

# Creative representation of large data sets

**"Discover: to obtain knowledge or sight of what was not known."**

# What is Data?

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# Data Visualization:

**visual representation of abstract information  
that exploits our visual perception abilities  
in order to amplify cognition**

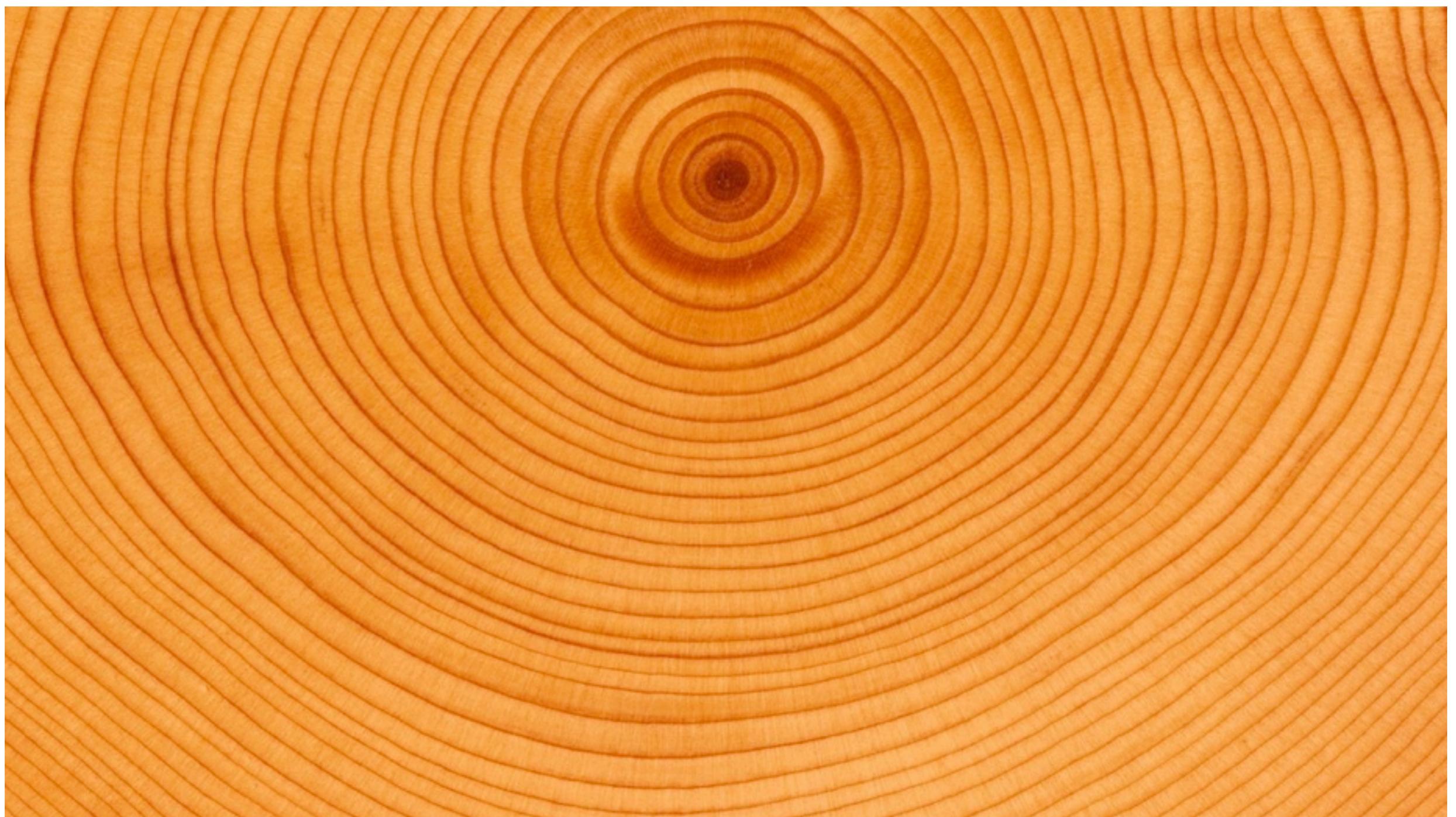
# Basic Visualization

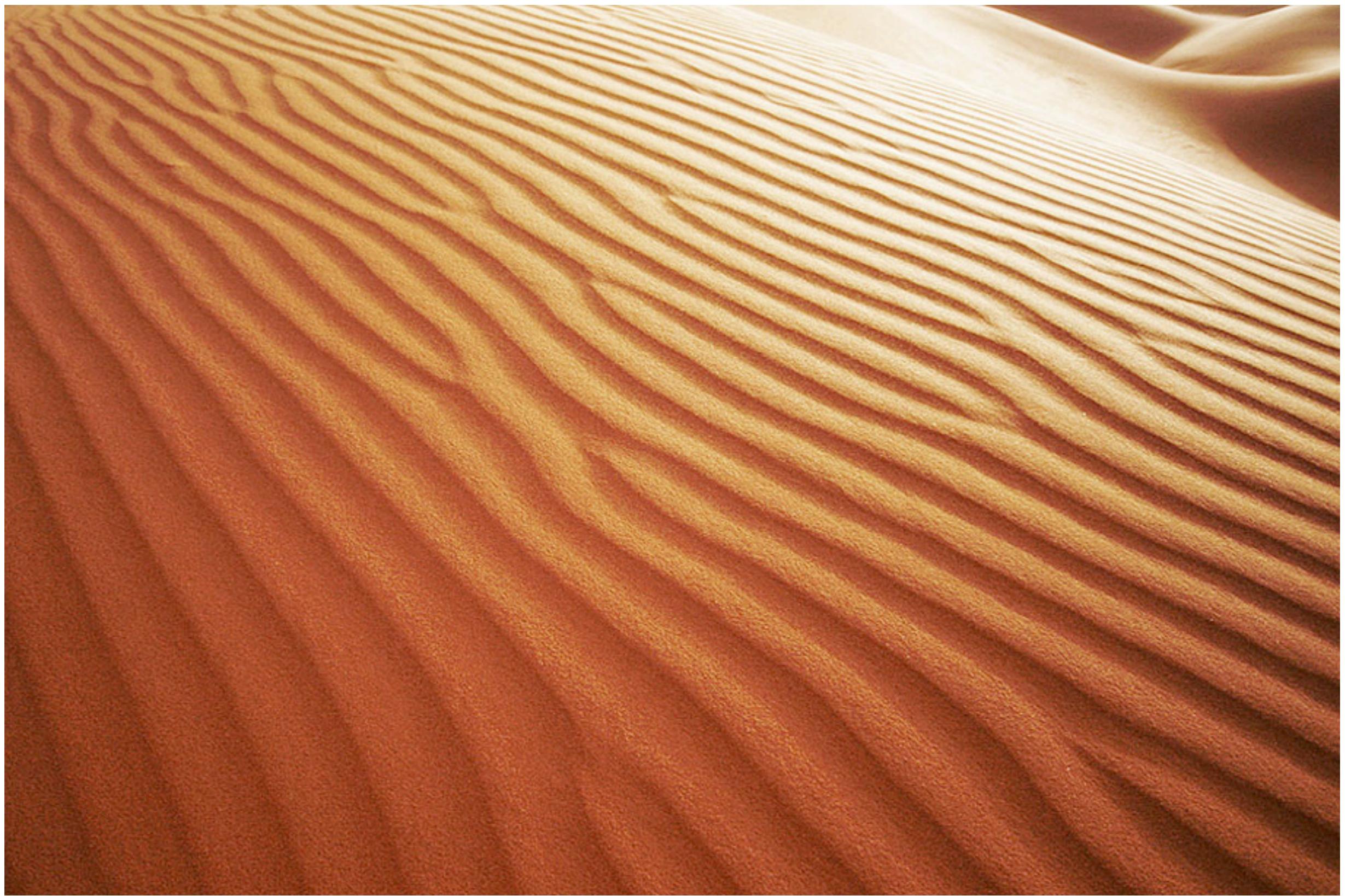
	A	B	C
1	Query	Searches	Volume
3	pga	5244	11.08230719
4	pga.com	2583	6.610499028
5	freegolfinfo	64	4.147764096
6	golf tips	1884	3.046014258
7	golf	176386	1.62022035
8	pga tour	4142	1.360985094
9	michigan football	5105	0.777705768
10	golf swing	1596	0.777705768
11	pga golf	1406	0.712896954
12	pga championship	504	0.583279326
13	mgoblue	311	0.583279326
14	putting tips	133	0.518470512
15	golf shank	22	0.453661698
16	michigan wolverines	2587	0.453661698
17	golf lessons	463	0.453661698
18	us open	6077	0.388852884
19	online golf tips	8	0.388852884
20	university of michigan	4948	0.32404407
21	golf schools	1657	0.32404407
22	how to play golf	394	0.32404407
23	free video golf lessons	5	0.32404407
25	stratton	976	0.259235256
26	swing plane	15	0.259235256

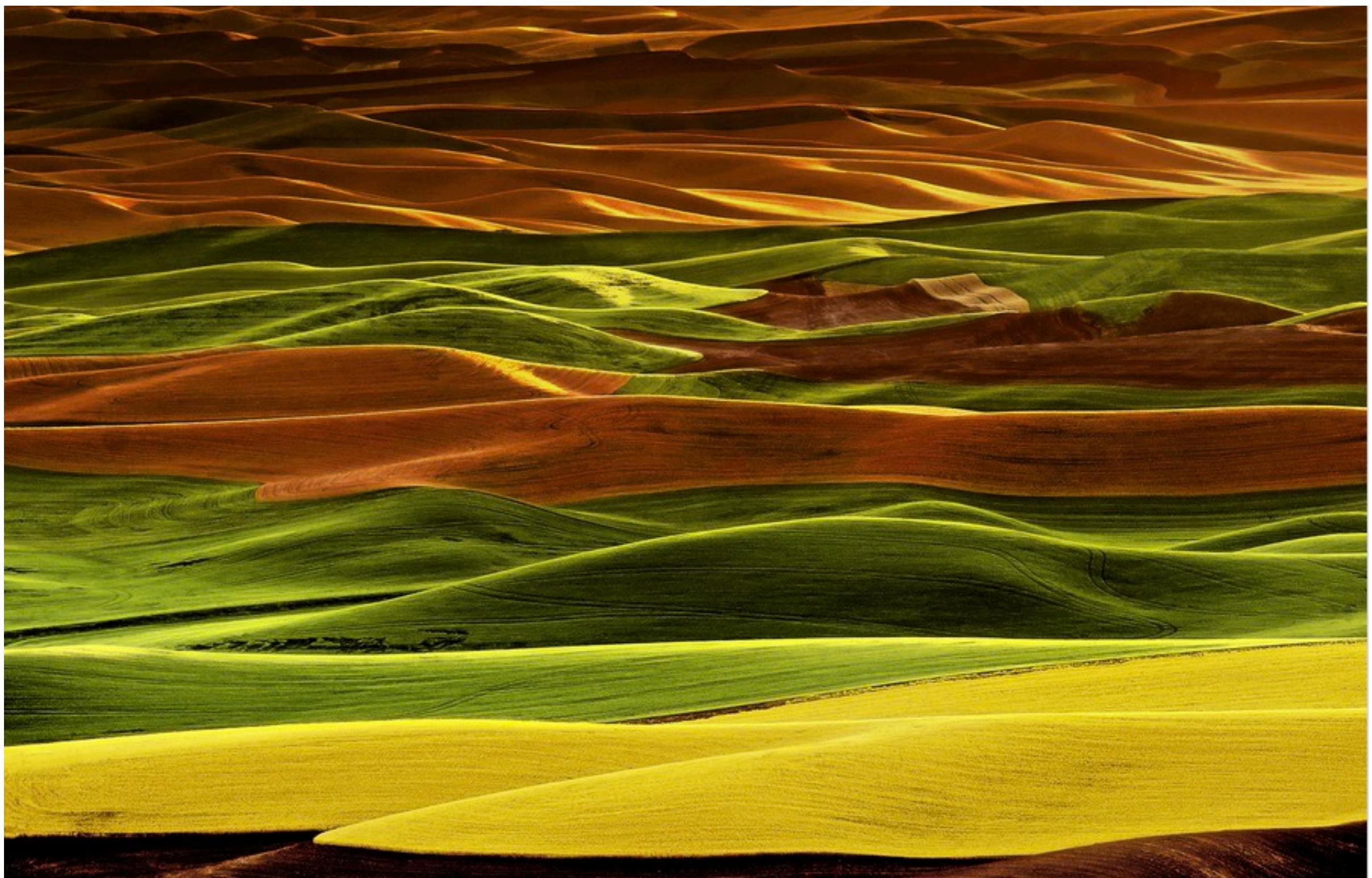
It doesn't allow to identify patterns.

# Why pattern?

**Humans are intensely visual creatures.  
Patterns can express meaning.**











Visual patterns can be surprisingly.  
**It can reveal hidden informations.**

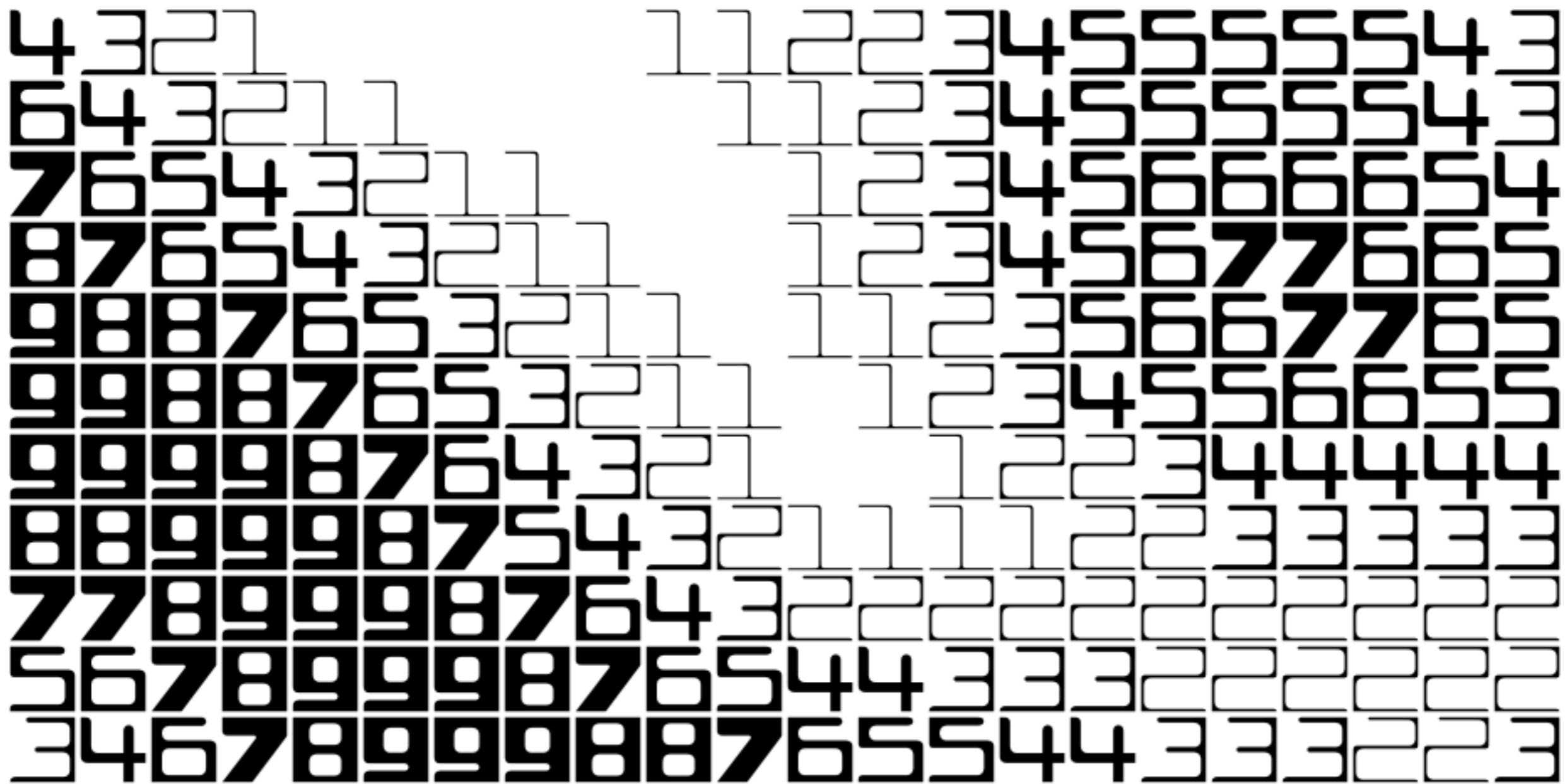
## Radiations of a microwave oven



# How to create patterns from raw data?

**The act of mapping information to visual elements.**

FatFont: a proportional correlation between the value and the ink



<http://fatfonts.org/>

# Purposes

**"The purpose of visualization is insight, not pictures"**

Ben Shneiderman

Visualization is a powerful tool to  
**discover, understand and present**  
hidden stories

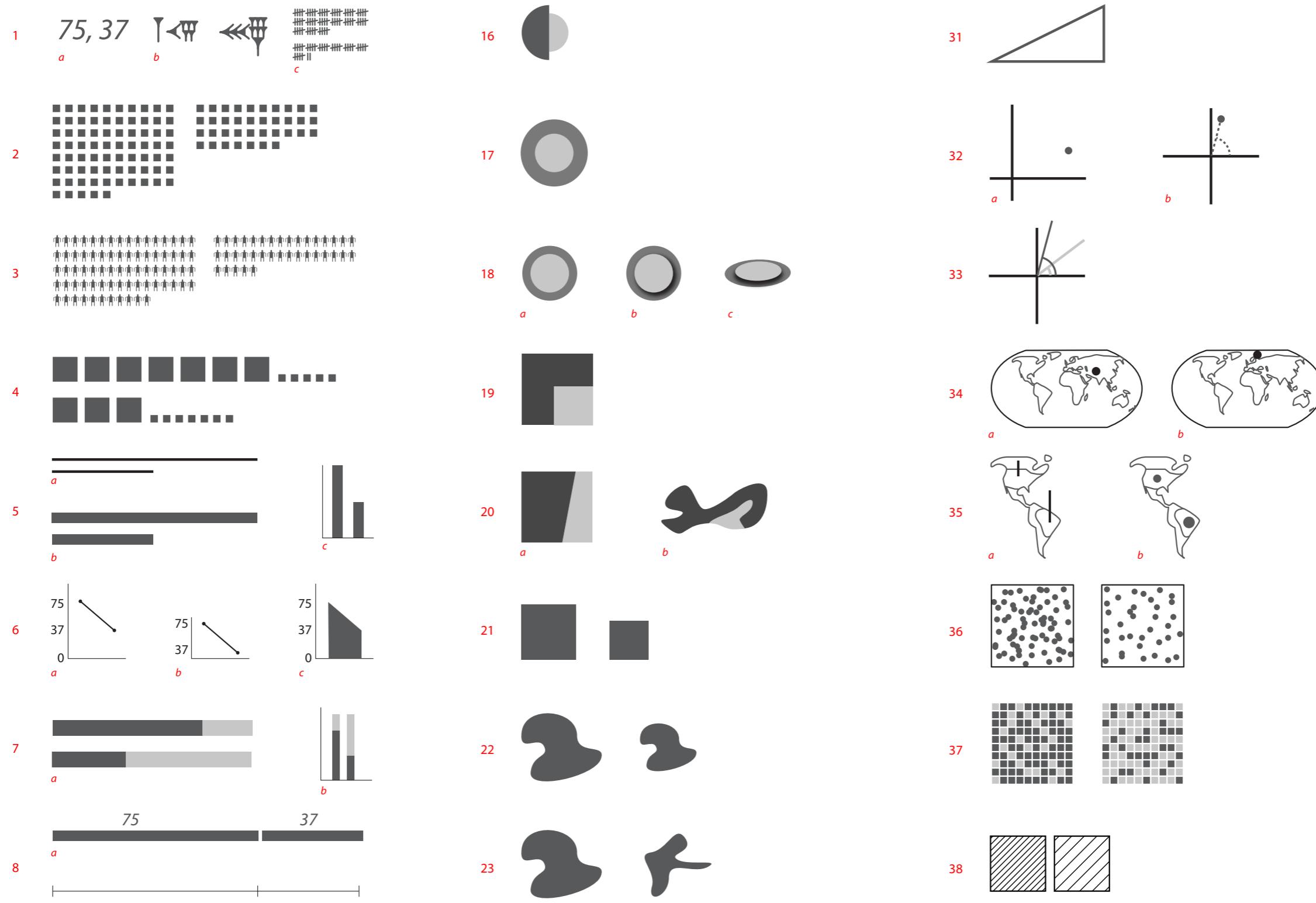
## Presentation:

- 1. Communicate:** clearly and effectively
- 2. Stimulate:** engage the viewer attention

We need a Language to

**explain the world, tell stories, point specific facts and objects,  
elaborate ambiguous messages, defend arguments,  
attack arguments and carry ideas and ideologies**

