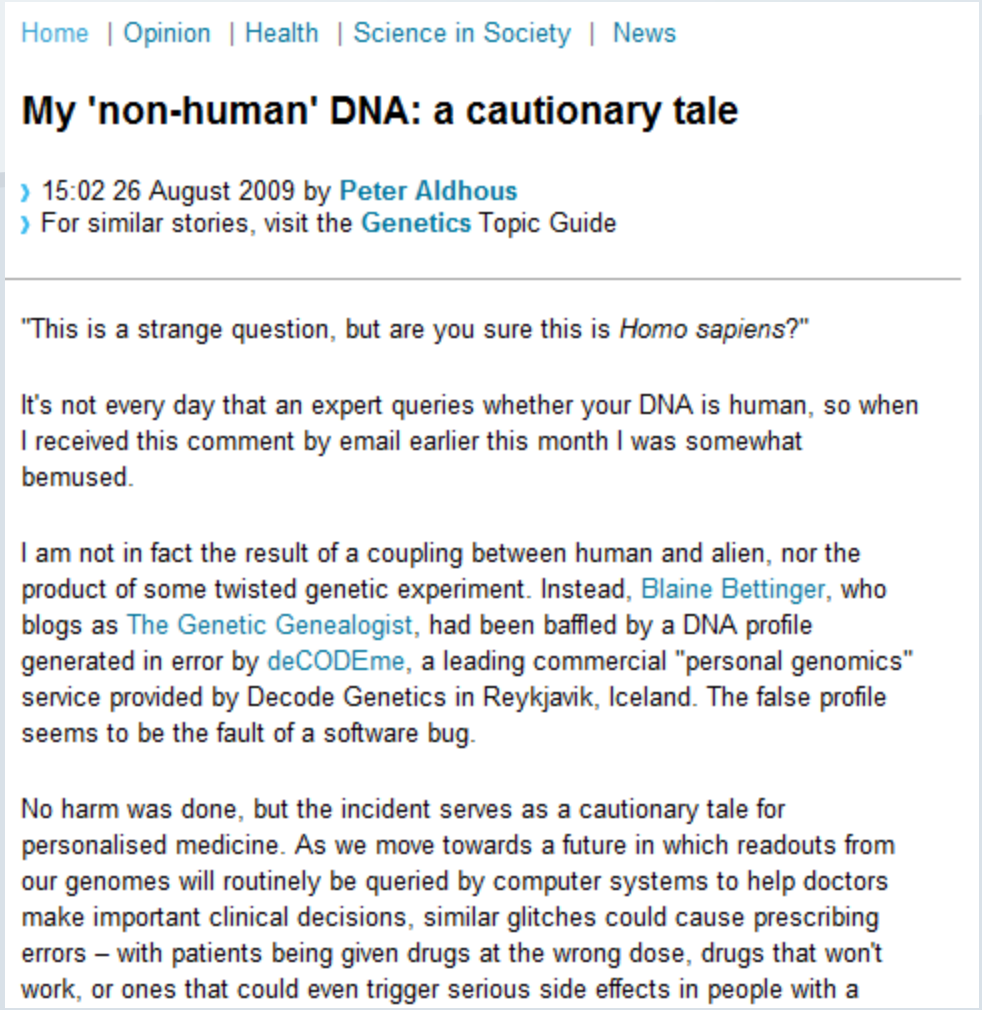
NewScientist

Tools and stories: databases

Data: US Food and Drug Administration's database of clinical investigators, joined to data on disciplinary actions from state medical boards. (Also FDA's list of disqualified investigators, and its database of inspections of clinical sites.)

Findings: Dozens of doctors selected to work on clinical trials over the past five years had previously been censured by state medical boards for problems with patient care; some had their own problems with substance abuse.

Tools and stories: databases



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My 'non-human' DNA: a cautionary tale

› 15:02 26 August 2009 by **Peter Aldhous**
› For similar stories, visit the **Genetics** Topic Guide

"This is a strange question, but are you sure this is *Homo sapiens*?"

It's not every day that an expert queries whether your DNA is human, so when I received this comment by email earlier this month I was somewhat bemused.

I am not in fact the result of a coupling between human and alien, nor the product of some twisted genetic experiment. Instead, Blaine Bettinger, who blogs as The Genetic Genealogist, had been baffled by a DNA profile generated in error by deCODEme, a leading commercial "personal genomics" service provided by Decode Genetics in Reykjavik, Iceland. The false profile seems to be the fault of a software bug.

No harm was done, but the incident serves as a cautionary tale for personalised medicine. As we move towards a future in which readouts from our genomes will routinely be queried by computer systems to help doctors make important clinical decisions, similar glitches could cause prescribing errors – with patients being given drugs at the wrong dose, drugs that won't work, or ones that could even trigger serious side effects in people with a

Data: Downloads of my own genetic scans, performed by 23andMe and DeCode Genetics. Corresponding data for my DNA markers read from the same companies' online "genome browsers".

Findings: DeCode had a glitch in its database software that could cause the presentation of an erroneous mitochondrial DNA profile in its genome browser.