# 75, 37 multiple ways to communicate two quantities



**"Every single pixel should testify directly to content"**

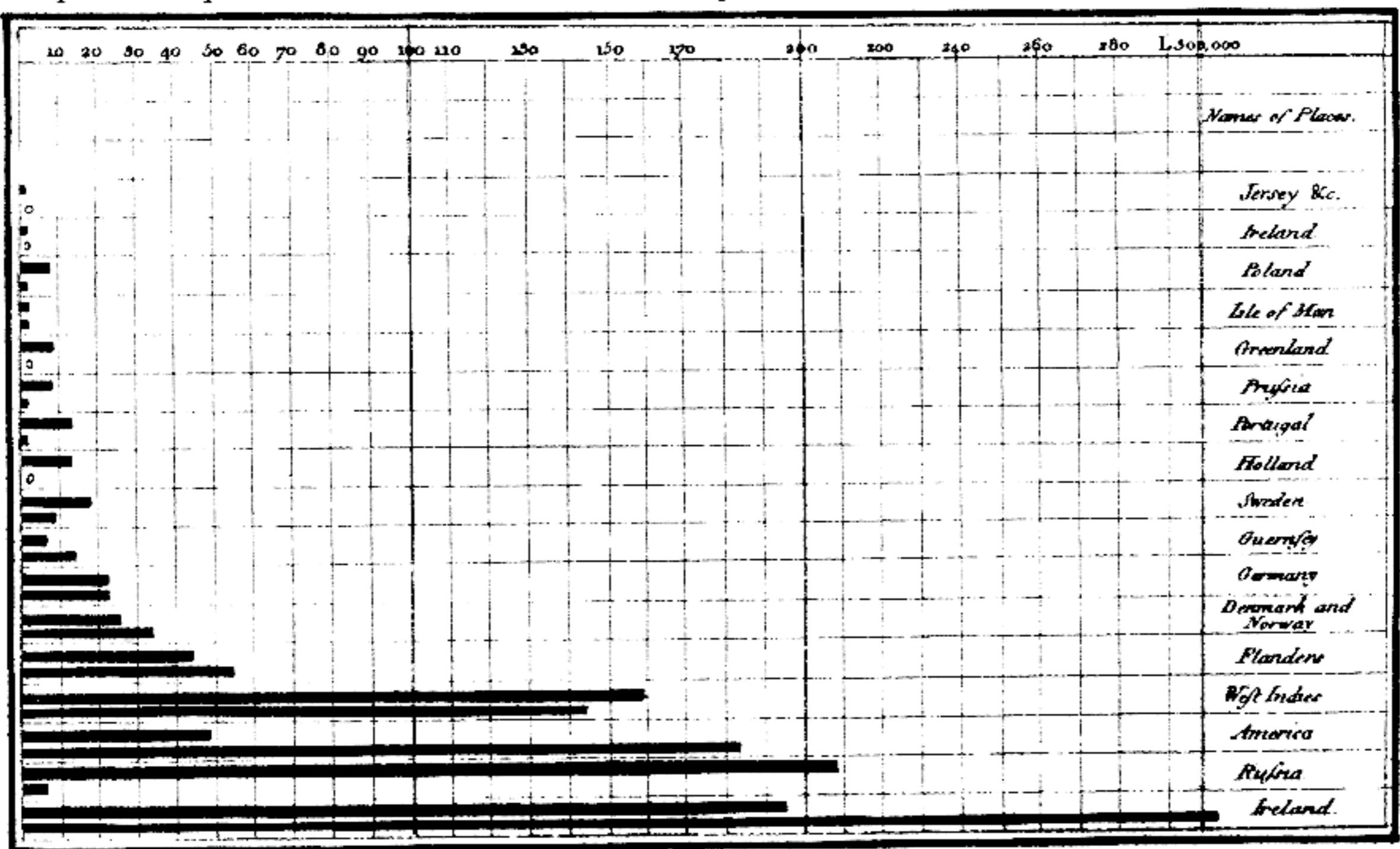
– Edward Tufte

**In charts, junk elements are those elements that can be removed without modify the meaning of the intention of the graph.**

# Early days

# William Playfair | Scotland's imports and exports (1786)

Exports and Imports of SCOTLAND to and from different parts for one Year from Christmas 1780 to Christmas 1781.



The Upright divisions are Ten Thousand Pounds each. The Black Lines are Exports the Ribbed lines Imports.  
Published at the Author's Office, January 1<sup>st</sup> 1782 by W<sup>m</sup> Playfair  
Nob<sup>r</sup> 109, St. James's Street, London.

z

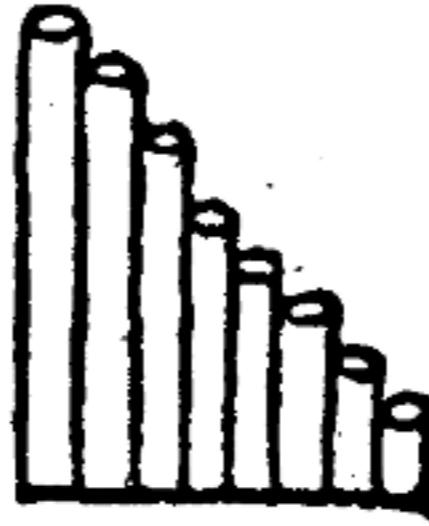
ratio reddit vniuersitatem et similitudinem  
ie. **D**iametrum vni  
us ex celius graduum  
opportos a latitudine p/  
ut ex celius graduum  
eius opportos equa-  
tum disto ut p; ex  
um secunde divisionis  
10 seruat tunc nulla  
e in latitudine tali et  
diametrum est disformis  
afformiter disformis  
idem eque distantium  
portionem sicut in se-  
tendum tamen est  
finitim ubi loquitur  
se eque distantium



**D**isformis disto

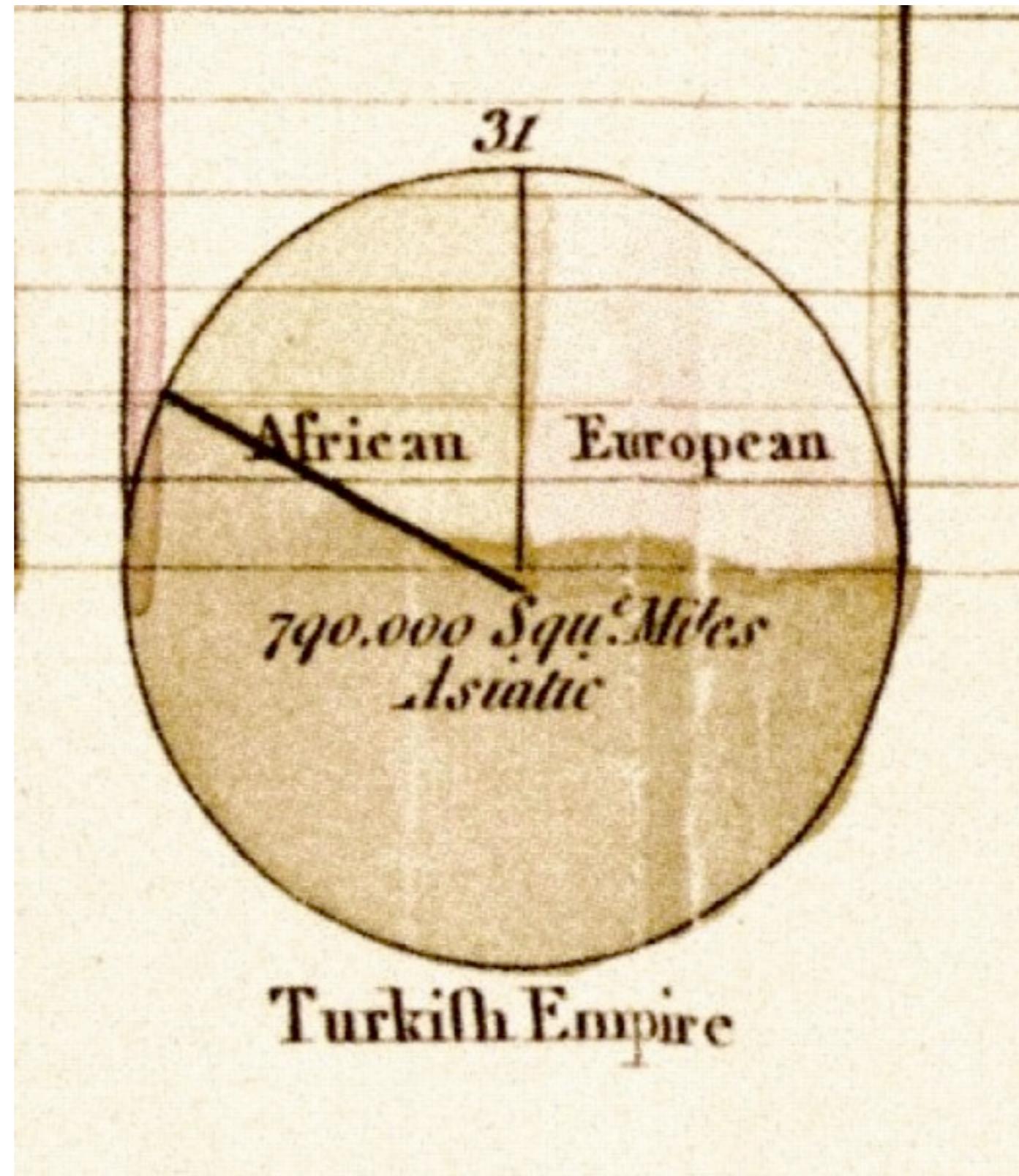


**D**isformis disto



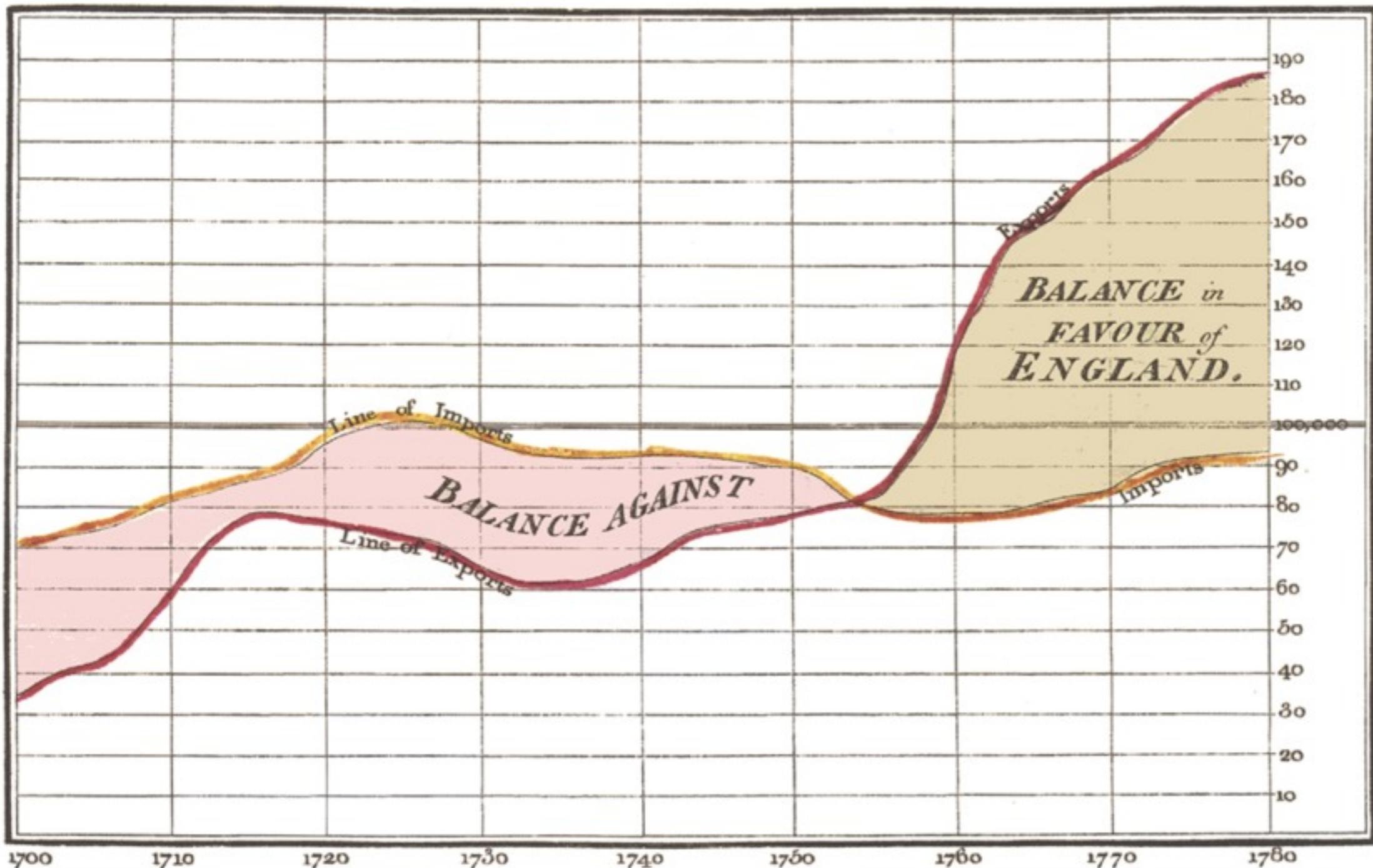
**D**isformis disto

William Playfair | Turkish Empire (1789)



# William Playfair | Exports and Imports of Denmark and Norway (1786)

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.

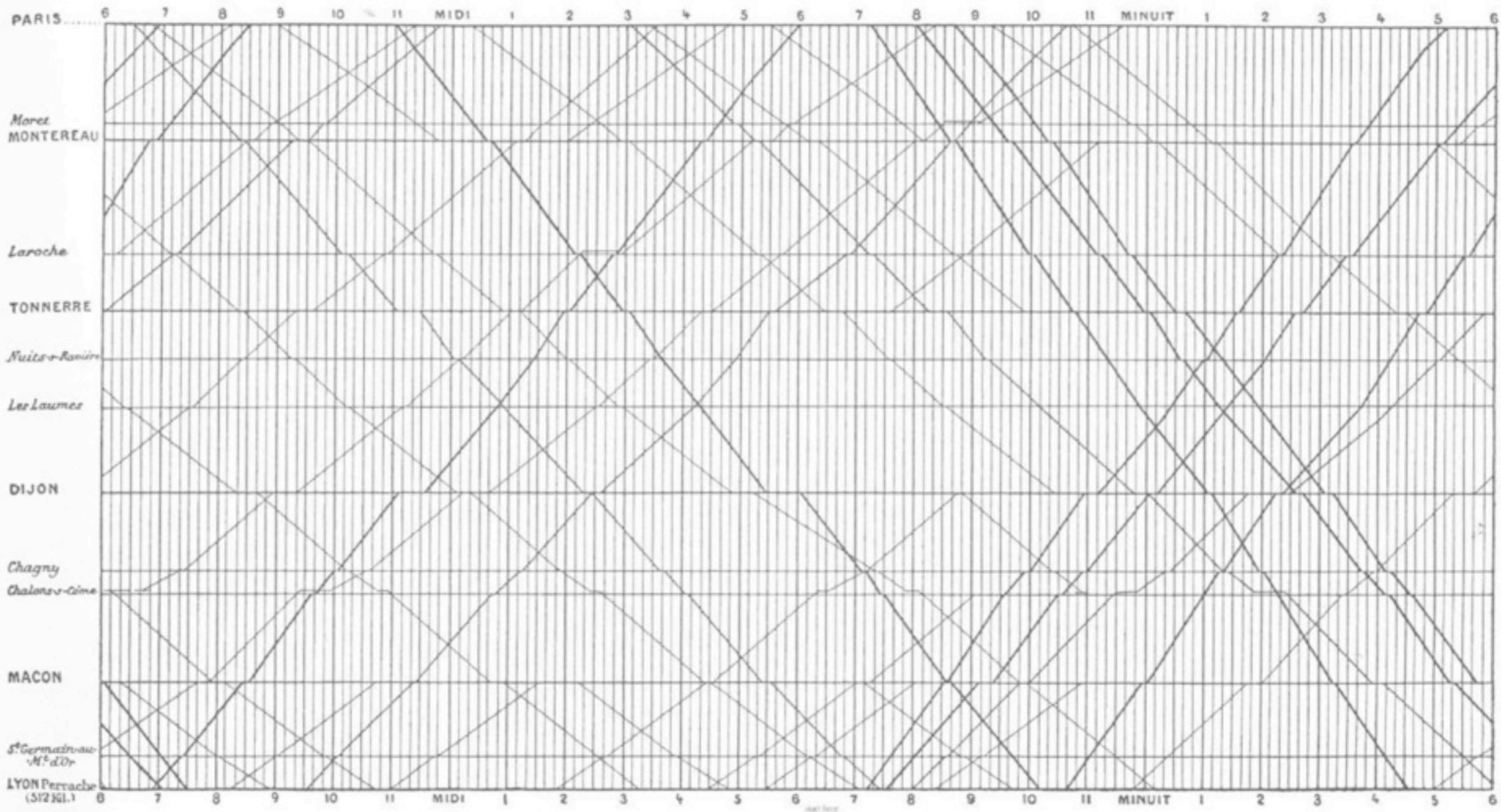


The Bottom line is divided into Years, the Right hand line into £10000 each.

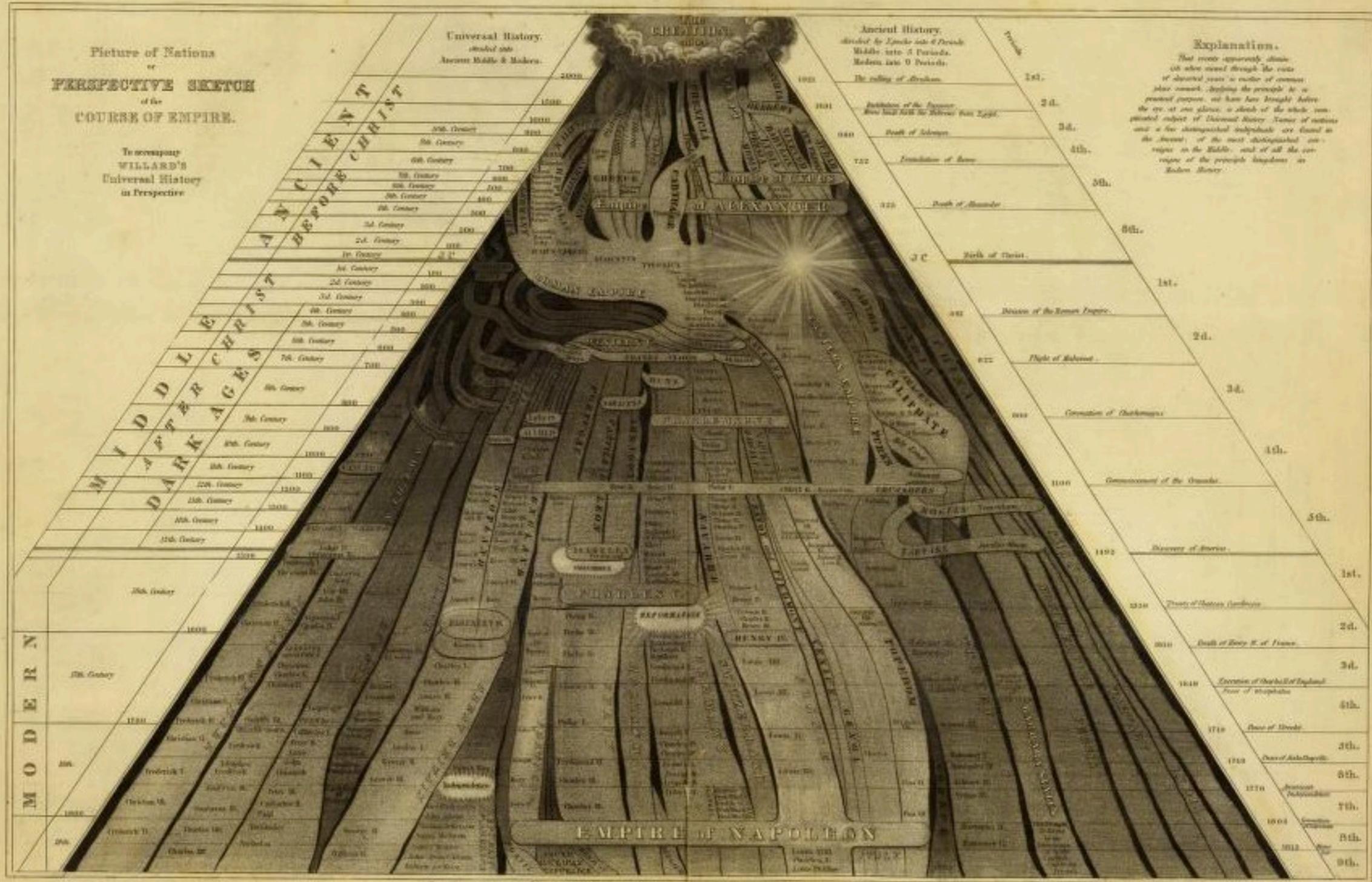
Published at the Act directed, 1<sup>st</sup> May 1786, by W<sup>m</sup> Playfair

Neale sculpt. 352, Strand, London.