NewScientist

DeCode's genome browser

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Record	Position (Human NCBI Build 36)	Position (CRS)	23andMe ID	23andMe Variation	23andMe Download Genotype	23andMe Browser Genotype	23andMe Consistency	DeCodeMe ID	DeCodeMe Variation	DeCodeMe Download Genotype	DeCodeMe Browser Genotype	DecodeMe Consistency	Consistency between 23andMe and DeCodeMe Downloads
20	19	2887	2885	rs2854130	C/T	T	T	Consistent	MitoT2887C	C/T	T	No data	Data in down	Consistent
21	20	3012	3010	rs3928306	A/G	A	A	Consistent	MitoG3012A	A/G	A	A	Consistent	Consistent
22	21	3198	3197	rs2854131	C/T	T	T	Consistent	MitoT3198C	C/T	T	T	Consistent	Consistent
23	22	3349	3348	rs41423746	A/G	A	A	Consistent	MitoA3349G	A/G	A	A	Consistent	Consistent
24	23	3395	3394	rs41460449	C/T	T	T	Consistent	MitoT3395C	C/T	T	C	Mismatch	Consistent
25	24	3481	3480	rs28358584	A/G	A	A	Consistent	MitoA3481G	A/G	A	G	Mismatch	Consistent
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27	26	3667	3666	rs28357968	A/G	G	G	Consistent	MitoG3667A	A/G	G	G	Consistent	Consistent
28	27	3721	3720	rs41355750	A/G	A	A	Consistent	MitoA3721G	A/G	A	G	Mismatch	Consistent
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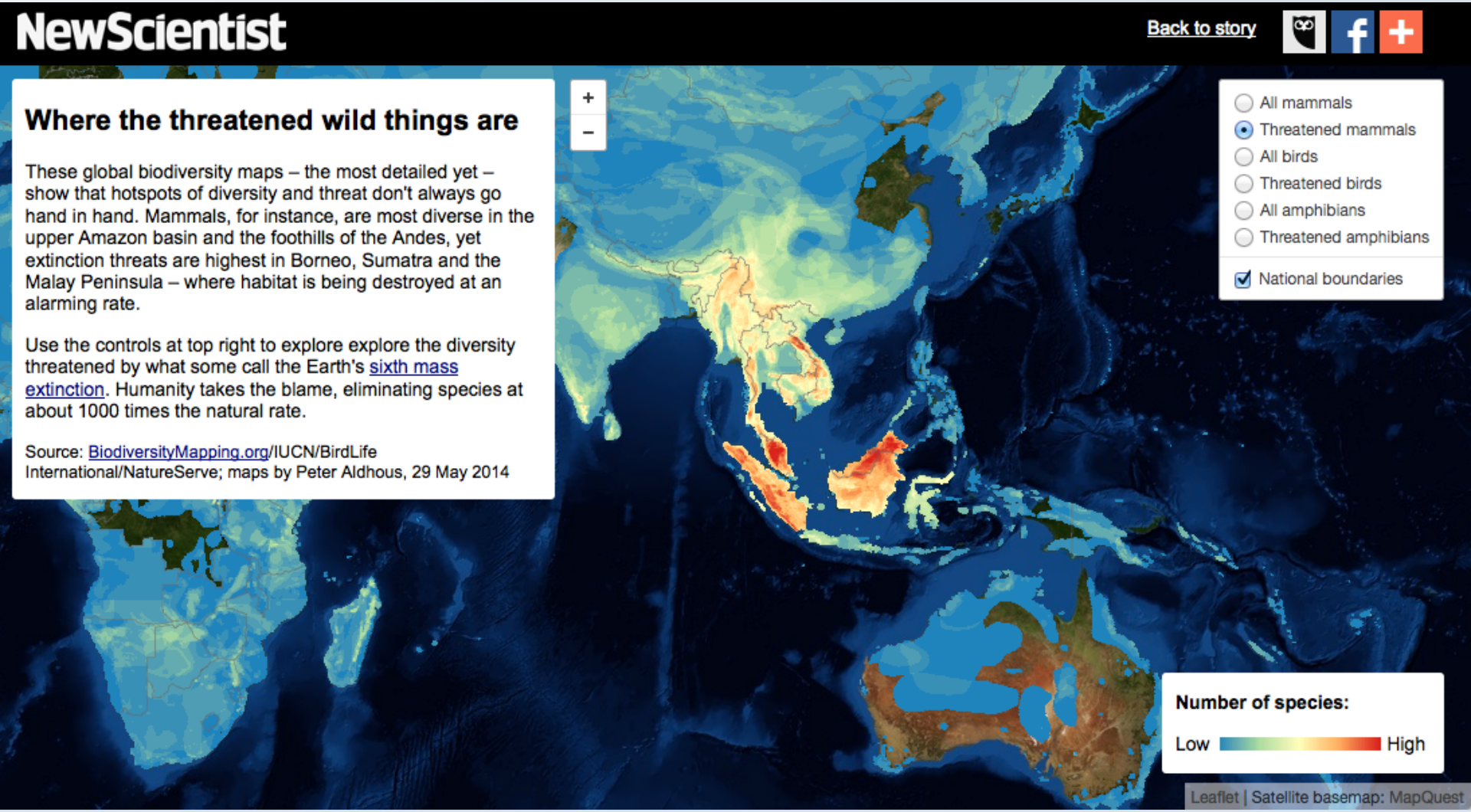
35	34	4562	4561	i1000011	C/T	T	T	Consistent	MitoT4562C	C/T	T	C	Mismatch	Consistent
36	35	4770	4769	rs3021086	A/G	G	G	Consistent	MitoG4770A	A/G	G	A	Mismatch	Consistent
37	36	4821	4820	rs28357977	A/G	G	G	Consistent	MitoG4821A	A/G	G	G	Consistent	Consistent
38	37	4825	4824	rs28357978	A/G	A	A	Consistent	MitoA4825G	A/G	A	No data	Data in down	Consistent
39	38	4884	4883	rs28357979	C/T	C	C	Consistent	MitoC4884T	C/T	C	T	Mismatch	Consistent
40	39	4918	4917	rs28357980	A/G	A	A	Consistent	MitoA4918G	A/G	A	A	Consistent	Consistent
41	40	4978	4977	rs28357981	C/T	T	T	Consistent	MitoT4978C	C/T	T	C	Mismatch	Consistent

Tools and stories: putting data onto maps



Tools and stories: putting data onto maps

The Seattle Times

Logging and landslides: What went wrong?

When Weyerhaeuser began clear-cutting the Douglas firs on the slopes surrounding Little Mill Creek, local water officials were on edge. Some of these lands had slid decades ago, after an earlier round of logging. They worried new slides could dump sediments into the mountain stream and overwhelm a treatment plant. Those fears came true last December.

By Hal Bernton and Justin Mayo
Seattle Times staff reporters

BOISTFORT VALLEY, Lewis County — When Weyerhaeuser began clear-cutting the Douglas firs on the slopes surrounding Little Mill Creek, local water officials were on edge.

Some of these lands had slid decades ago, after an earlier round of logging. They worried new slides could dump sediments into the mountain stream and overwhelm a treatment plant.

Those fears came true last December when a monster storm barreled in from the Pacific, drenching the mountains around the Chehalis River basin and touching off hundreds of landslides. Little Mill Creek, filled with mud and debris, turned dark like chocolate syrup.

More than three months passed before nearly 3,000 valley residents could drink from their taps again.

"I have never seen anything like this before, and I hope I never do again," said Fred Hamilton, who works for the Boistfort Valley Water Corp.

State forestry rules empower the Department of Natural Resources (DNR) to restrict logging on

PREV 1 of 7 NEXT

enlarge STEVE RINGMAN / THE SEATTLE TIMES

Data: GIS data on clear-cuts, landslides and prior studies of the hazards from the state Department of Natural Resources; logging company Weyerhaeuser's logging permits.

Findings: With little scrutiny from state geologists, Weyerhaeuser was allowed to clear-cut unstable slopes.

Using mapping software, the reporters showed that clear-cut sites that had at least half of their acreage in a moderate- to high-hazard zone accounted for a disproportionate number of landslides in December 2007 storms.

Statistical analysis, network analysis, etc:

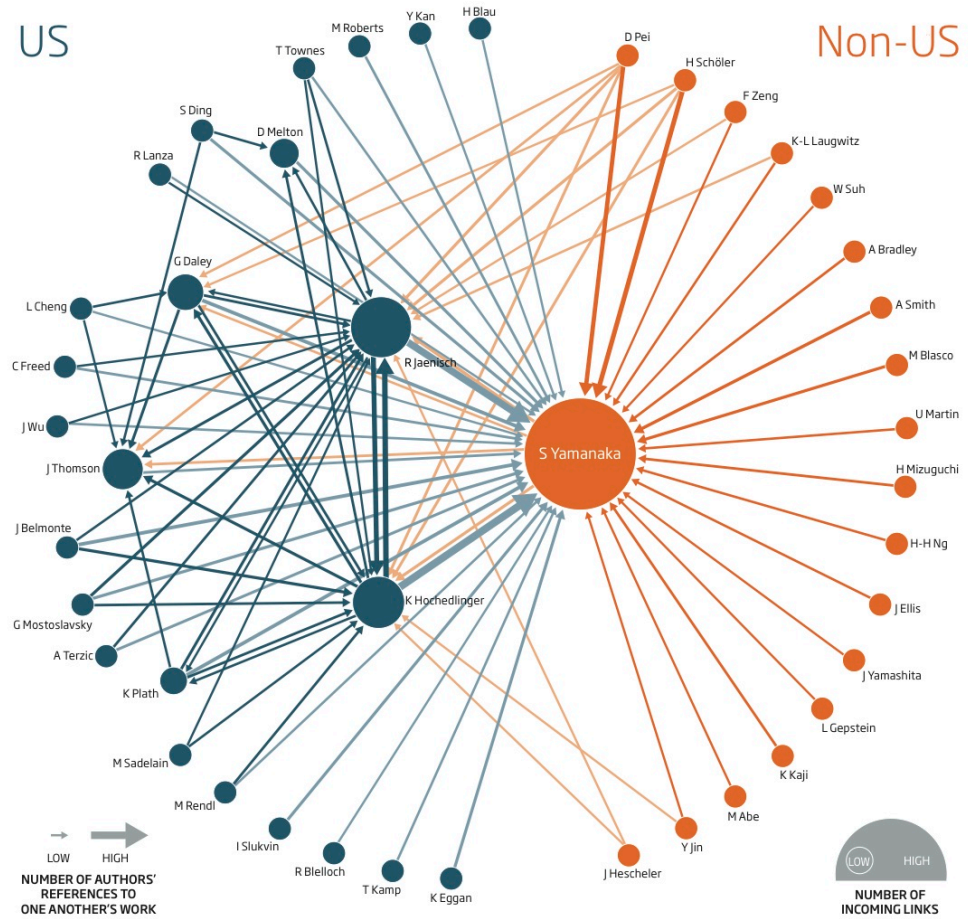
Not just for our scientist sources

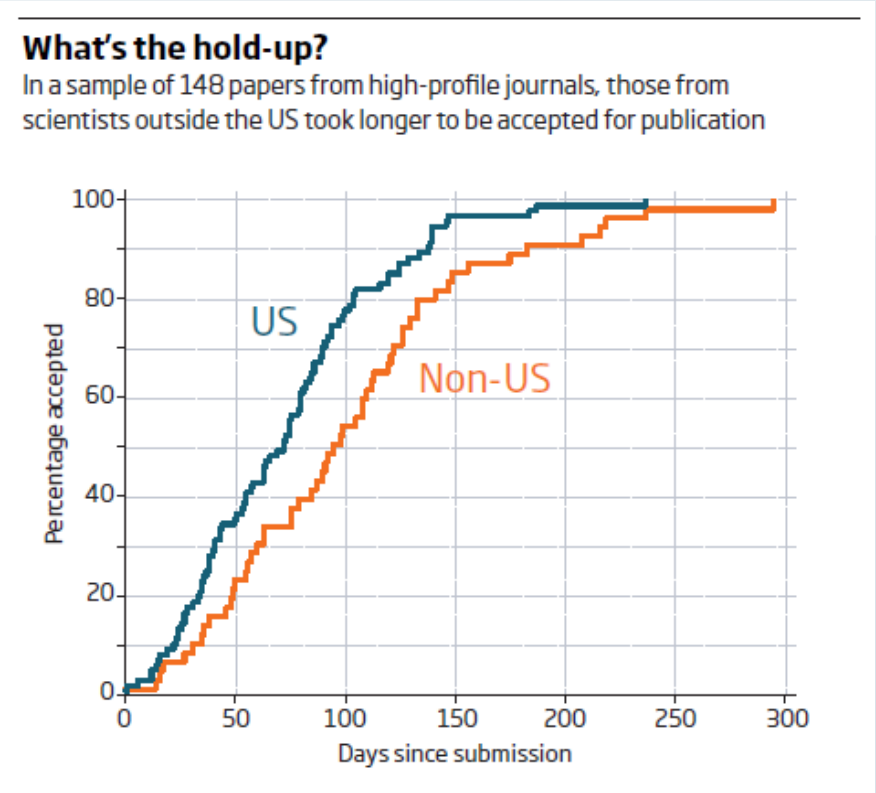
NewScientist

THE STEM CELL WARS

When a Nobel prize is up for grabs, do scientists across the globe compete on a level playing field? **Peter Aldhous** investigates

The most influential players in cellular reprogramming are revealed by recording how many times the scientists have referred to each other's work. Each link shows where one researcher cited another four or more times in papers in leading journals (for analysis, see "The strongest link", below right)