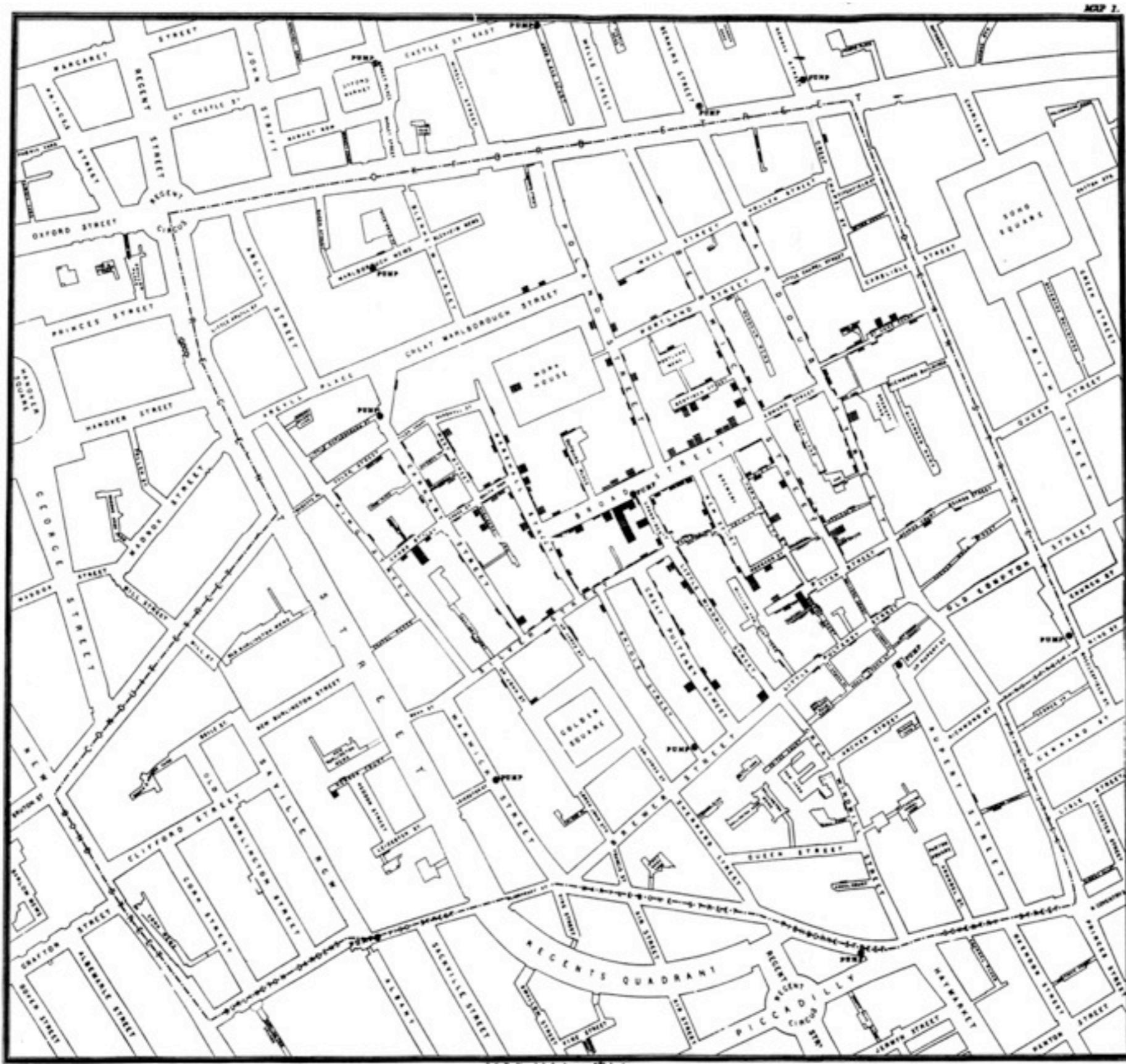
# E.J. Marey | Train Schedule Paris-Lyon (1880)



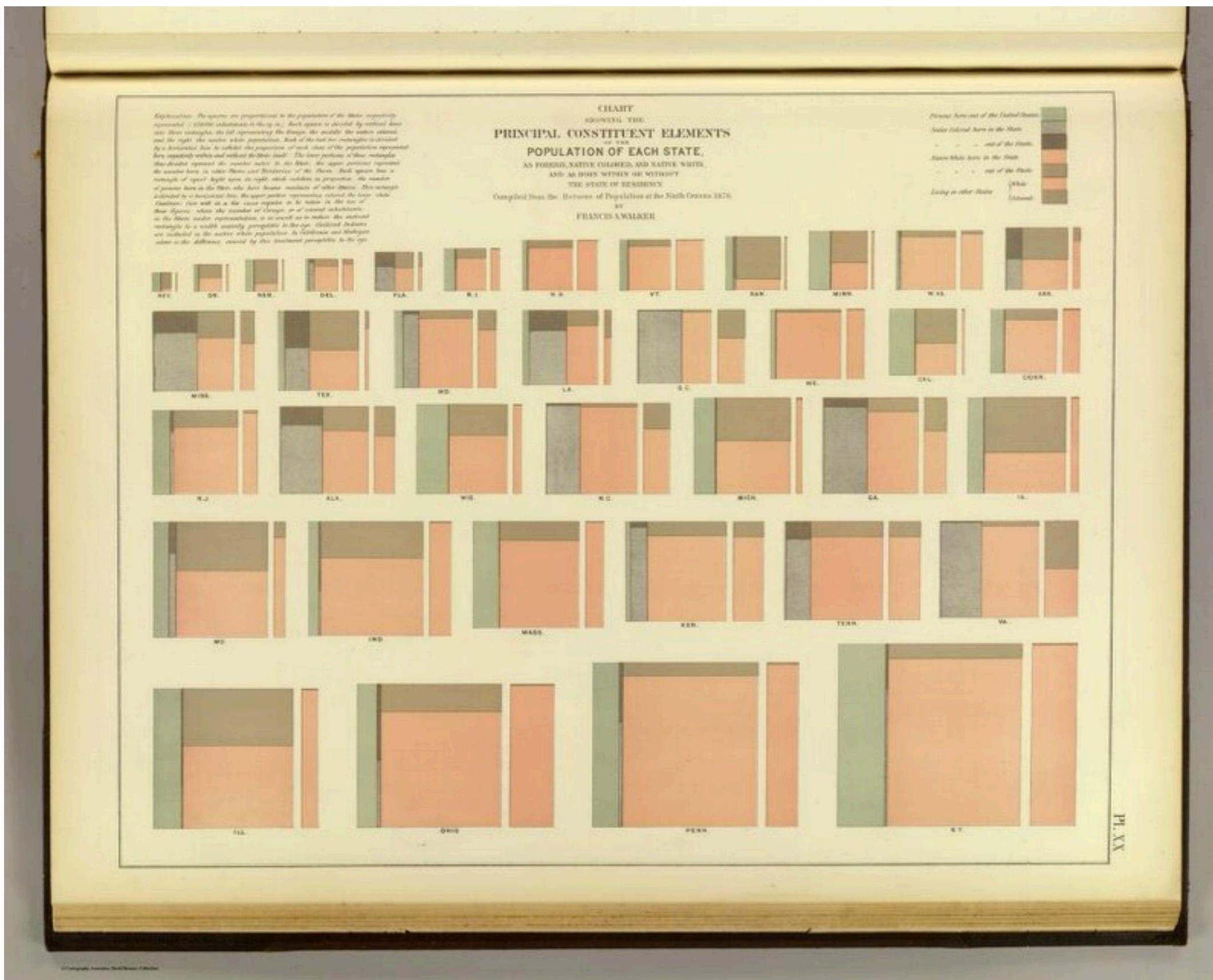
# Emma Willard | Picture of Nation: (1835)



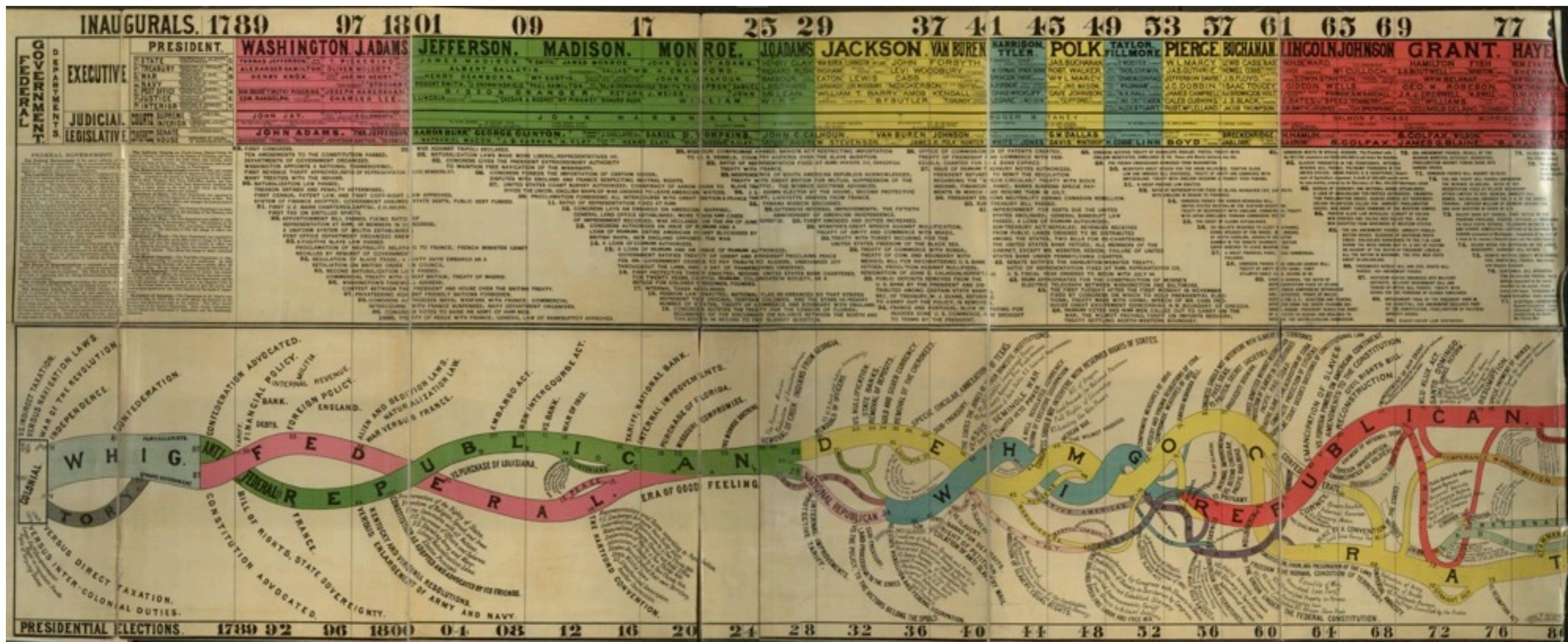
# John Snow | Communication of Cholera (1854)



# Francis Walker | Principal Constituent Elements (1874)



Walter Houghton | Conspectus of the History of Political Parties (1880)



# Charles Minard | Map of Napoleon's March (1869)

*Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.*  
Dessiné par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite

Paris, le 20 Novembre 1869.

Les nombres d'hommes perdus sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en lettres des zones. Le rouge désigne les hommes qui ont péri en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de Léger, de Fezendaac, de Chambray et le journal intime de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davout qui avaient été détachés sur Minsk et Malibow et qui rejoignirent Osscha et Wilek, avaient toujours marché avec l'armée.

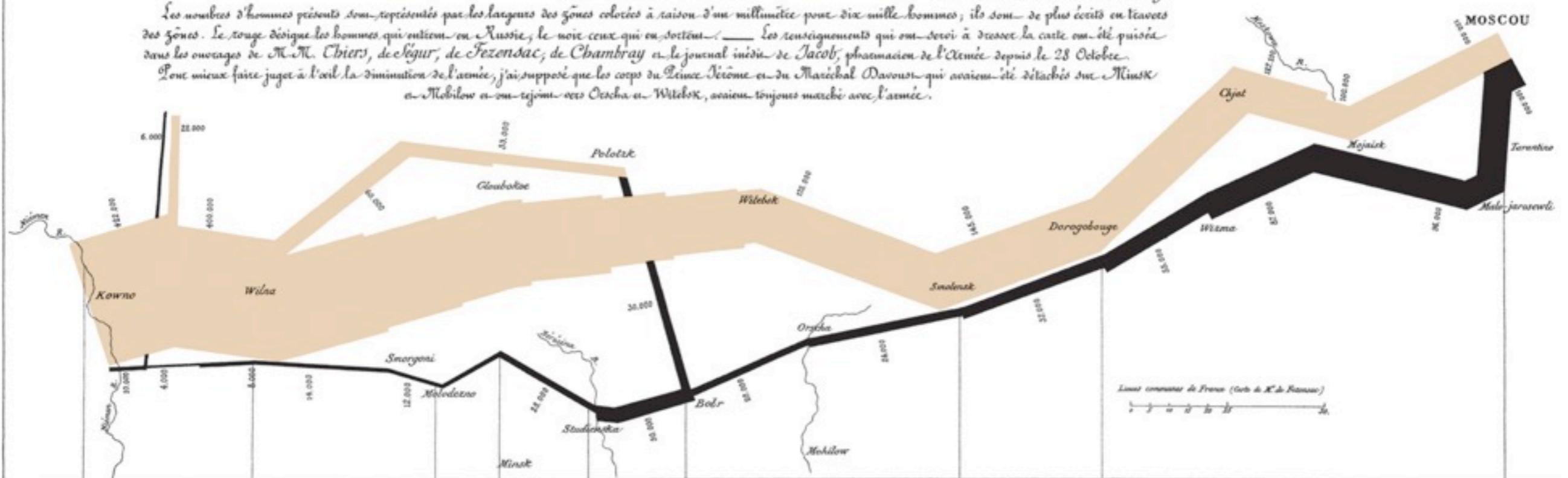
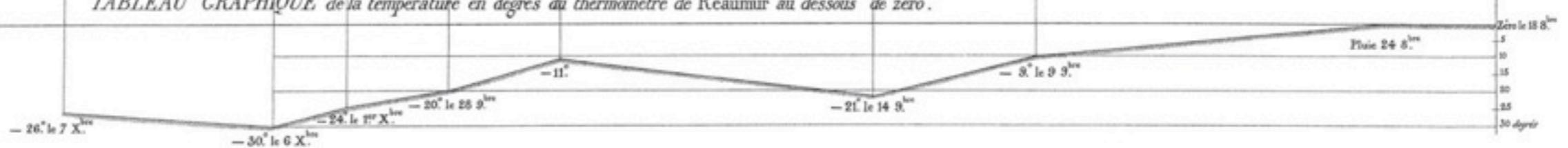


TABLEAU CRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Cosaques passent au gelé  
le Nilovka gelé.



Imprimé par Regnier, E. Pau. 5<sup>e</sup> Rue Sainte-Marie 3<sup>e</sup> étage à Paris.

Imp. Litt. Regnier et Bourdet.

# Dmitri Mendeleev | Periodic Table of Elements (1869)

hydrogen 1 <b>H</b> 1.0079																		helium 2 <b>He</b> 4.0026
lithium 3 <b>Li</b> 6.941	beryllium 4 <b>Be</b> 9.0122																	neon 10 <b>Ne</b> 20.180
sodium 11 <b>Na</b> 22.990	magnesium 12 <b>Mg</b> 24.305																	chlorine 17 <b>Cl</b> 35.453
potassium 19 <b>K</b> 39.098	calcium 20 <b>Ca</b> 40.078	scandium 21 <b>Sc</b> 44.956	titanium 22 <b>Ti</b> 47.967	vanadium 23 <b>V</b> 50.942	chromium 24 <b>Cr</b> 51.996	manganese 25 <b>Mn</b> 54.908	iron 26 <b>Fe</b> 55.845	cobalt 27 <b>Co</b> 58.903	nickel 28 <b>Ni</b> 58.693	copper 29 <b>Cu</b> 63.546	zinc 30 <b>Zn</b> 65.39	gallium 31 <b>Ga</b> 69.723	germanium 32 <b>Ge</b> 72.61	arsenic 33 <b>As</b> 74.922	selenium 34 <b>Se</b> 78.96	bromine 35 <b>Br</b> 79.904	krypton 36 <b>Kr</b> 83.90	
rubidium 37 <b>Rb</b> 85.468	strontium 38 <b>Sr</b> 87.62	yttrium 39 <b>Y</b> 88.906	zirconium 40 <b>Zr</b> 91.224	nobium 41 <b>Nb</b> 92.906	molybdenum 42 <b>Mo</b> 95.94	technetium 43 <b>Tc</b> [98]	ruthenium 44 <b>Ru</b> 101.07	rhodium 45 <b>Rh</b> 102.91	palladium 46 <b>Pd</b> 106.42	silver 47 <b>Ag</b> 107.87	cadmium 48 <b>Cd</b> 112.41	indium 49 <b>In</b> 114.82	tin 50 <b>Sn</b> 118.71	antimony 51 <b>Sb</b> 121.76	tellurium 52 <b>Te</b> 127.60	iodine 53 <b>I</b> 126.90	xenon 54 <b>Xe</b> 131.29	
caesium 55 <b>Cs</b> 132.91	barium 56 <b>Ba</b> 137.33	57-70 * <b>Lu</b> 174.97	lutetium 71 <b>Hf</b> 178.49	hafnium 72 <b>Ta</b> 180.95	tantalum 73 <b>W</b> 183.84	tungsten 74 <b>Re</b> 186.21	rhenium 75 <b>Os</b> 190.23	osmium 76 <b>Ir</b> 192.22	iridium 77 <b>Pt</b> 195.08	platinum 78 <b>Au</b> 196.97	gold 79 <b>Hg</b> 200.59	mercury 80 <b>Tl</b> 204.38	thallium 81 <b>Pb</b> 207.2	lead 82 <b>Bi</b> 208.98	bismuth 83 <b>Po</b> [209]	polonium 84 <b>At</b> [210]	astatine 85 <b>Rn</b> [222]	
francium 87 <b>Fr</b> [223]	radium 88 <b>Ra</b> [226]	89-102 * * <b>Lr</b> [262]	lawrencium 103 <b>Rf</b> [261]	rutherfordium 104 <b>Db</b> [262]	dubnium 105 <b>Sg</b> [266]	seaborgium 106 <b>Bh</b> [264]	bohrium 107 <b>Hs</b> [269]	hassium 108 <b>Mt</b> [268]	meitnerium 109 <b>Uun</b> [271]	ununnilium 110 <b>Uuu</b> [272]	ununtrium 111 <b>Uub</b> [277]	ununpentium 112 <b>Uuq</b> [289]	ununquadium 114 <b></b> [289]					

\* Lanthanide series

lanthanum 57 <b>La</b> 138.91	cerium 58 <b>Ce</b> 140.12	praseodymium 59 <b>Pr</b> 140.91	neodymium 60 <b>Nd</b> 144.24	promethium 61 <b>Pm</b> [145]	samarium 62 <b>Sm</b> 150.36	europlum 63 <b>Eu</b> 151.96	gadolinium 64 <b>Gd</b> 157.25	terbium 65 <b>Tb</b> 158.93	dysprosium 66 <b>Dy</b> 162.50	holmium 67 <b>Ho</b> 164.93	erbium 68 <b>Er</b> 167.26	thulium 69 <b>Tm</b> 168.93	ytterbium 70 <b>Yb</b> 173.04
actinium 89 <b>Ac</b> [227]	thorium 90 <b>Th</b> 232.04	protactinium 91 <b>Pa</b> 231.04	uranium 92 <b>U</b> 238.03	neptunium 93 <b>Np</b> [237]	plutonium 94 <b>Pu</b> [244]	americium 95 <b>Am</b> [243]	curium 96 <b>Cm</b> [247]	berkelium 97 <b>Bk</b> [247]	californium 98 <b>Cf</b> [251]	einsteinium 99 <b>Es</b> [252]	fermium 100 <b>Fm</b> [257]	mendelevium 101 <b>Md</b> [258]	nobelium 102 <b>No</b> [259]

\*\* Actinide series

# Failed attempts

# A PERIODIC TABLE OF VISUALIZATION METHODS

> < <b>C</b> continuum	Data Visualization Visual representations of quantitative data in schematic form (either with or without axes)												Strategy Visualization The systematic use of complementary visual representations in the analysis, development, formulation, communication, and implementation of strategies in organizations.												> < <b>G</b> graphic facilitation
> < <b>Tb</b> table	> < <b>Ca</b> cartesian coordinates	Information Visualization The use of interactive visual representations of data to amplify cognition. This means that the data is transformed into an image, it is mapped to screen space. The image can be changed by users as they proceed working with it												> < <b>Me</b> meeting trace	> < <b>Mm</b> metro map	> < <b>Tm</b> temple	< > <b>St</b> story template	> < <b>Tr</b> tree	> < <b>Ct</b> cartoon						
> < <b>Pi</b> pie chart	> < <b>L</b> line chart	Concept Visualization Methods to elaborate (mostly) qualitative concepts, ideas, plans, and analyses.												> < <b>Co</b> communication diagram	> < <b>Fp</b> flight plan	> < <b>Cs</b> concept skeleton	> < <b>Br</b> bridge	> < <b>Fu</b> funnel	> < <b>Ri</b> rich picture						
> < <b>B</b> bar chart	> < <b>Ac</b> area chart	> < <b>R</b> radar chart cobweb	> < <b>Pa</b> parallel coordinates	> < <b>Hy</b> hyperbolic tree	> < <b>Cy</b> cycle diagram	> < <b>T</b> timeline	> < <b>Ve</b> venn. diagram	< > <b>Mi</b> mindmap	< > <b>Sq</b> square of oppositions	> < <b>Ee</b> concentric circles	> < <b>Ar</b> argument slide	> < <b>Sw</b> swim lane diagram	> < <b>Gc</b> gantt chart	< > <b>Pm</b> perspectives diagram	> < <b>D</b> dilemma diagram	> < <b>Pr</b> parameter ruler	< > <b>Kn</b> knowledge map								
> < <b>Hi</b> histogram	> < <b>Sc</b> scatterplot	> < <b>Sa</b> sankey diagram	> < <b>In</b> information lens	> < <b>E</b> entity relationship diagram	> < <b>Pt</b> petri net	> < <b>Fl</b> flow chart	< > <b>Cl</b> clustering	> < <b>Lc</b> layer chart	> < <b>Py</b> minia pyramid technique	> < <b>Ce</b> casse-effect chains	> < <b>Tl</b> toolmin map	> < <b>Dt</b> decision tree	> < <b>Cp</b> cpm critical path method	< > <b>Cf</b> concept fan	> < <b>Co</b> concept map	> < <b>Ic</b> iceberg	> < <b>Lm</b> learning map								
> < <b>Tk</b> tukey box plot	> < <b>Sp</b> spectrogram	> < <b>Da</b> data map	> < <b>Tp</b> treemap	> < <b>Cn</b> cone tree	> < <b>Sy</b> system dyn./ simulation	> < <b>Df</b> data flow diagram	< > <b>Se</b> semantic network	> < <b>So</b> soft system modeling	< > <b>Sn</b> synergy map	< > <b>Fo</b> force field diagram	> < <b>Ib</b> ibis argumentation map	> < <b>Pr</b> process event chains	> < <b>Pe</b> pert chart	< > <b>Ev</b> evocative knowledge map	> < <b>V</b> Vee diagram	< > <b>Hh</b> heaven 'n' hell chart	> < <b>I</b> infomural								

## Cy Process Visualization

Note: Depending on your location and connection speed it can take some time to load a pop-up picture.

version 1.5

## Hy Structure Visualization

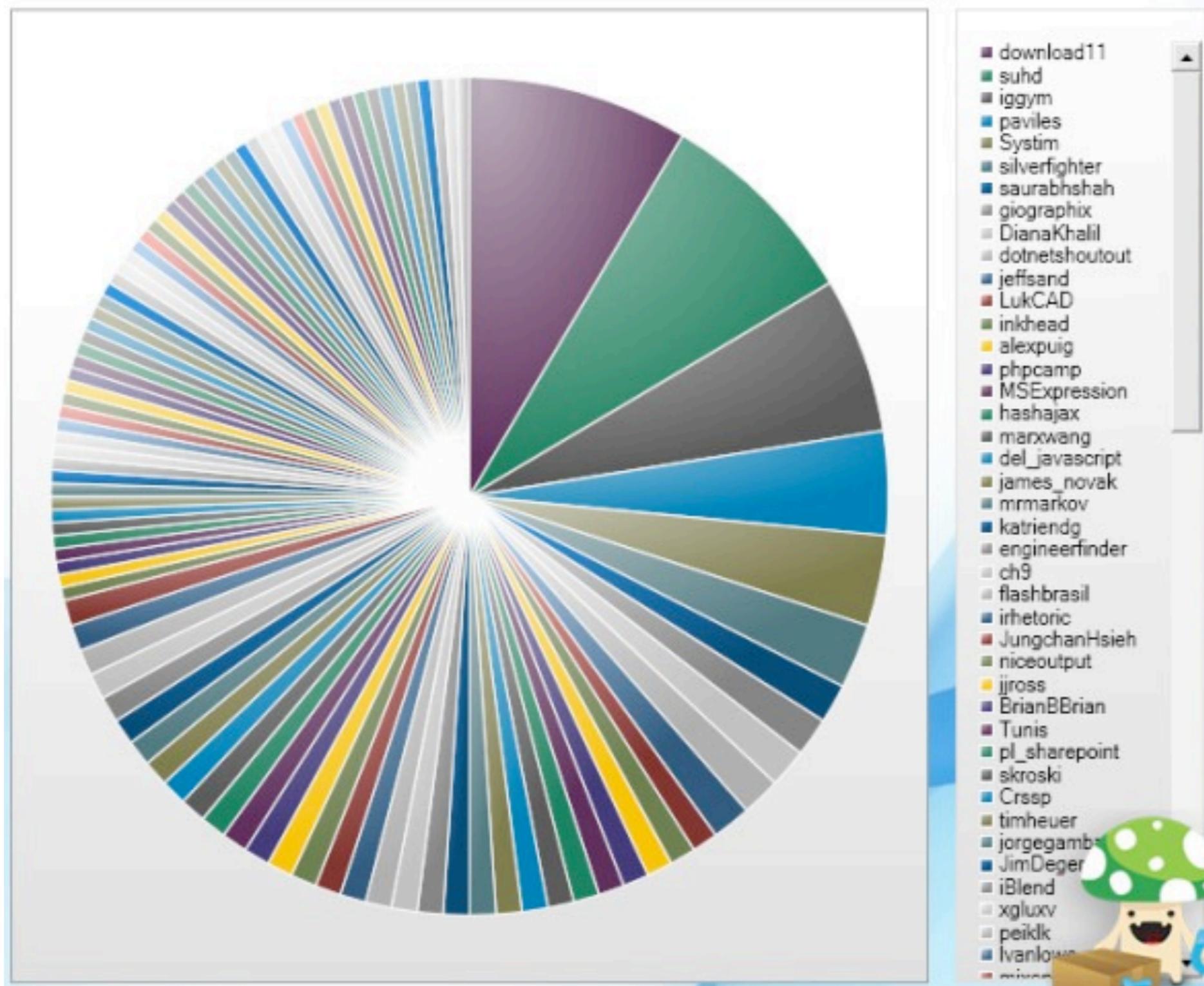
Overview  
Detail

Detail AND Overview

Divergent thinking  
Convergent thinking

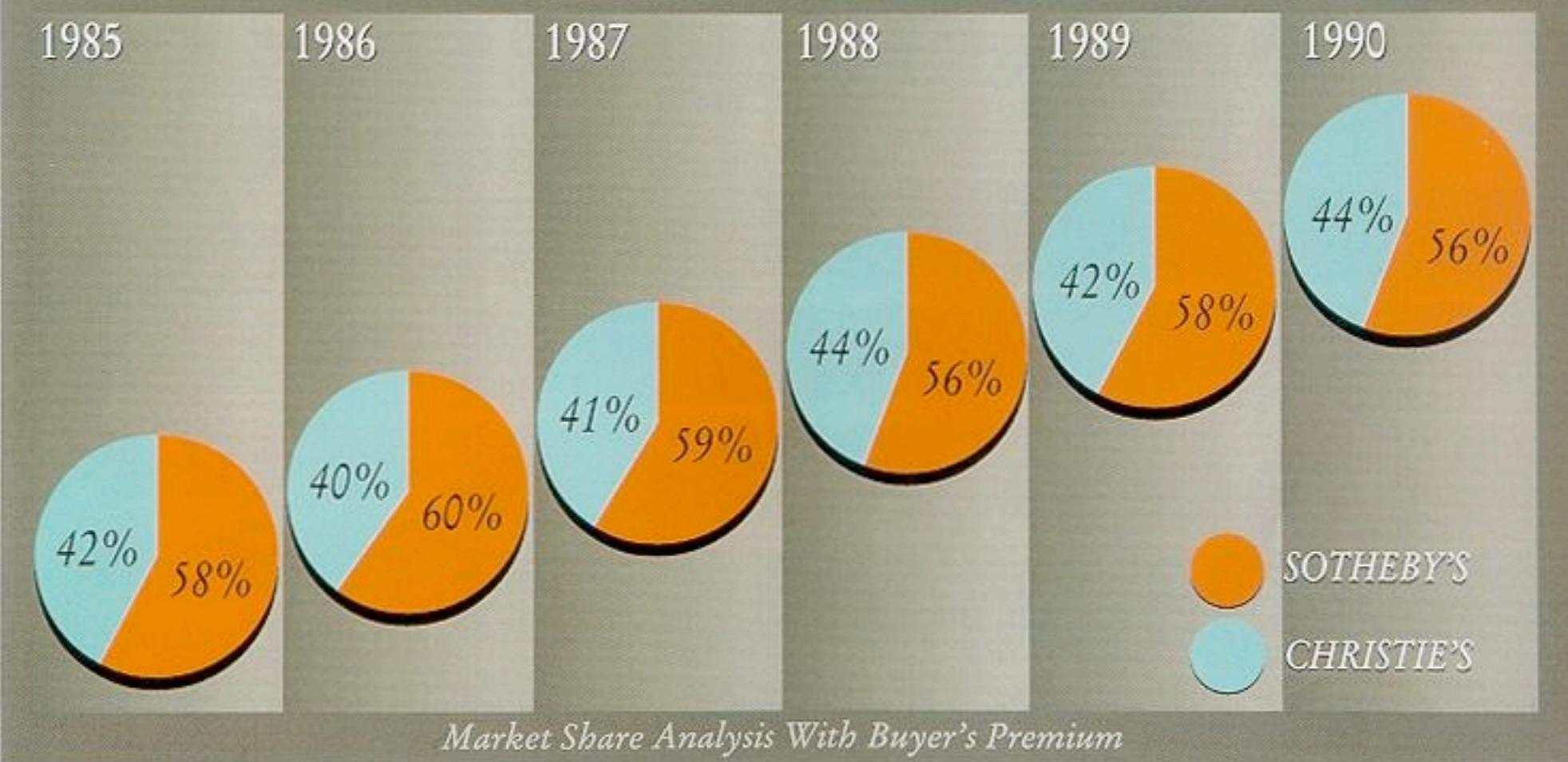
> < <b>Su</b> supply demand curve	> < <b>Pc</b> performance charting	> < <b>St</b> strategy map	> < <b>Oc</b> organisation chart	< > <b>Ho</b> house of quality	> < <b>Fd</b> feedback diagram	> < <b>Ft</b> failure tree	> < <b>Mq</b> magic quadrant	> < <b>Ld</b> life-cycle diagram	> < <b>Po</b> porter's five forces	< > <b>S</b> s-cycle	< > <b>Sm</b> stakeholder map	> < <b>Is</b> ishikawa diagram	> < <b>Tc</b> technology roadmap
> < <b>Ed</b> edgeworth box	> < <b>Pf</b> portfolio diagram	> < <b>Sg</b> strategic game board	> < <b>Mz</b> mintzberg's organigraph	< > <b>Z</b> zwicky's morphological box	< > <b>Ad</b> affinity diagram	> < <b>De</b> decision discovery diagram	> < <b>Bm</b> bcg matrix	> < <b>Stc</b> strategy canvas	> < <b>Vc</b> value chain	< > <b>Hy</b> hype-cycle	< > <b>Sr</b> stakeholder rating map	> < <b>Ta</b> taps	< > <b>Sd</b> spray diagram