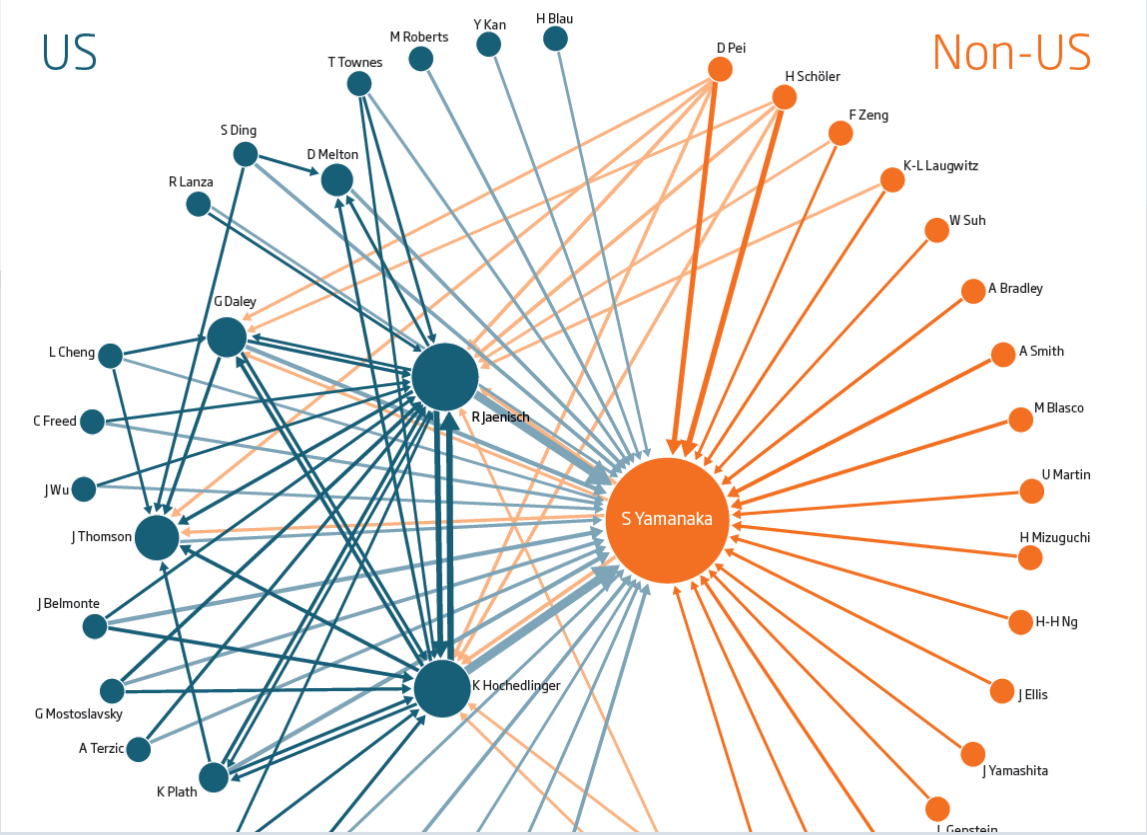


Data: Time-to-acceptance for papers involving "induced pluripotent stem cells" – an exciting alternative to embryonic stem cells which later won their discoverer a Nobel prize.

Data preparation and analysis: Searches and downloads from Web of Science database. Annotation of spreadsheet to document time of receipt, acceptance and publication, and location of primary author. Statistical and graphical analysis of time-to-acceptance data. See methods.

Findings: Papers from corresponding authors outside the US took significantly longer to be accepted for publication

NewScientist



NewScientist

Data: Citations between primary authors of papers on iPS cells.

Data preparation and analysis: Citation information extracted from Web of Science using academic bibliometric software; database queries to link the citations by primary author. Manual checking for errors. Then analysis of network graph. See methods.

Findings: The citation network graph maps influence and connections in the field. Does this help explain why non-US scientists seem to be losing the race to publish?

nature

Data: Metadata for 34,000+ papers published in *PNAS* from 2004-2013, plus citation counts, scraped from the journal's website.

Findings: Few academy members "contribute" papers at close to the maximum rate, but this group includes several members of the journal's editorial board. Contributed papers are cited less often than those reviewed in the normal way – although the gap has narrowed in recent years.

The *inside* track

Members of the US National Academy of Sciences have long enjoyed a privileged path to publication in the body's prominent house journal. ***Meet the scientists who use it most heavily.***

BY PETER ALDHOUS

In April, the US National Academy of Sciences elected 105 new members to its ranks. Academy membership is one the most prestigious honours for a scientist, and it comes with a tangible perk: members can submit up to four papers per year to the body's high-profile journal, the venerable *Proceedings of the National Academy of Sciences* (*PNAS*), through the 'contributed' publication track. This unusual process allows authors to choose who will review their paper and how to respond to those reviewers' comments.

For many academy members, this privileged path is central to the appeal of *PNAS*. But to some scientists, it gives the journal the appearance of an old boys' club. "Sound anachronistic? It is," wrote biochemist Steve Caplan of the University of Nebraska, Omaha, in a 2011 blog post that suggested the contributed track could be used as a "dumping ground" for certain papers. Editors at *PNAS* have strived to dispel that perception.

With *PNAS* currently celebrating its centenary, the news team at *Nature* decided to examine the contributed track, both to assess its scientific impact and to see which members use it most heavily and why. After analysing a decade's worth of *PNAS* papers, we found that only a small number of scientists have used the track at close to the maximum allowable rate. The group includes some of the biggest names in science, and six of them sit on the editorial board at the journal. These scientists say the main motivator for using the contributed track is an intense frustration with the peer-review process at other high-profile journals, which they argue has become excessive and laborious.

Our analysis also suggests that the efforts by *PNAS* to prevent abuse of the contributed track and to boost the quality of papers published by this route are bearing fruit. Although contributed *PNAS* papers attract fewer citations than those handled through the journal's standard review process, the gap has narrowed in recent years. "We have worked really hard at this," says Alan Fersht, a biophysicist at the University of Cambridge, UK, one of *PNAS*'s associate editors and a heavy user of the contributed track.