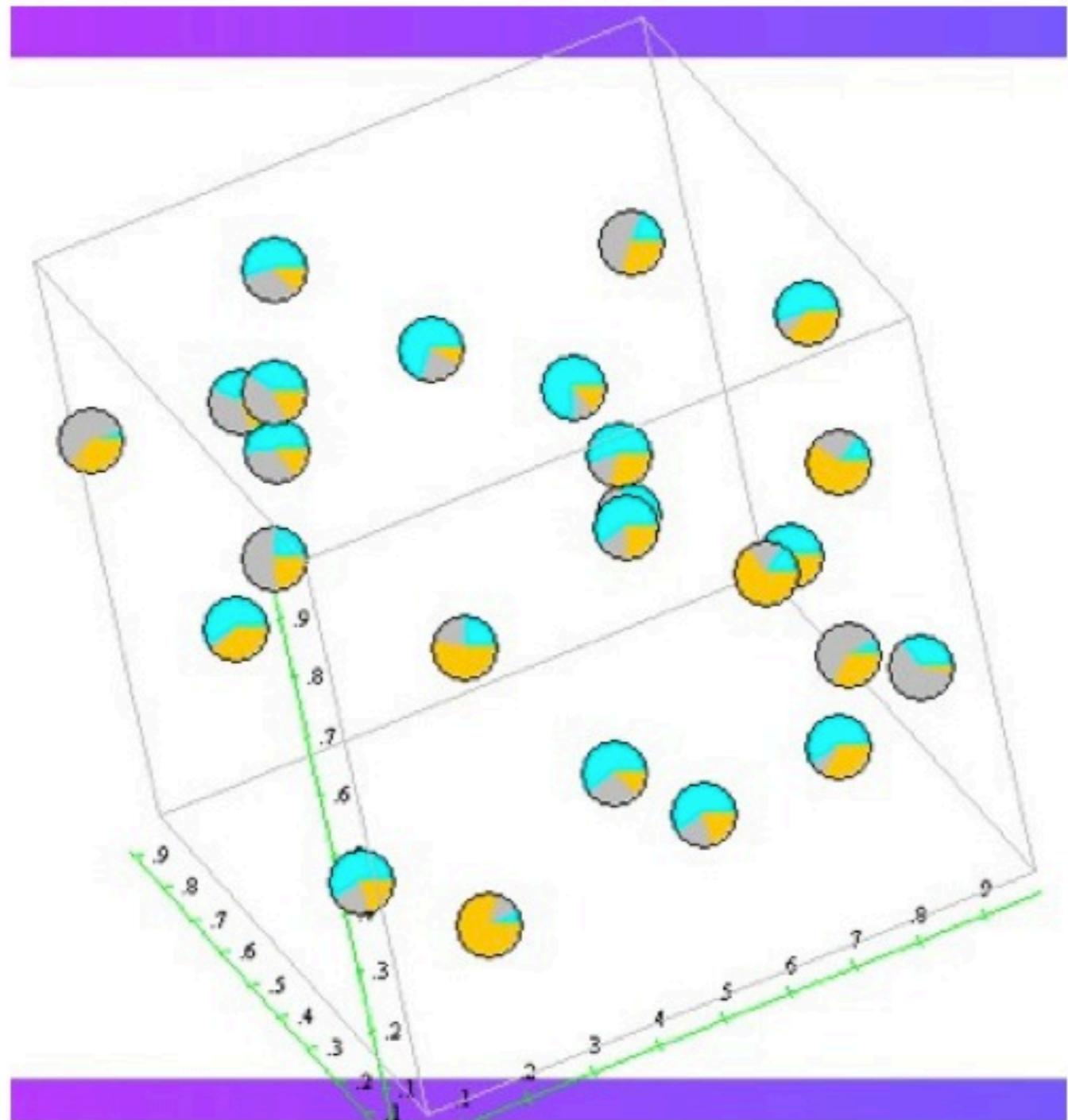
## 100 Most Active Tweeters

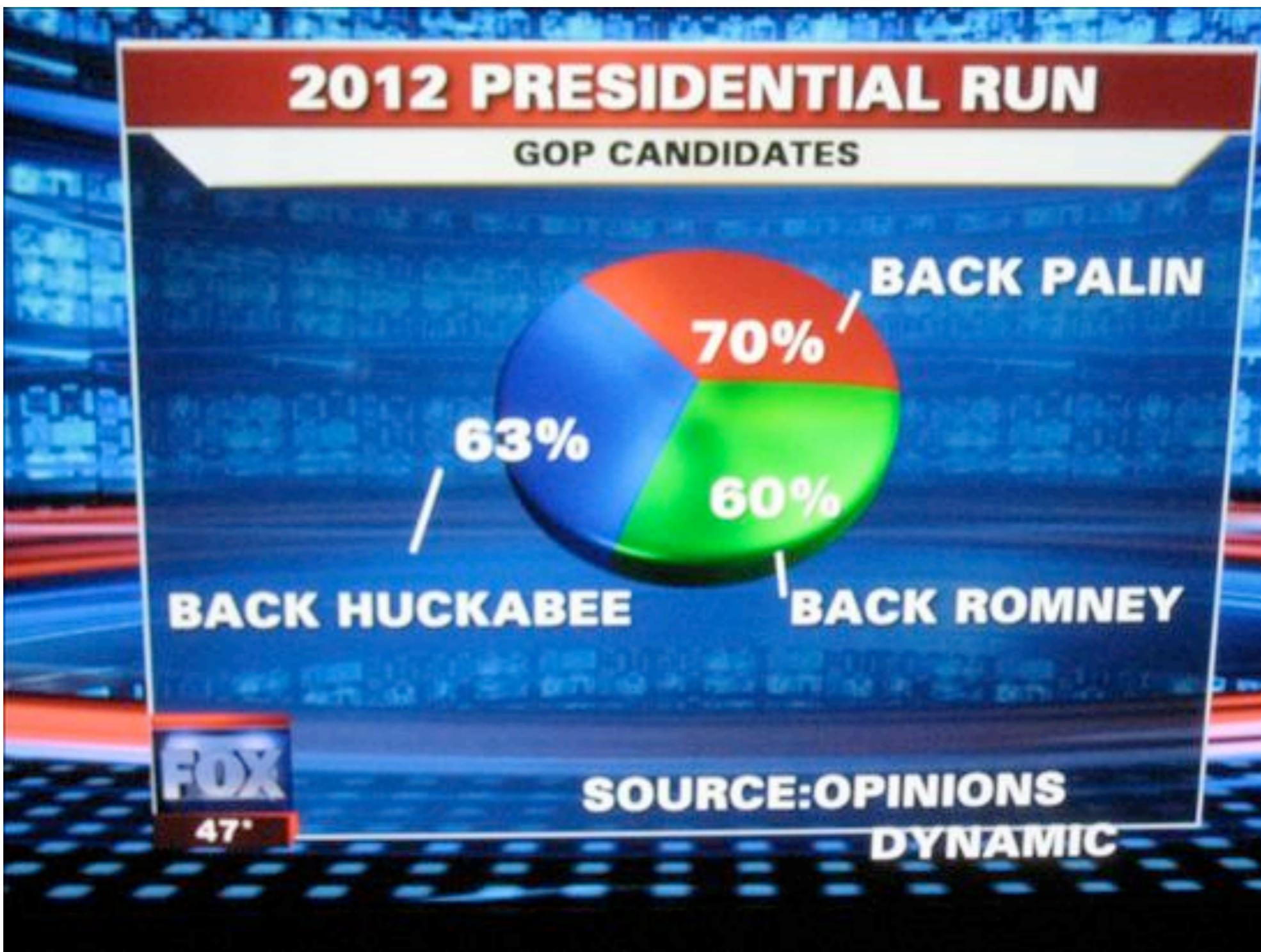


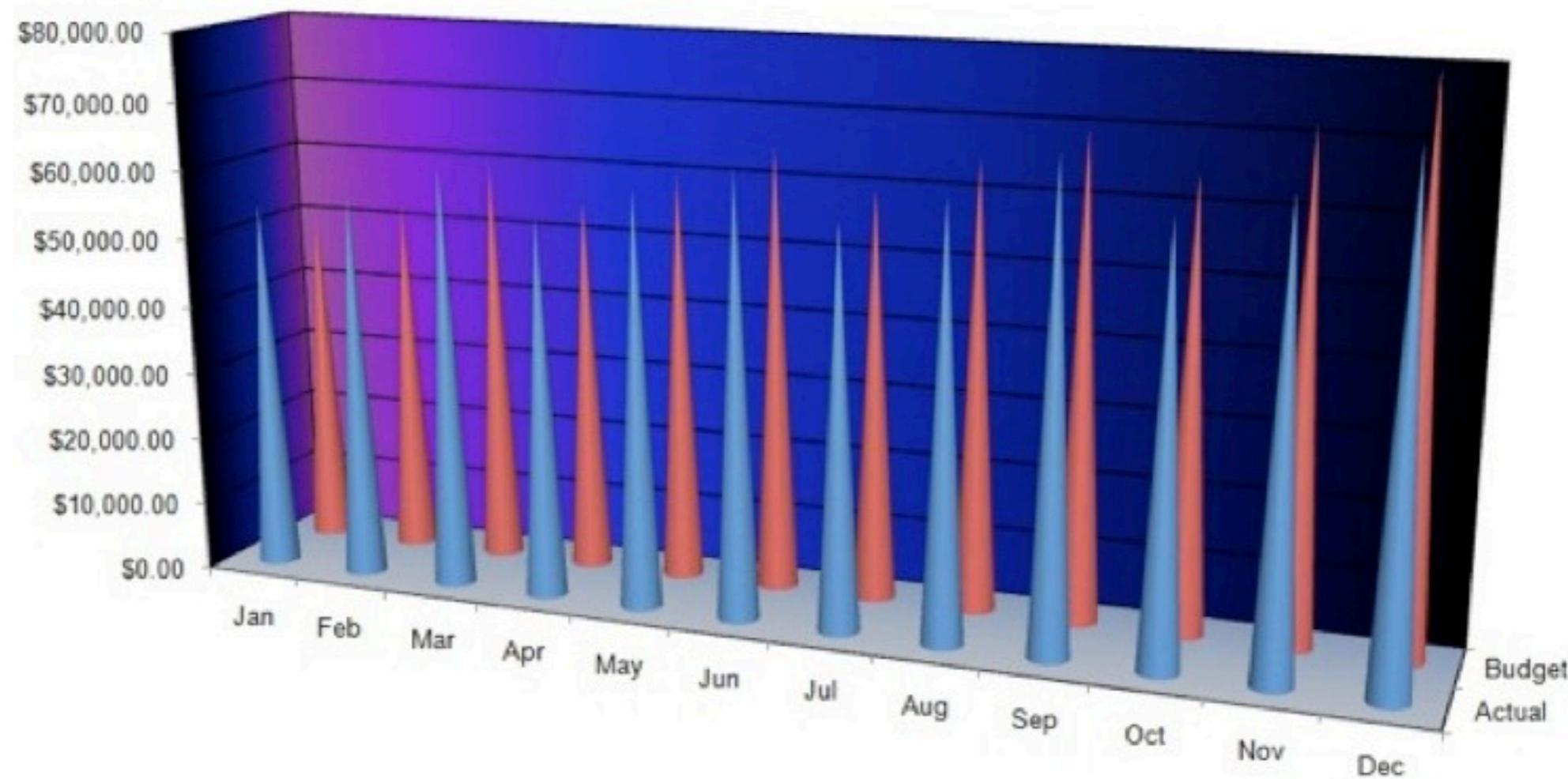
# Sotheby's / Christie's

## Worldwide Sales Market Share Analysis

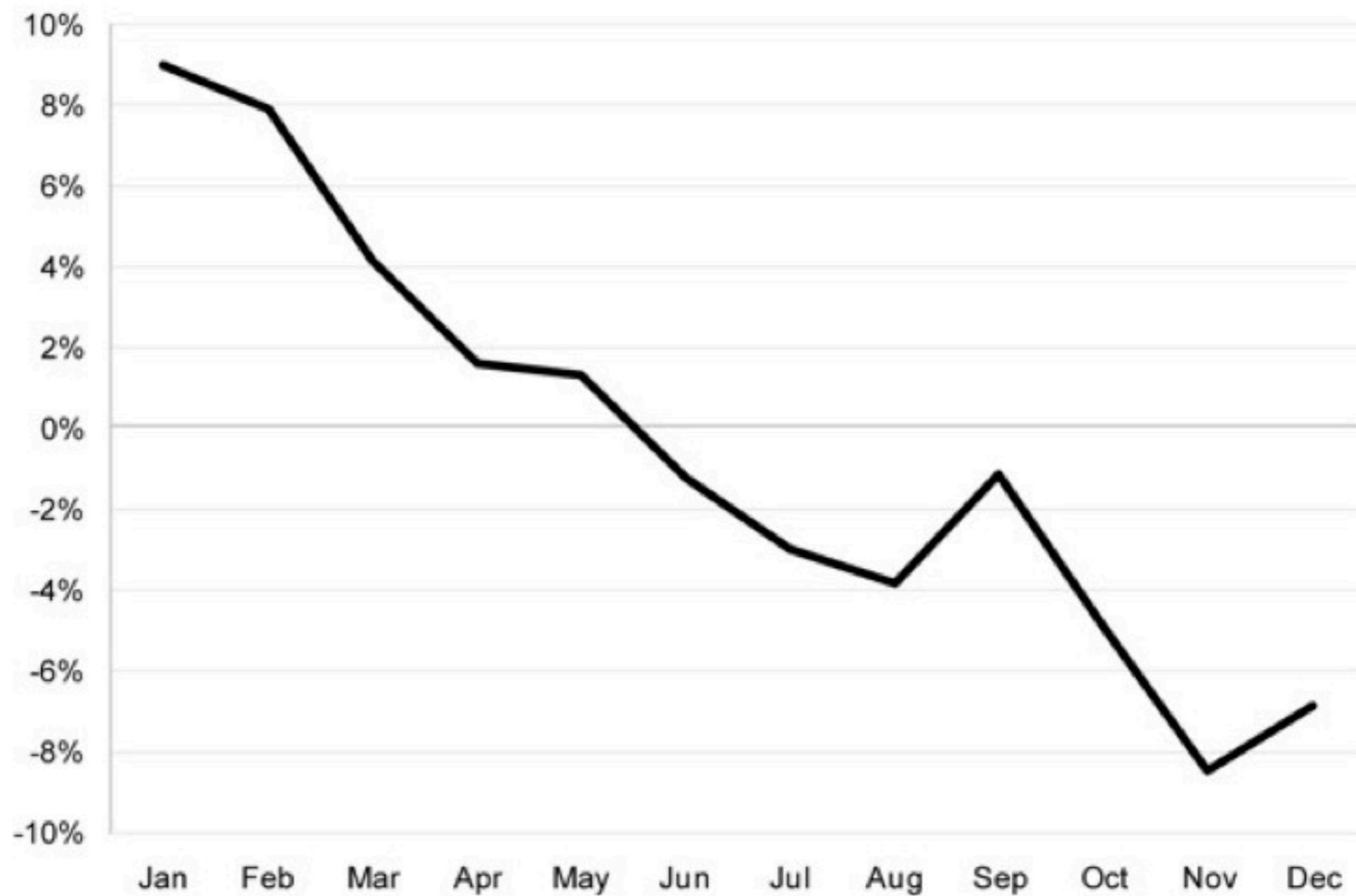






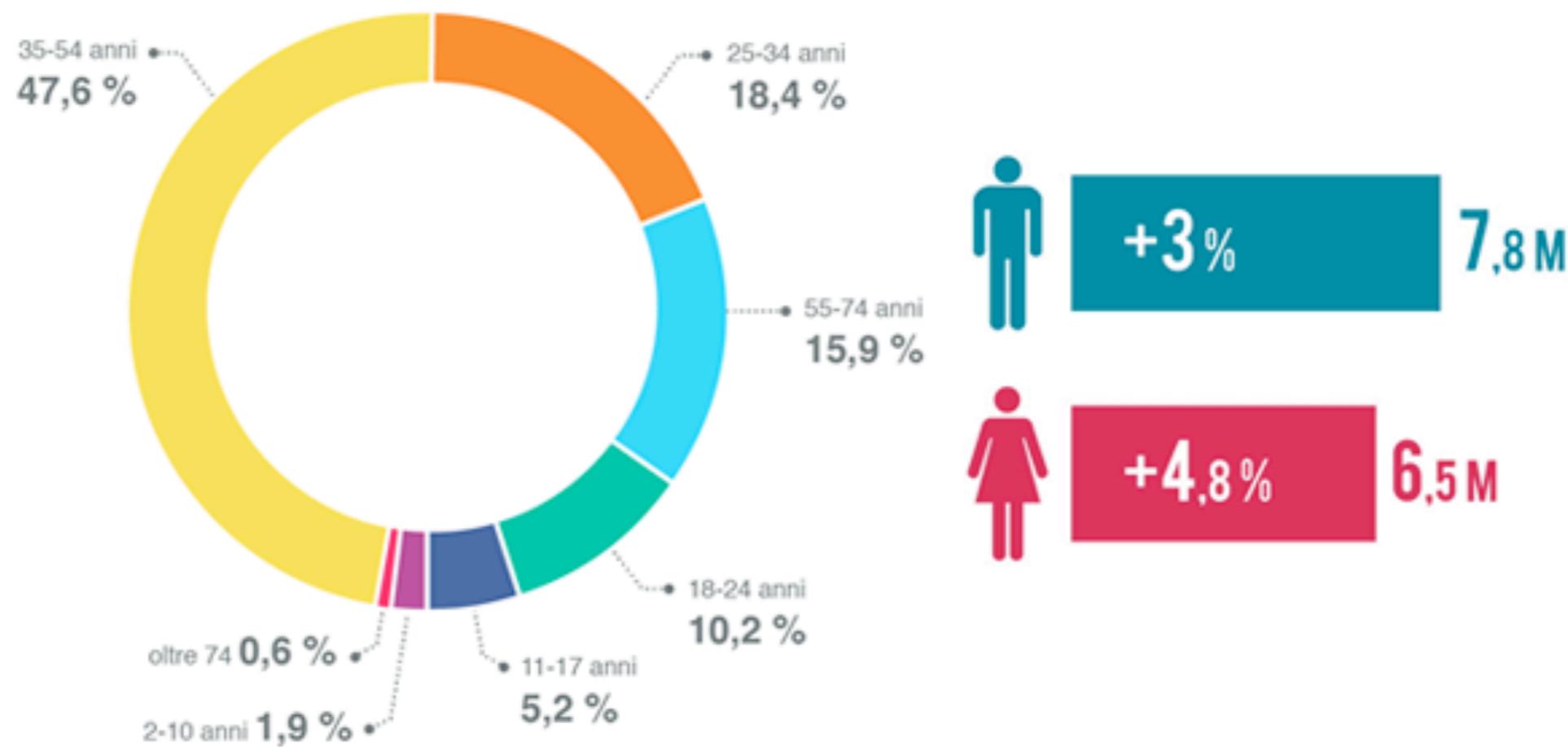


### Expenses Percentage Variance from Budget



# Missing opportunities

# CHI USA LA RETE



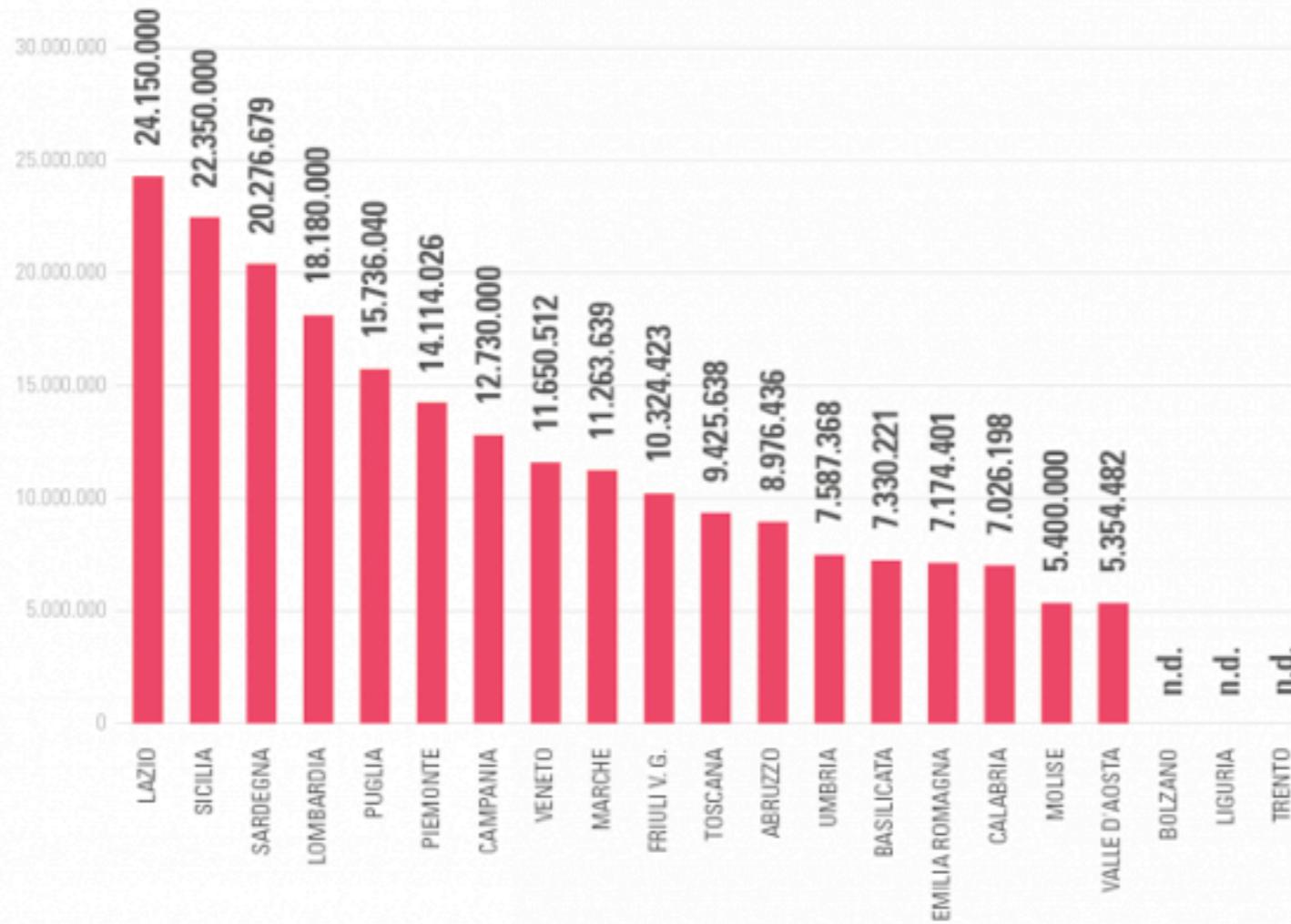
©Blogmeter

Fonte Audiweb/Nielsen

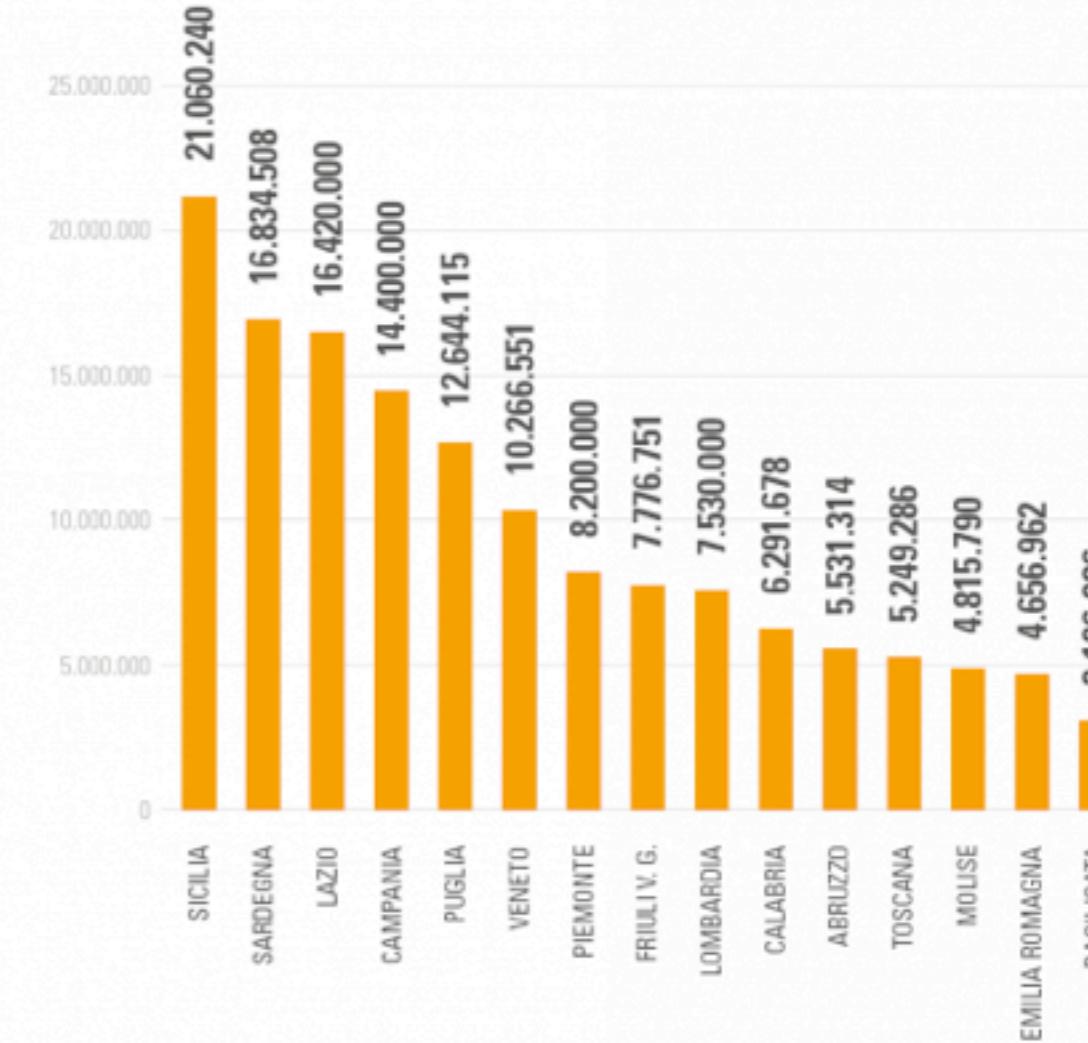
[http://vincos.it/2013/06/01/state-of-the-net-2013-parte-1-lo-scenario-italiano/?utm\\_source=rss&utm\\_medium=rss&utm\\_campaign=state-of-the-net-2013-parte-1-lo-scenario-italiano](http://vincos.it/2013/06/01/state-of-the-net-2013-parte-1-lo-scenario-italiano/?utm_source=rss&utm_medium=rss&utm_campaign=state-of-the-net-2013-parte-1-lo-scenario-italiano)

# Cost of Local Councillors

## INDENNITÀ



## VITALIZI (\*)



(\*) non sono considerate le indennità di fine mandato

<http://www.linkiesta.it/costi-regioni-italia-consiglio>

# The Shift

**The field has become less reserved for experts and less expensive**

The **science** used visualization  
as a tool for understanding data.

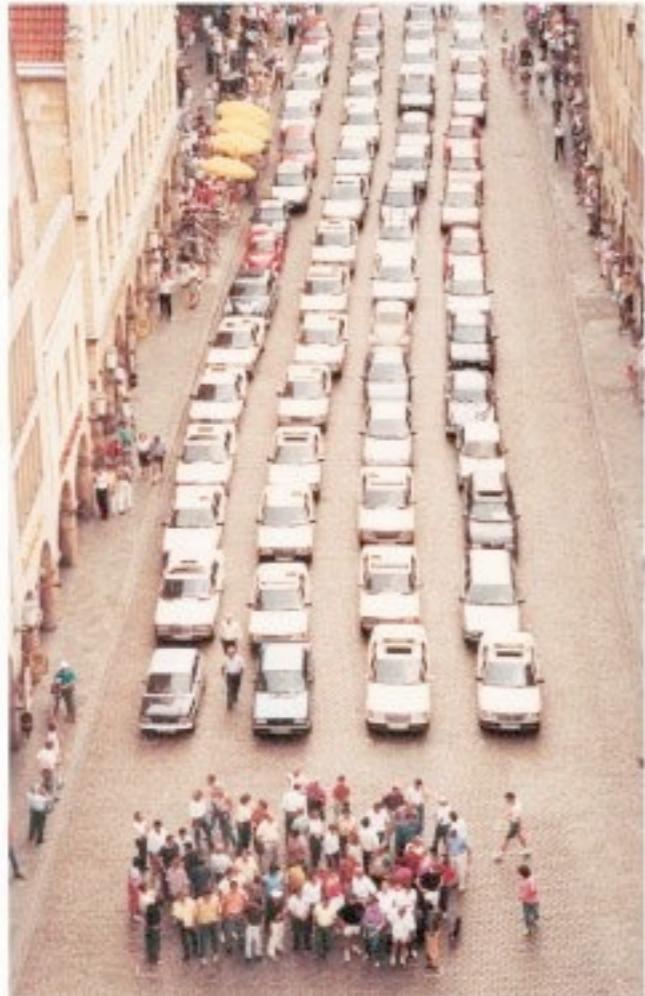
Now the same paradigms  
belong also to the **design** culture

Artists and Designers have started to work with  
data as **raw material**

They use the Data Visualization paradigm  
to evoke particular emotions.

We need to define  
what is a Beautiful and Effective  
Visualization

Amount of space required to transport the same number of passengers by car, bus or bicycle.



Car?

Bus?

Bicycle?

(Poster in city of Muenster Planning Office, August 2001)

Credit: Press-Office City of Münster, Germany

# SPACE

taken by 60 people



remix by aza raskin

# Principles

## Is innovative

The possibilities for innovation are not, by any means, exhausted. Technological development is always offering new opportunities for innovative design. But innovative design always develops in tandem with innovative technology, and can never be an end in itself.

## Is useful

A product is bought to be used. It has to satisfy certain criteria, not only functional, but also psychological and aesthetic. Good design emphasizes the usefulness of a product whilst disregarding anything that could possibly detract from it.

# Is aesthetic

The aesthetic quality of a product is integral to its usefulness because products are used every day and have an effect on people and their well-being. Only well-executed objects can be beautiful.

## Is understandable

It clarifies the product's structure. Better still, it can make the product clearly express its function by making use of the user's intuition. At best, it is self-explanatory.

## Is unobtrusive

Products fulfilling a purpose are like tools. They are neither decorative objects nor works of art. Their design should therefore be both neutral and restrained, to leave room for the user's self-expression.

## Is long-lasting

It avoids being fashionable and therefore never appears antiquated. Unlike fashionable design, it lasts many years – even in today's throwaway society.

## Is complete (to the last detail)

Nothing must be arbitrary or left to chance. Care and accuracy in the design process show respect towards the consumer.

## Is as little design as possible

Less, but better – because it concentrates on the essential aspects, and the products are not burdened with non-essentials. Back to purity, back to simplicity.

## Is honest

It does not make a product more innovative, powerful or valuable than it really is. It does not attempt to manipulate the consumer with promises that cannot be kept.

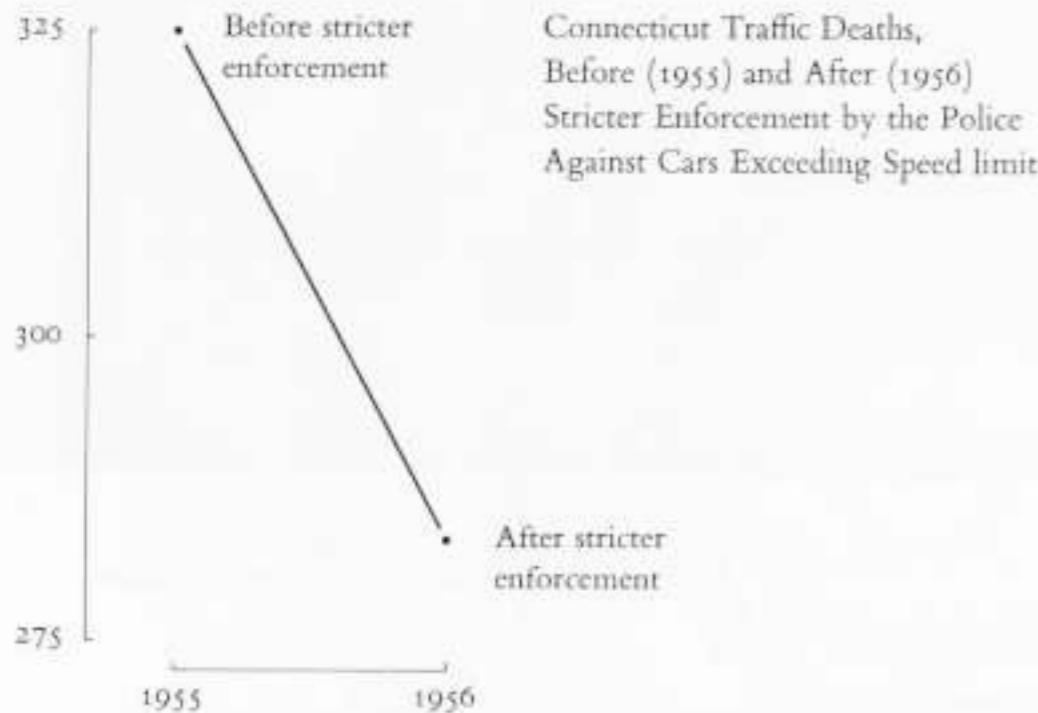
“Making an evidence presentation is a moral act  
as well as an intellectual activity”

Edward Tufte

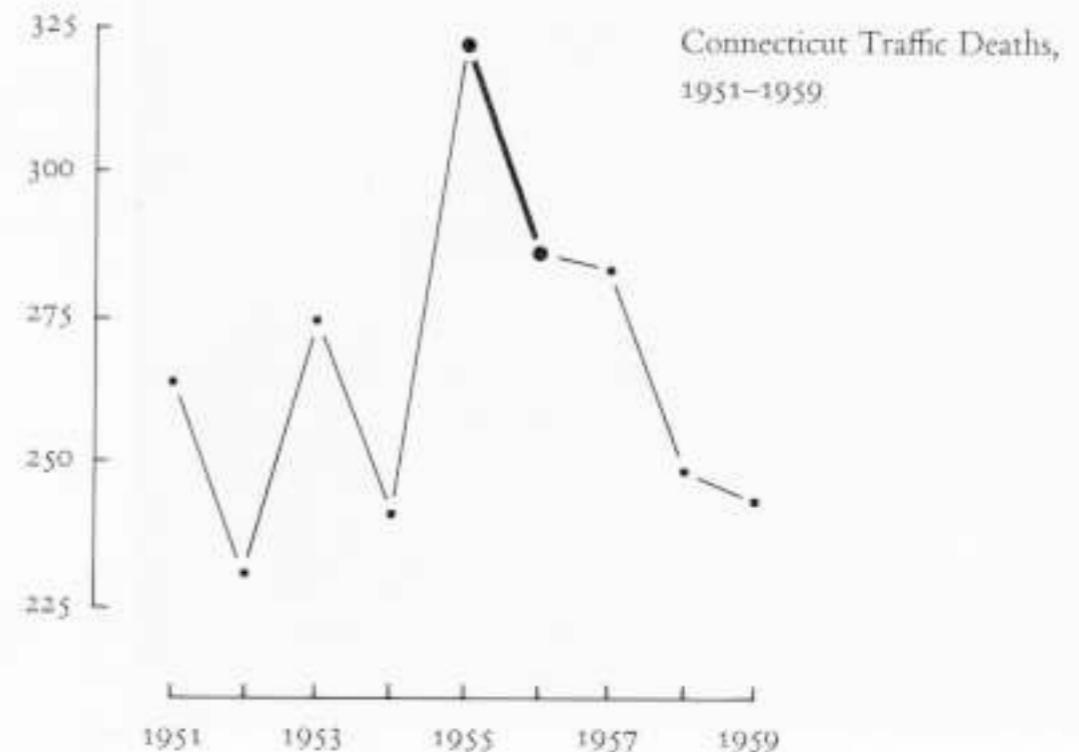
With a great power  
comes great responsibility  
(the lie factor)

Graphics must not quote data out of context.

Nearly all the important questions are left unanswered by this display:

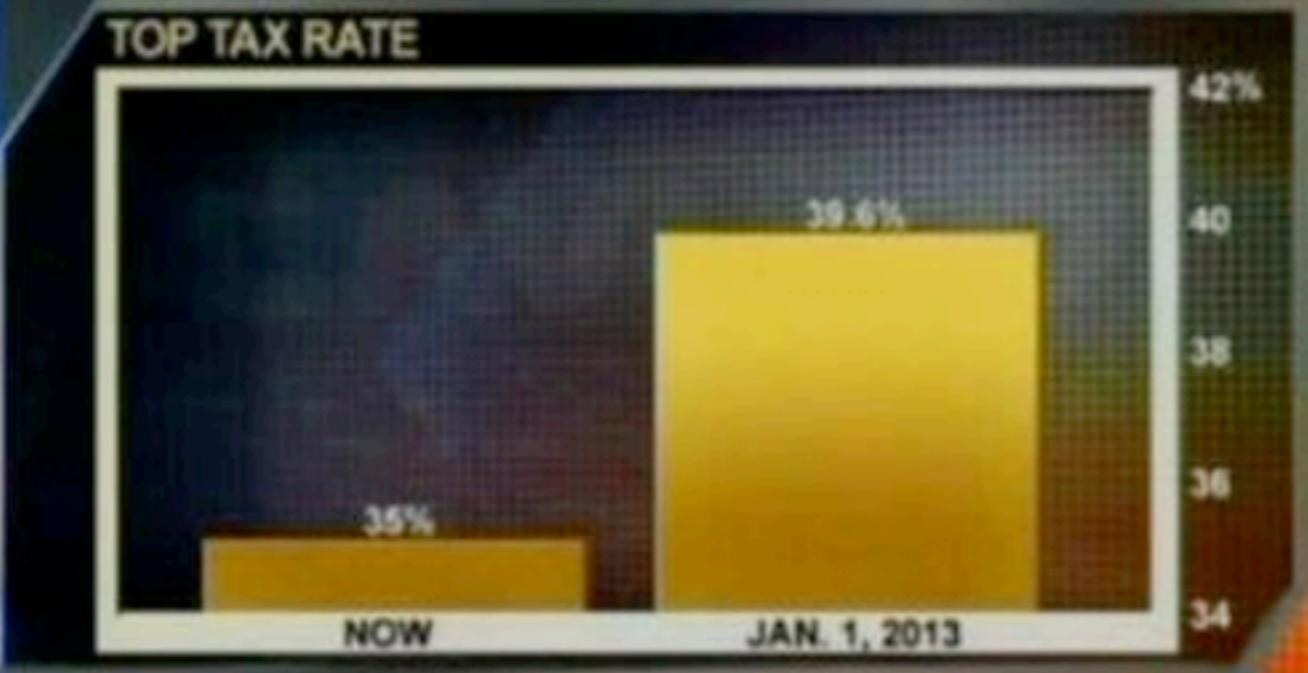


A few more data points add immensely to the account:



## IF BUSH TAX CUTS EXPIRE

### TOP TAX RATE



8:01p ET



TOP STORIES

TECHNOLOGY

CONSUMER

WITH THE JUSTICE DEPARTMENT AND ACQUIRES FULL T

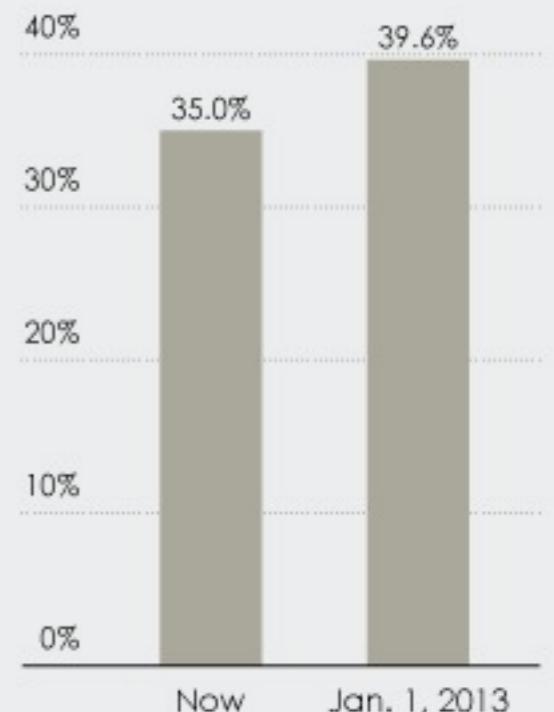
DOW 13008.68 □ 64.33

S&P 1379.32 □ 5.98

NASDAQ 2939.52 □ 6.32

### If Bush tax cuts expire...

Top tax rate



# US representatives exploit their free mailing privileges to advance their re-election campaigns

## FRANKED MAIL TIE TO VOTING SHOWN

### Testimony Finds the Volume Rises Before Elections

WASHINGTON, June 1 (AP)—Witnesses before a Senate committee and their written testimony showed yesterday that Congressmen used franked mail to increase expense account and received campaign contributions from their offices and themselves.

Witness Joseph K. Biden, Jr., Democrat of Delaware, said he used his franked mail privilege to send every election year, between January, the volume and cost of franked mail has increased. A new Federal law will limit what postal-office challenges can speed its issuance.

In 1970, Congress passed a law prohibiting franked mail to be sent within 20 days before an election. The sponsor of that legislation, Representative Morris K. Udall, Democrat of Arizona, said in an interview that further changes were needed to combat political abuse of the frank.

Mr. Udall urged a House committee yesterday to ban franked mail to be used for campaign purposes. "It is clear that Congress has been guilty of abusing its privilege to get votes," he said.

Mr. Udall's proposal was referred to the House Committee on Post Office and Civil Service, which is headed by Frank W. Clark, Democrat of Pennsylvania, and set up a House committee yesterday at the

beginning of the session, and only Congress police against abuse of the free mail privilege.

Another spokesman for

the State of Kansas, Peter H. Dorn, testified after he had left his office. Mr. Dorn is seeking Martin Dr. of Maryland.

To report his old post,

Franked mail to his old

State of Kansas, Peter H. Dorn, of

of Congress, Charles H. Gandy, was demonstrated by mem-

oranda.

Another spokesman for

Mr. Gandy, a high-ranking

postmaster, said

Franked mail by his chil-

dren, in 1970,

another spokesman for

Frank C. Coffey, a high-ranking

postmaster, said

Franked mail by his chil-

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Franked mail by his chil-

dren, in 1970,

Another spokesman for

Frank Coffey, a high-ranking

# Finding stories

The greatest value of a picture is when it forces us  
to notice what we never expected to see.

—John Tukey

Important stories live in our data.

# The AOL case

**Released search data for roughly 658,000 anonymized users  
over a three month period from March to May**

# The AOL case

## The User 17556639 search history

how to kill your wife  
how to kill your wife  
wife killer  
how to kill a wife  
poop  
dead people  
pictures of dead people  
killed people  
dead pictures  
dead pictures  
dead pictures  
murder photo  
steak and cheese  
photo of death  
photo of death  
death  
dead people photos  
photo of dead people  
[www.murderpeople.com](http://www.murderpeople.com)  
decapitated photos  
decapitated photos  
car crashes3  
car crashes3  
car crash photo

# The AOL case

**Thelma Arnold recognized as user No. 4417749**



[http://www.nytimes.com/2006/08/09/technology/09aol.html?  
ex=1155787200&en=6c5dfa2a9c1be4ec&ei=5070&emc=eta1](http://www.nytimes.com/2006/08/09/technology/09aol.html?ex=1155787200&en=6c5dfa2a9c1be4ec&ei=5070&emc=eta1)

# Successful Visualizations

**Visualizations that mean something**

# Conceptual

Here Is Today

# HERE IS THIS YEAR

Today



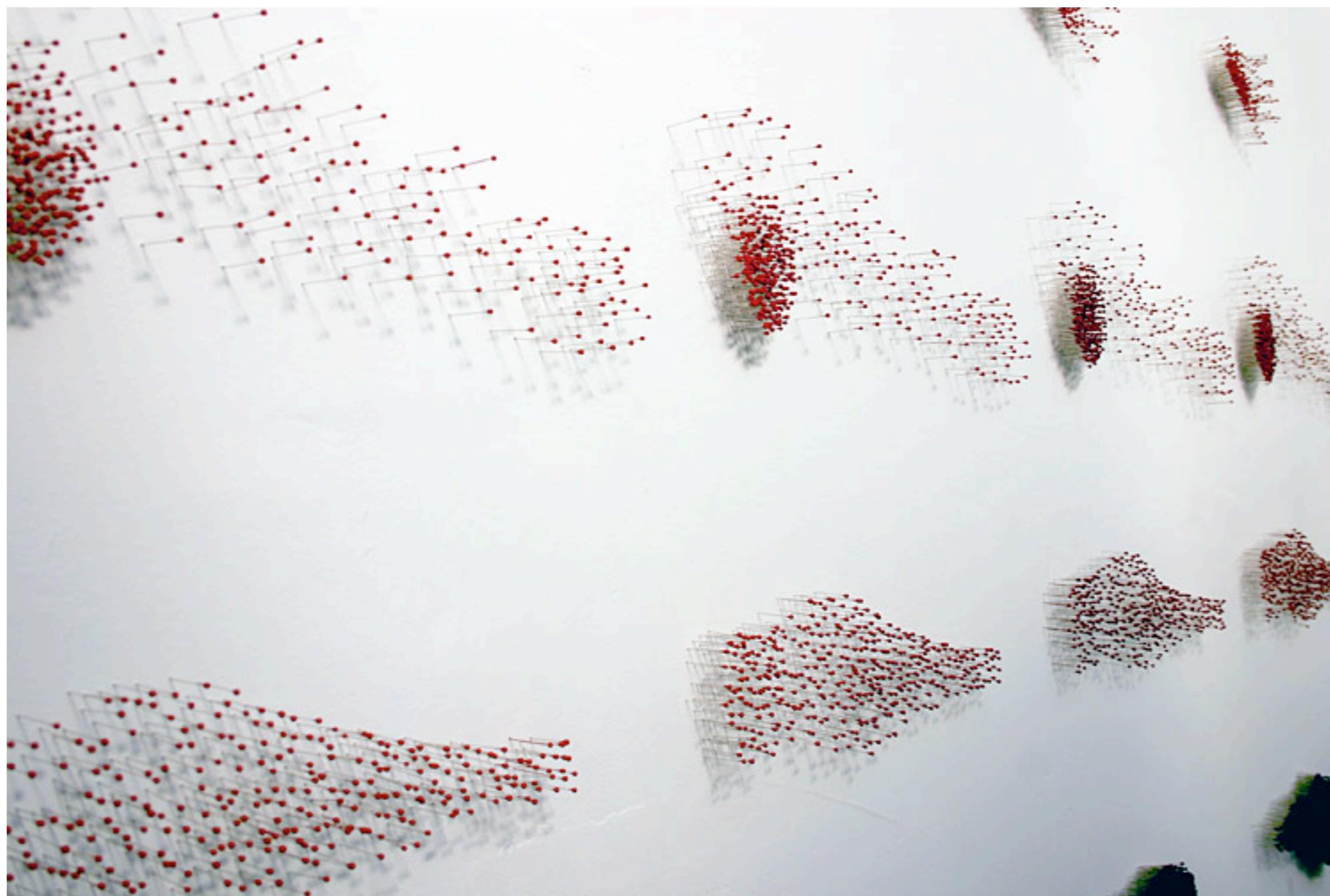
2013

---

- back | Okay +

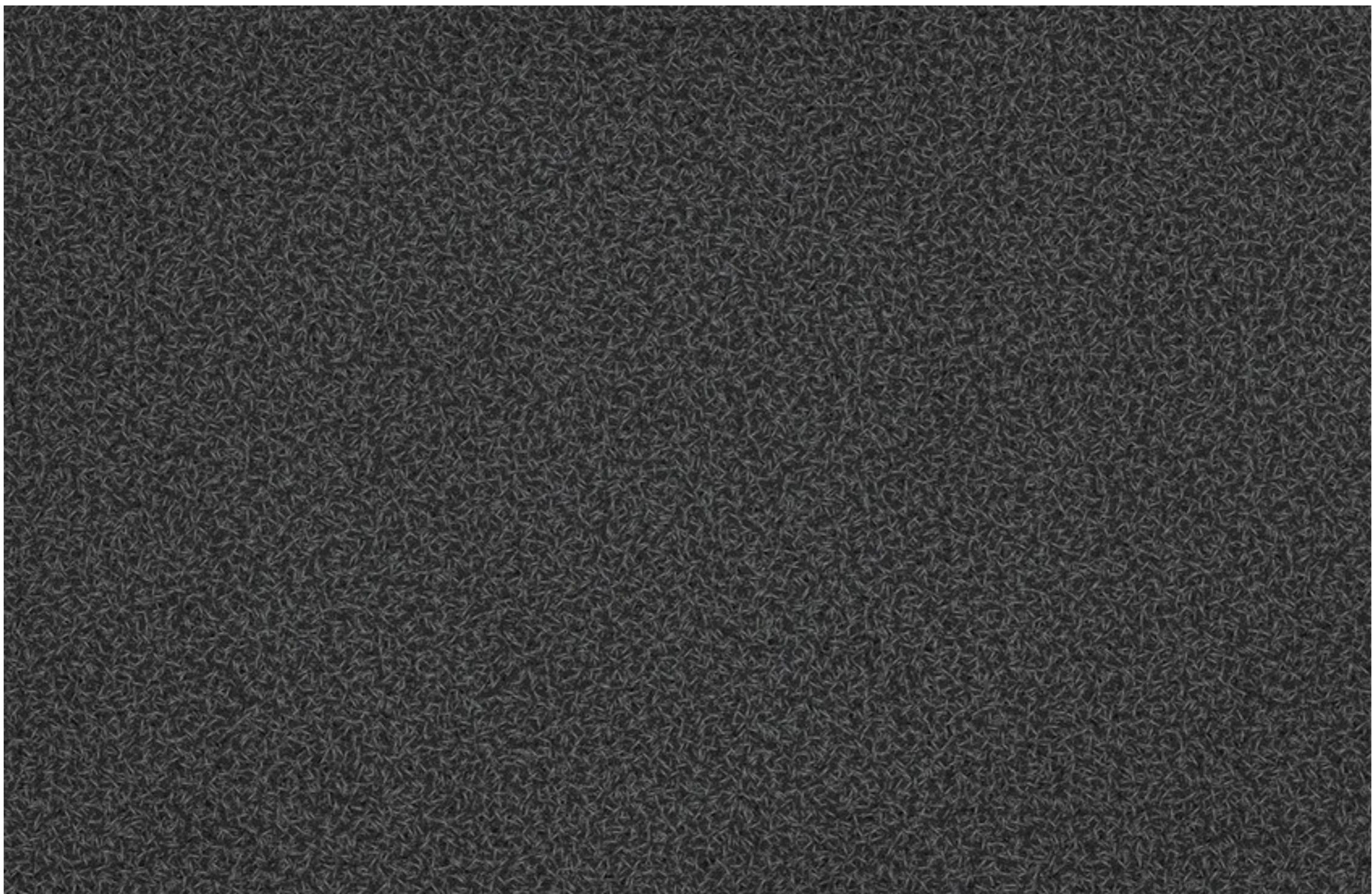
<http://hereistoday.com/>

Katie Lewis



<http://katiehollandlewis.com>

## Running the Numbers



<http://www.chrisjordan.com>

# Prime Number Patterns

## El Patrón de los Números Primos

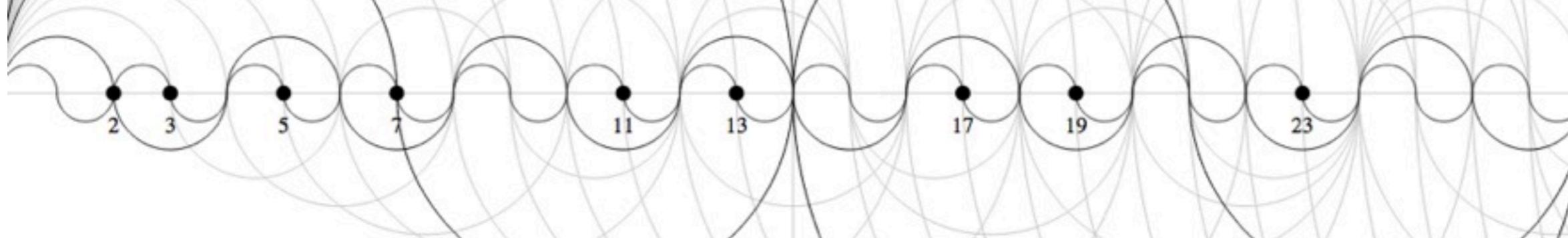
### Prime Number Patterns

by [Jason Davies](#).