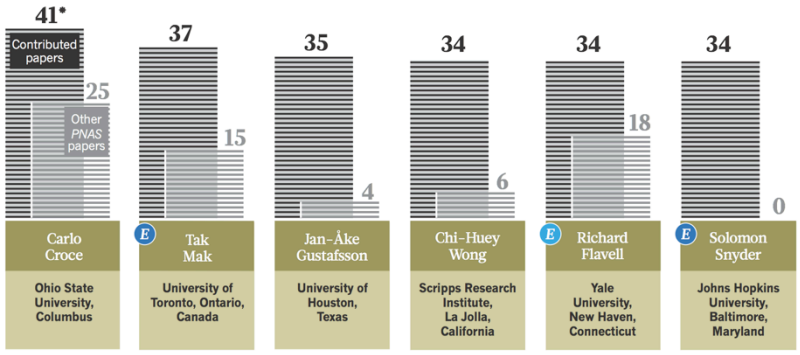
A PRIVILEGE TO PUBLISH

An inside track to publication for academy members rests deep in *PNAS*'s DNA. The journal was established in 1914 with the explicit goal of publishing members' "more important contributions to research" in addition to "work that appears to a member to be of particular importance". That remit led to the creation of two publishing tracks: contributed and 'communicated' papers -- manuscripts sent by non-members to colleagues in the academy, who shepherded them through review.

Who are the power users?

Just 13 members of the US National Academy of Sciences consistently published three or more papers per year in the 'contributed track' at *PNAS* during the past decade. 'Other' papers include direct submissions, reviewed in the normal way, and papers contributed or communicated by other members.

Nobel prizewinner
E Member of *PNAS* editorial board
E Former member of editorial board



* Total includes one paper submitted in 2003.

nature

Data preparation and analysis: After the web scraping, extensive data cleaning to remove variants of authors' names, giving one name format for each academy member. Database queries to count papers of different types from each academy member. Statistical analysis to analyse citation rates of different classes of paper. See methods.

TABLE 1

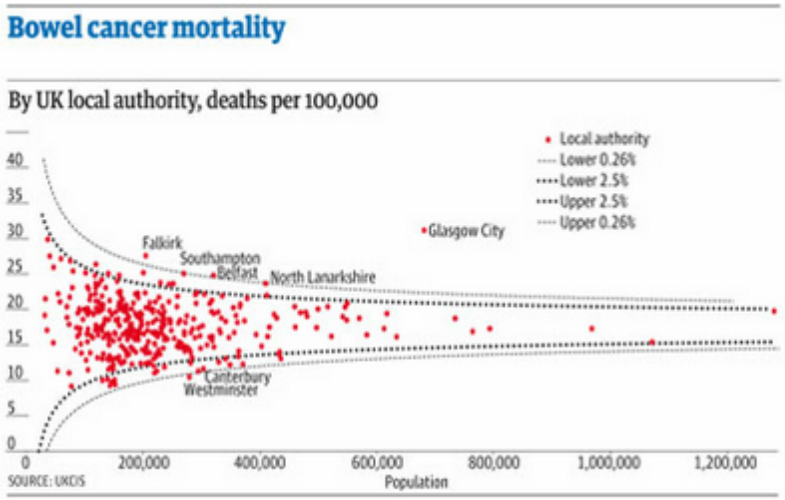
	Contributed papers			Communicated papers		
Period	Effect size	95% confidence interval	*p*	Effect size	95% confidence interval	*p*
2004–11	−4.43%	−5.39% to −3.47%	<0.001	−0.53%	−1.70% to 0.65%	0.37
2004	−6.60%	−9.39% to −3.72%	<0.001	−3.45%	−6.37% to −0.44%	<0.05
2005	−7.39%	−10.01% to −4.70%	<0.001	−1.02%	−3.94% to 1.99%	0.5
2006	−7.01%	−9.63% to −4.32%	<0.001	−1.42%	−4.23% to 1.47%	0.33
2007	−5.81%	−8.52% to −3.01%	<0.001	−3.67%	−6.48% to −0.78%	<0.05
2008	−3.41%	−6.14% to −0.60%	<0.05	−0.12%	−3.25% to 3.11%	0.94
2009	−1.89%	−4.65% to 0.94%	0.19	1.53%	−1.85% to 5.03%	0.38
2010	−3.48%	−6.06% to −0.83%	<0.05	−2.50%	−6.58% to 1.76%	0.25
2011	−1.14%	−3.70% to 1.48%	0.39	N/A	N/A	N/A

Beware running with scissors:
Seek expert help if you need rigorous statistical analysis!

DIY statistical analysis: experience the thrill of touching real data

The story of one man's efforts to re-analyse the stats behind a BBC report on bowel cancer is a heartwarmingly nerdy one

Ben Goldacre
guardian.co.uk, Friday 28 October 2011 17.31 EDT
Comments (60)



A funnel plot of bowel cancer mortality rates in different areas of the UK

The BBC has found a story: "'Threefold variation' in UK bowel cancer rates". The average death rate across the UK from bowel cancer is 17.9 per 100,000 people, but in some places it's as low as 9, and in some places it's as high as 30. What can be causing this?

Journalists tend to find imaginary patterns in statistical noise, which we've covered many times before. But this case is particularly silly, as you will see, and it has a heartwarming, nerdy twist.

Society
Cancer · Bowel cancer

Science
Cancer

Media
BBC

Series
Bad science

More from Comment is free on

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Even Nate Silver can get his fingers burned …

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18 MAR 2014

Nate Silver's new FiveThirtyEight dishes out statistical nonsense on health coverage.