For each natural number  $n$ , we draw a periodic curve starting from the origin, intersecting the x-axis at  $n$  and its multiples. The prime numbers are those that have been intersected by *only two* curves: the prime number itself and one.

Below the currently highlighted number, we also show its [sum of divisors](#)  $\sigma(n)$ , and its aliquot sum  $s(n) = \sigma(n) - n$ , which indicate whether the number is [prime](#), [deficient](#), [perfect](#) or [abundant](#).

Based on [Sobre el patrón de los números primos](#) by Omar E. Pol.



<http://www.jasondavies.com/primos/>

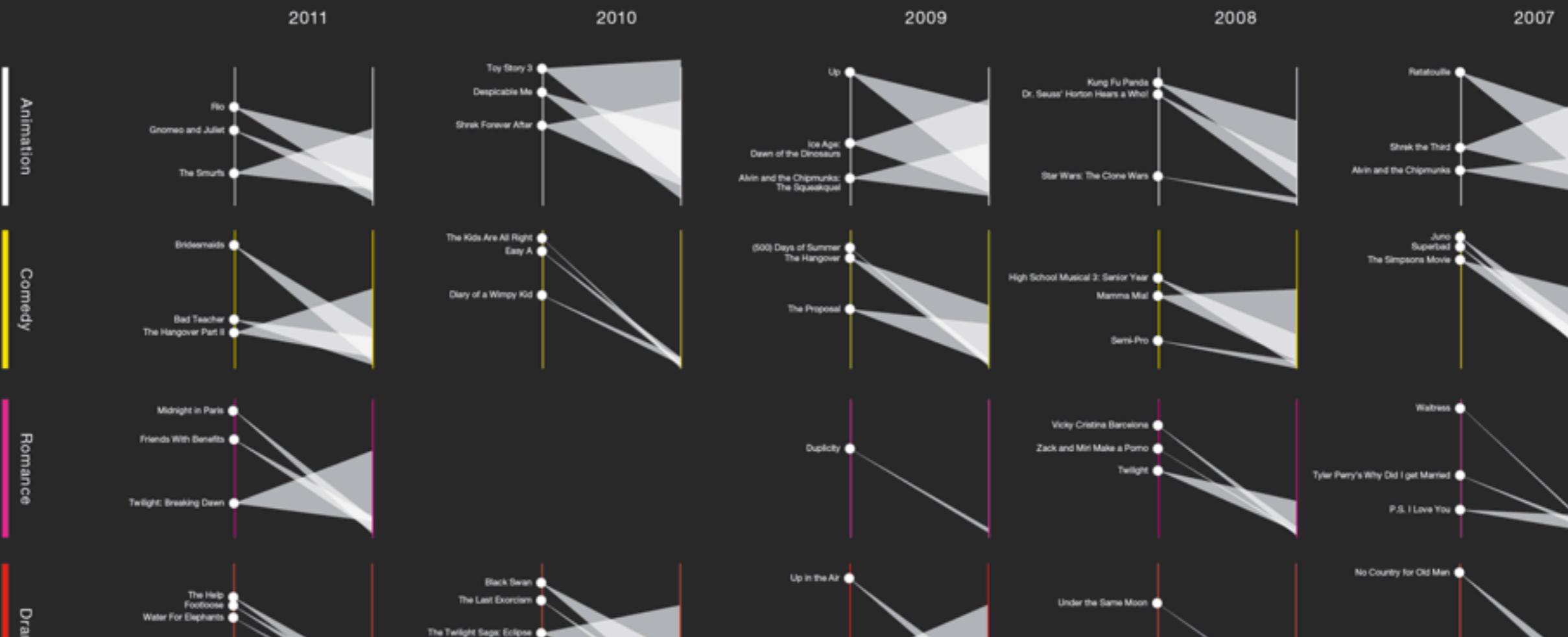
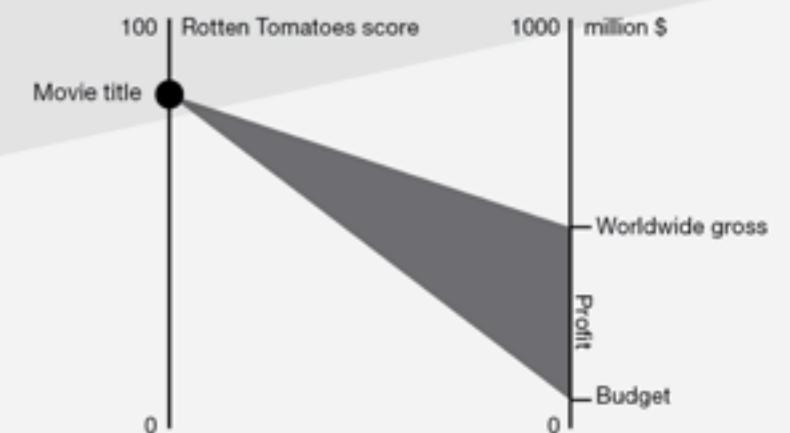
# Informative/Insight

# Spotlight on Profitability

<http://szucs.krisztina.hu>

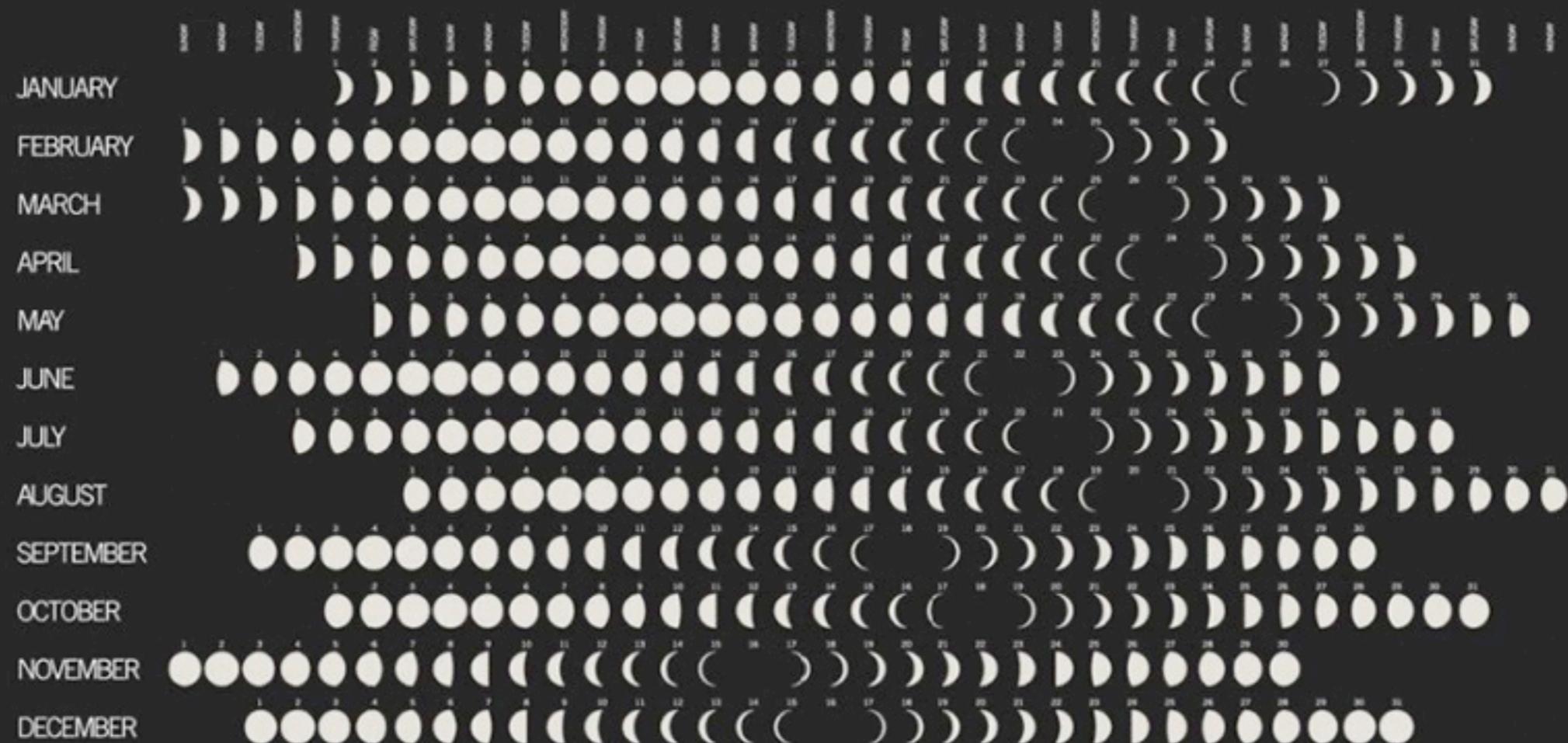
## SPOTLIGHT ON PROFITABILITY

Top 3 selection based on profitability  
(% of budget recovered)\*



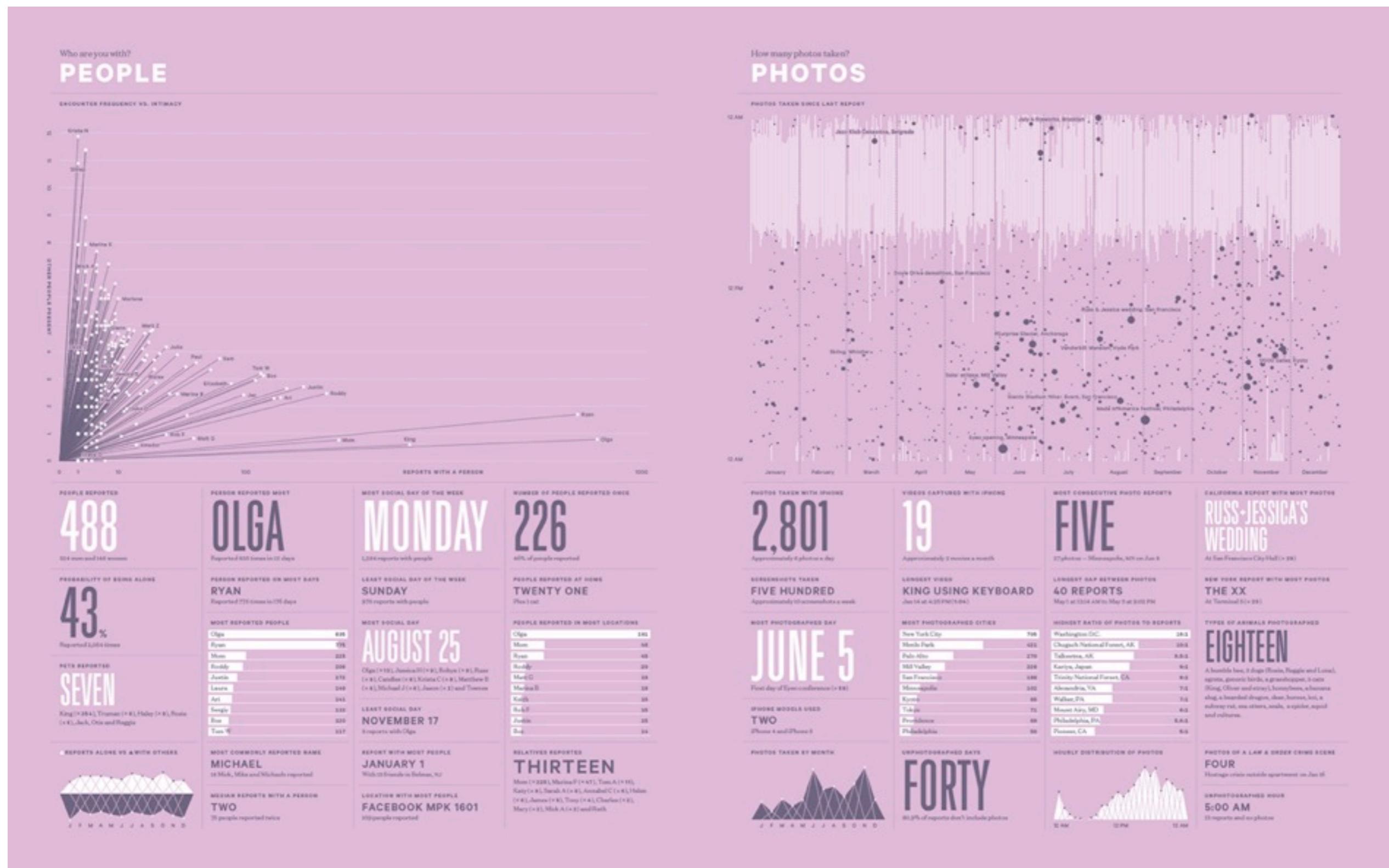
# 2011 Moon Phase Calendar by Irwin Glusker

## 2011 PHASES OF THE MOON



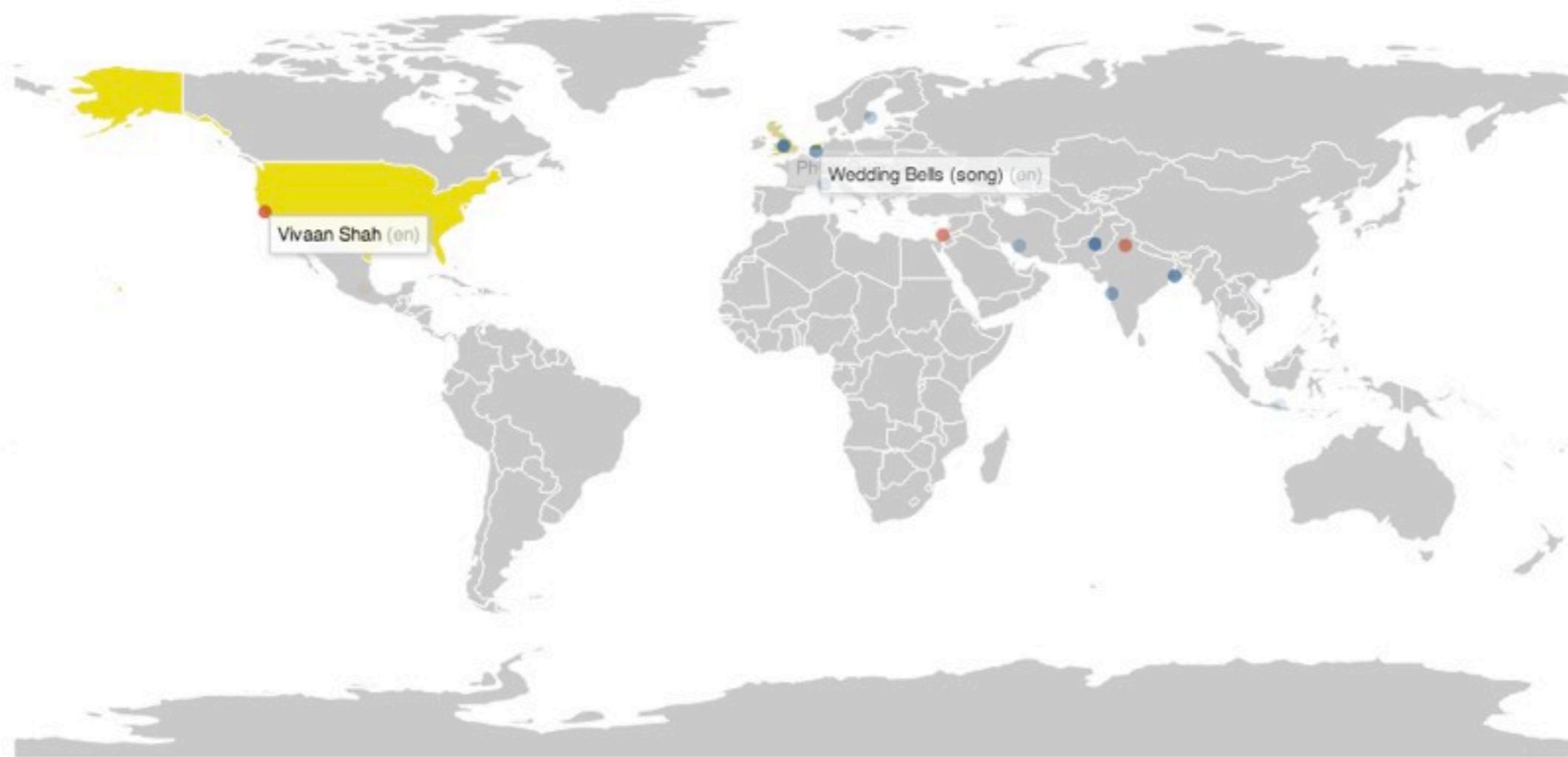
©2011 The Museum of Modern Art, New York

# The Feltron Annual Report



[http://feltron.com/ar12\\_02.html](http://feltron.com/ar12_02.html)

# Wikipedia Recent Changes Map



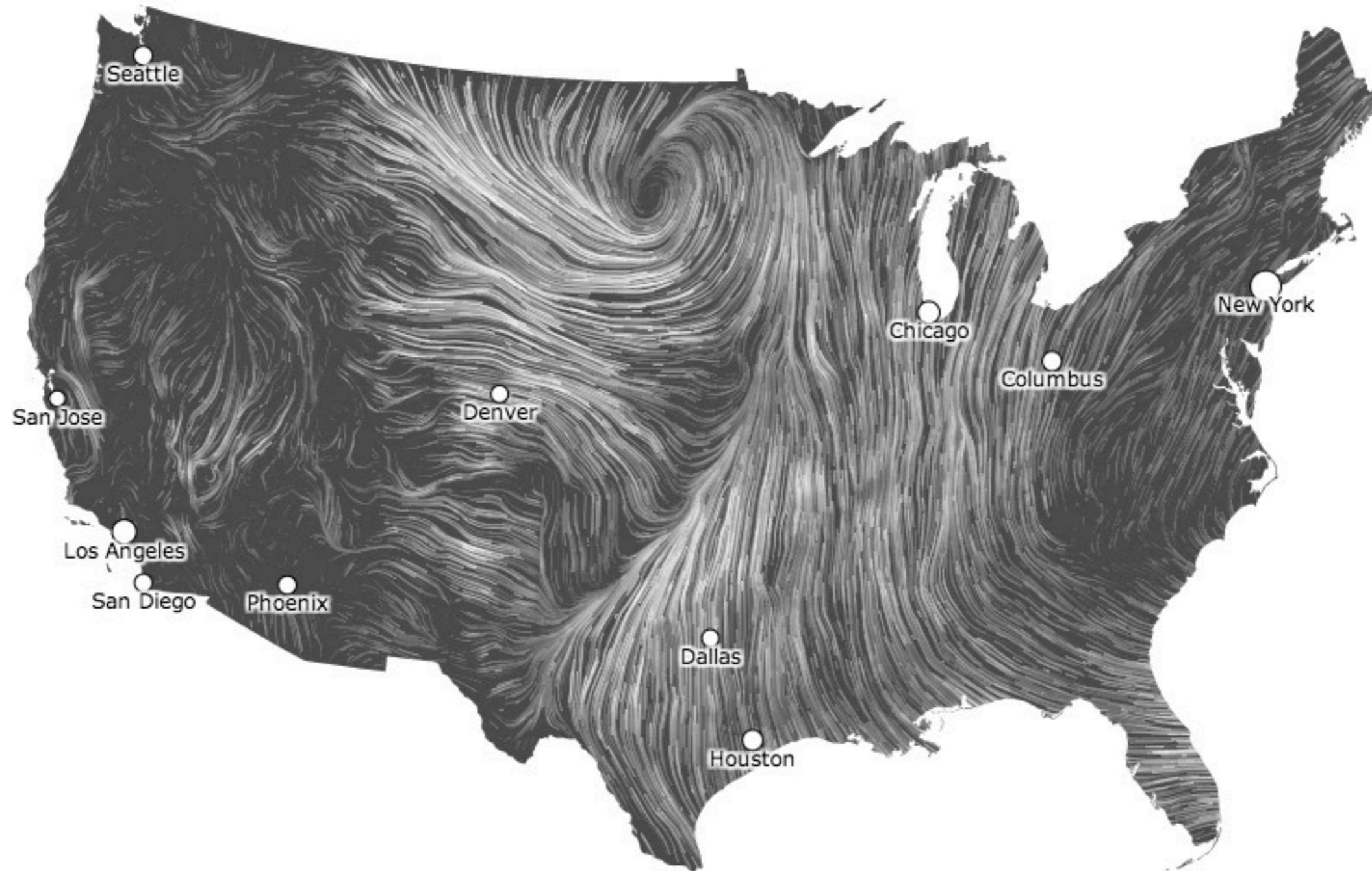
## Recent changes

- Someone in Sunnyvale (California, United States) edited "[Vivaan Shah](#)" (en)
- Someone in Eindhoven (Noord-Brabant, Netherlands) edited "[Wedding Bells \(song\)](#)" (en)
- Someone in Cannock (St. Helens, United Kingdom) edited "[Phillip Gaimon](#)" (en)
- Someone in Pakistan edited "[Sipra](#)" (en)
- Someone in Tel Aviv (Tel Aviv, Israel) edited "[Shabab Al-Dhahiriya SC](#)" (en)
- Someone in Karnal (Haryana, India) edited "[Lossy compression](#)" (en)
- Someone in Monaco edited "[West Side Story \(film\)](#)" (en)
- Someone in Kolkata (West Bengal, India) edited "[Tom Clancy's Rainbow Six: Vegas](#)" (en)
- Someone in Pune (Maharashtra, India) edited "[Kim Sharma](#)" (en)