3 Comments

Author: Paul Raeburn

Tags: 538, fivethirtyeight, fivethirtyeight.com, Nate Silver, presidential election

Share

Nate Silver's **fivethirtyeight.com** relaunched yesterday at its new home--**ESPN**--vowing to focus its coverage on five areas: politics, economics, life, sports--and science.

The inclusion of science was a surprise to me. And possibly a mistake, unless FiveThirtyEight can quickly improve the quality of the "science" it's publishing. The lead story on the relaunched site's first day--"Finally, a Formula for Decoding Health News"--was abysmal.

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… and be forced to backtrack

FiveThirtyEight

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DataLab

A NOTE TO OUR READERS

FiveThirtyEight to Commission Response to Disputed Climate Article

11:50 AM | MAR 28 | By NATE SILVER

FiveThirtyEight relaunched less than two weeks ago. It's been a heck of a learning experience. When you're trying something new, it's going to take some time to get everything right, and you're going to get criticism from all quarters.

FiveThirtyEight staff

Tweets from a list by FiveThirtyEight

Follow our writers and editors on Twitter.

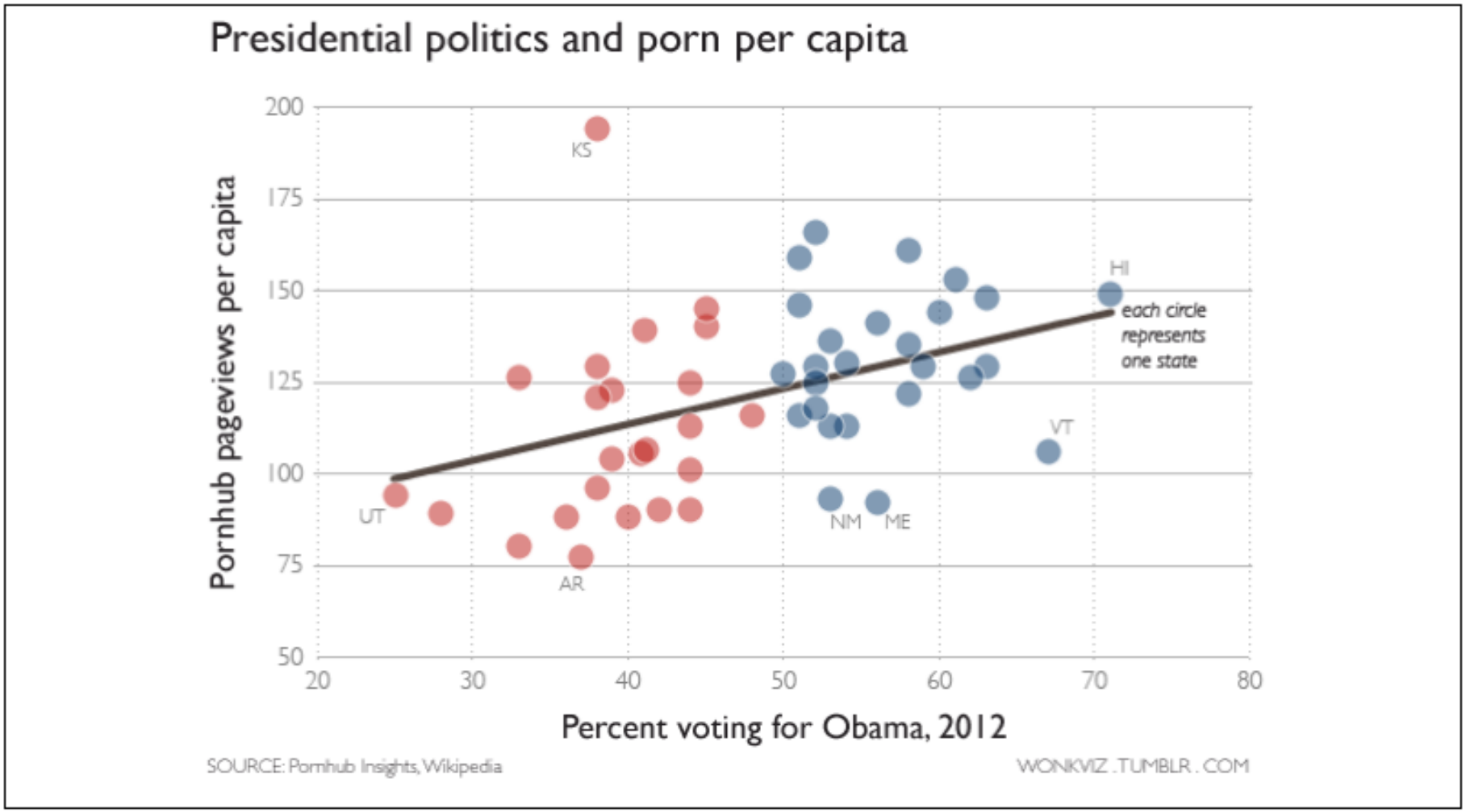
Marie P Donoghue 1h
@mariepdonoghue
Love this story of female mentoring -- A Woman's Place Is Running the Kitchen nyti.ms/1ffNmSB
Show Summary

Micah Cohen 3h
@micahcohen
.@nationaljournal that last paragraph is spot on, and neatly summarizes the @FiveThirtyEight view too
Expand

Jeanne Whalen 7h
@JeanneWhalen
Some employers now see autism as an asset, not a liability. By @ShirleySWangWSJ on.wsj.com/1peuav3

DISTRUST YOUR DATA

Jacob Harris on Six Ways to Make Mistakes with Data



(Chris Ingraham)

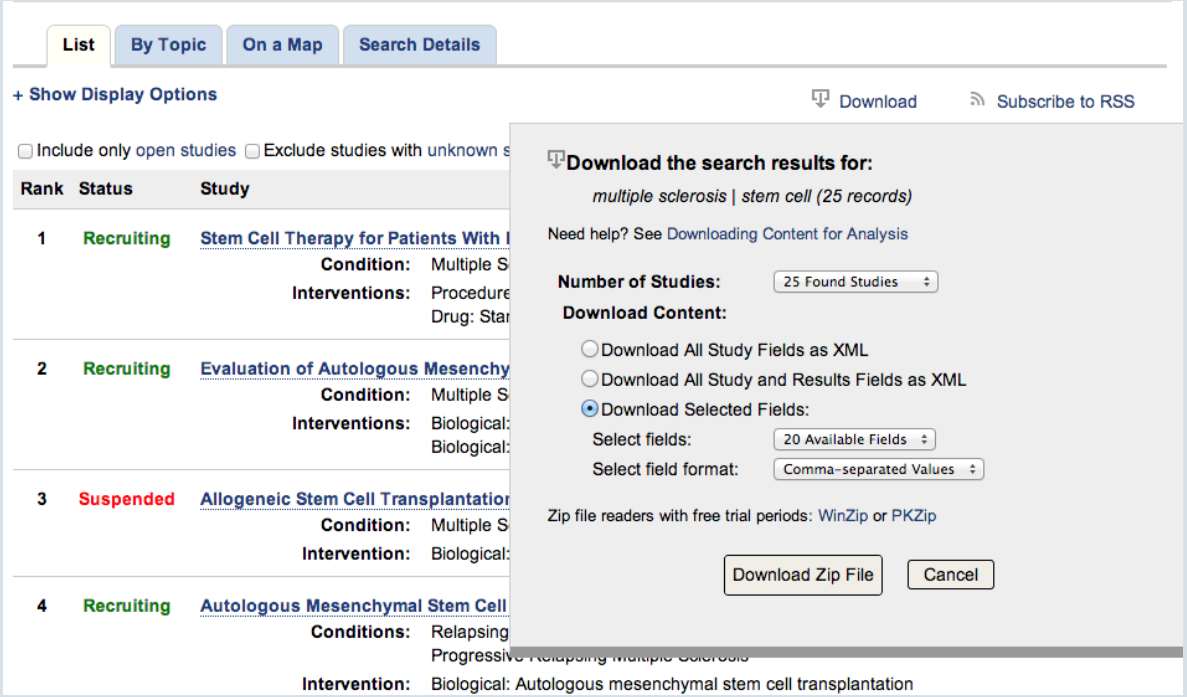
Read this before committing an act of data journalism!

Why aren’t we seeing more data-driven science journalism?

Some basic data resources for science reporters

Using web search forms

- Look for the advanced search page, which will offer options to customize your search.
- Read the Help or FAQs to learn how the search works. Does it use Boolean logic (AND, OR, NOT)? Do quote marks allow you to search for a specific phrase? Is there a wildcard character, such as * or **%**, that allows you to look for variations on a search term?
- Look for download options once you've found the data you need:



Scientific literature

PubMed
https://www.ncbi.nlm.nih.gov/pubmed/
http://www-ncbi-nlm-nih-gov.oca.ucsc.edu/pubmed

Web of Science
http://bit.ly/YmJtGM

Google Scholar
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Agricola
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Clear presentation of claims, abstract, diagrams etc.

Grant funding

National Institutes of Health RePORTER
http://projectreporter.nih.gov/reporter.cfm
Grants from NIH, with links to papers and patents arising from projects
Also **Exporter**, to download to your own database:
http://exporter.nih.gov/

National Science Foundation
http://www.nsf.gov/awardsearch/advancedSearch.jsp

Research.gov
http://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_eventName=viewQuickSearchFormEvent_so_rsr
Also includes NASA grants,
and note option to download **all** grants by year, from 2007 onwards

Clinical trials

ClinicalTrials.gov

http://www.clinicaltrials.gov

Information on more than 211,000 clinical trials in US and beyond

International Standard Randomised Controlled Trial Number Register

http://www.isrctn.com/

Information on more than 14,000 registered clinical trials

WHO International Clinical Trials Registry Platform

http://apps.who.int/trialsearch/default.aspx

Incorporates data from ClinicalTrials.gov, ISRTCN, and national trials registries.

The most comprehensive source

Understand common data formats

JSON


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[{"country":"Bahrain","income_group":"High income: non-OECD","democ_score":45.6,"infect_rate":23},
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XML


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</rows>
```

Investigating science

(with help from data)

Peter Aldhous,
Science reporter, BuzzFeed News

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@paldhous