<http://rcmap.hatnote.com/#en>

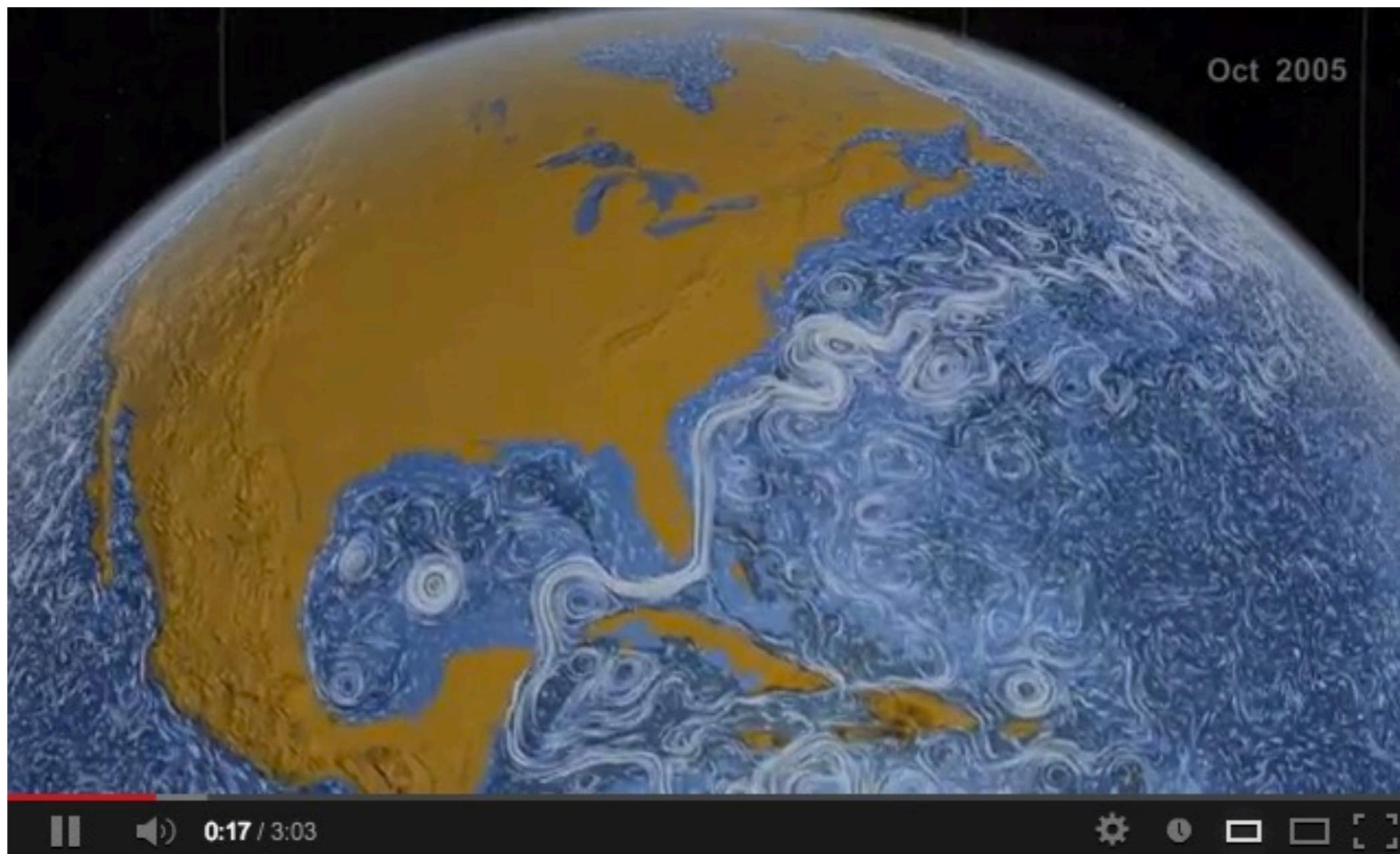
# Complexity / Pattern

# Wind Map



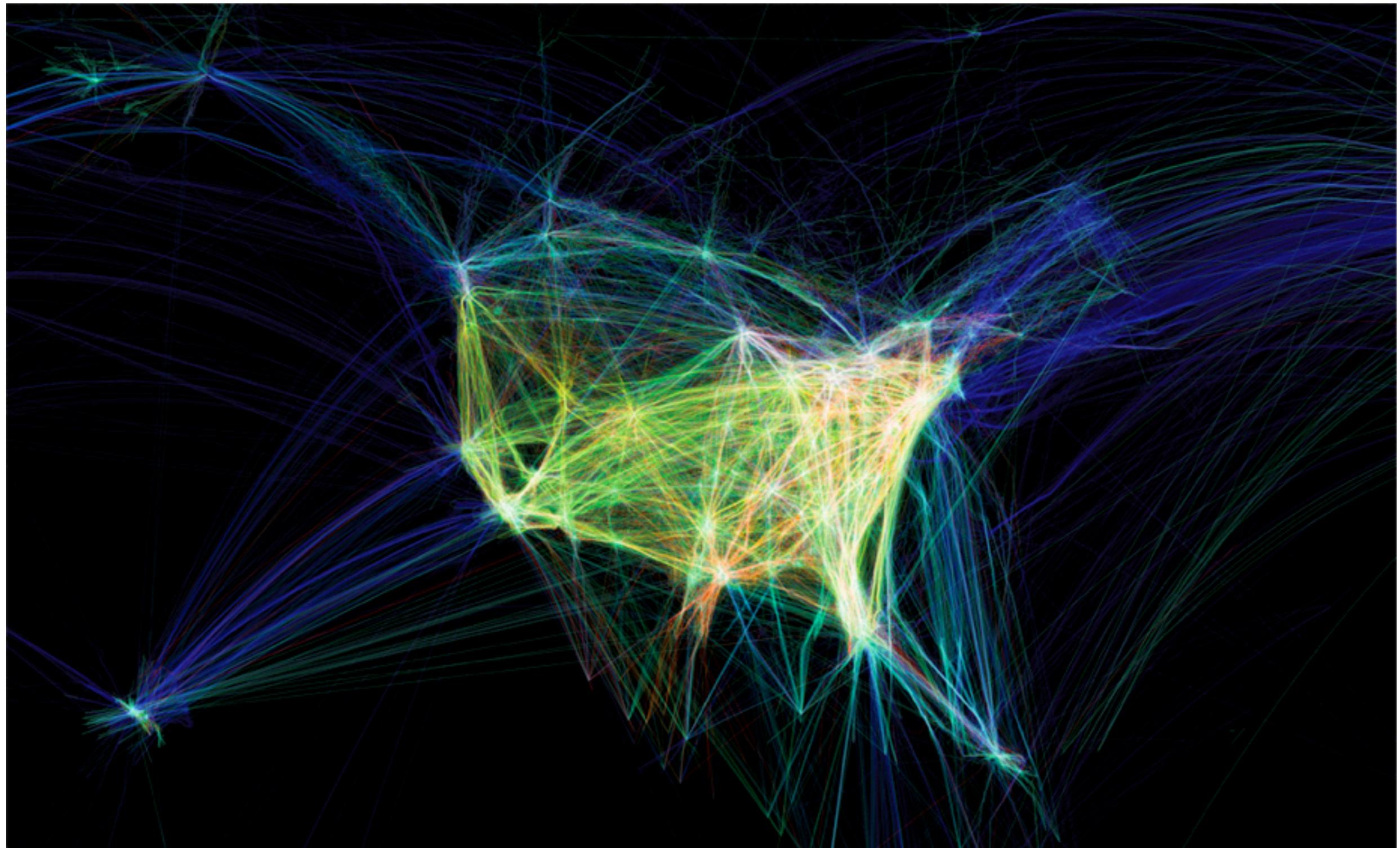
<http://hint.fm/wind/>

# NASA - Perpetual Ocean



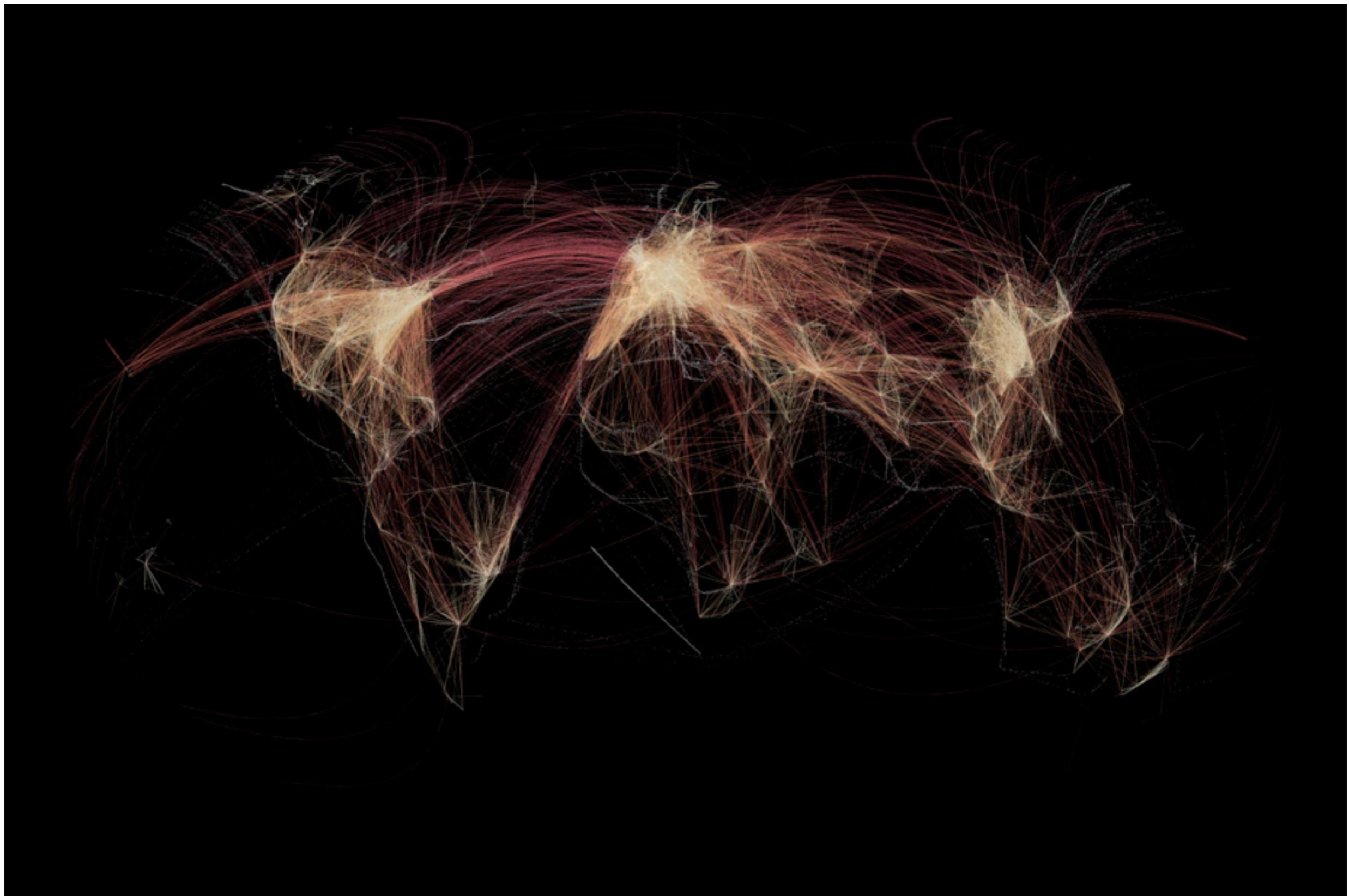
<http://www.youtube.com/watch?v=CCmTYOPKGDs>

## Aaron Koblin - Flight Pattern



[http://www.youtube.com/watch?feature=player\\_embedded&v=ystkKXzt9Wk#!](http://www.youtube.com/watch?feature=player_embedded&v=ystkKXzt9Wk#!)

## Michael Markieta - Global Air and Sea Routes



<http://www.spatialanalysis.ca/2011/global-connectivity-mapping-out-flight-routes/>

# A History of the World in 100 Seconds



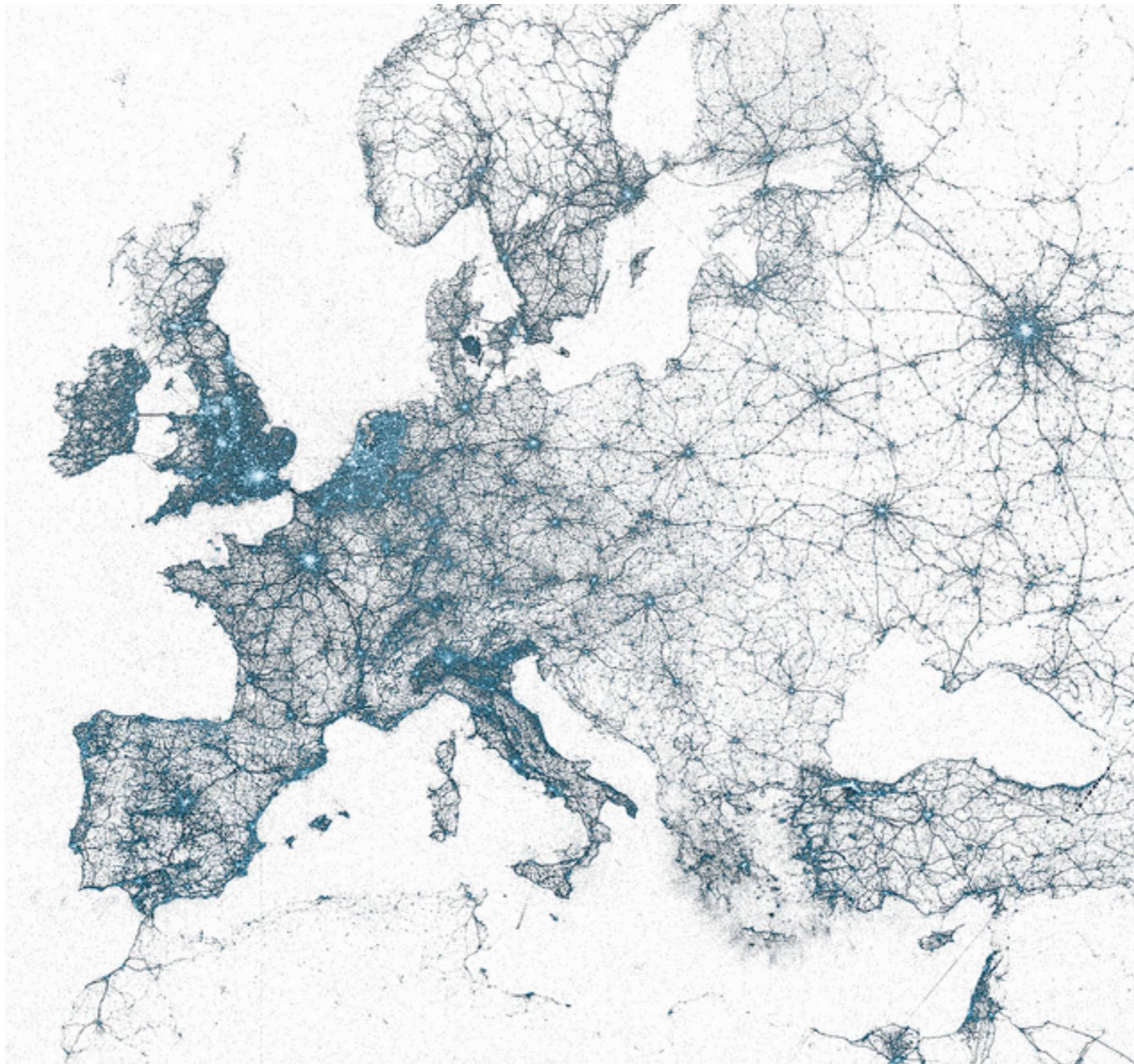
<https://vimeo.com/19088241>

## OSM 2008: A Year of Edits



<http://vimeo.com/2598878>

## The geography of Tweets | All geo-tagged Tweets since 2009



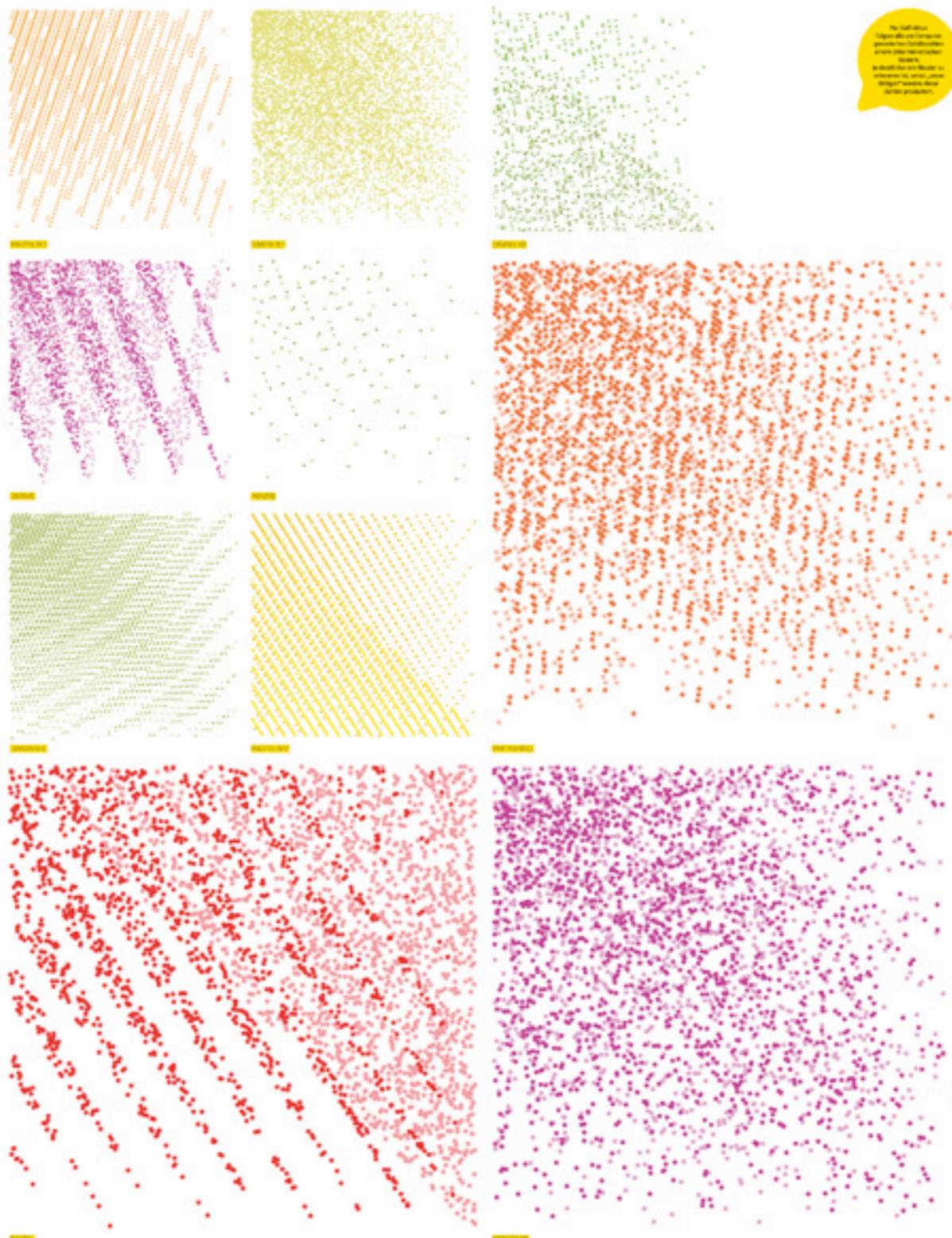
<http://www.flickr.com/photos/twitteroffice/sets/72157633647745984/>

# Every Day Of My Life



<http://marcignac.com/projects/everyday-of-my-life/>

# WHAT DOES RANDOMNESS LOOK LIKE?



## NUMBER OF ZUFÄLLIGE

Eigibt viele mathematische Modelle, mit denen Hilfe der Computer Zufallszahlen produzieren, denn ein zufälliges Zufall kann er nicht kontrollieren, da die Computer vollständig deterministisch funktioniert. Man spricht daher von Pseudo-Zufallszahlen. Hier sind jeweils 20 000 Zufallszahlen zwischen eins und zwanzig verschieden.

## RANDOM WALK

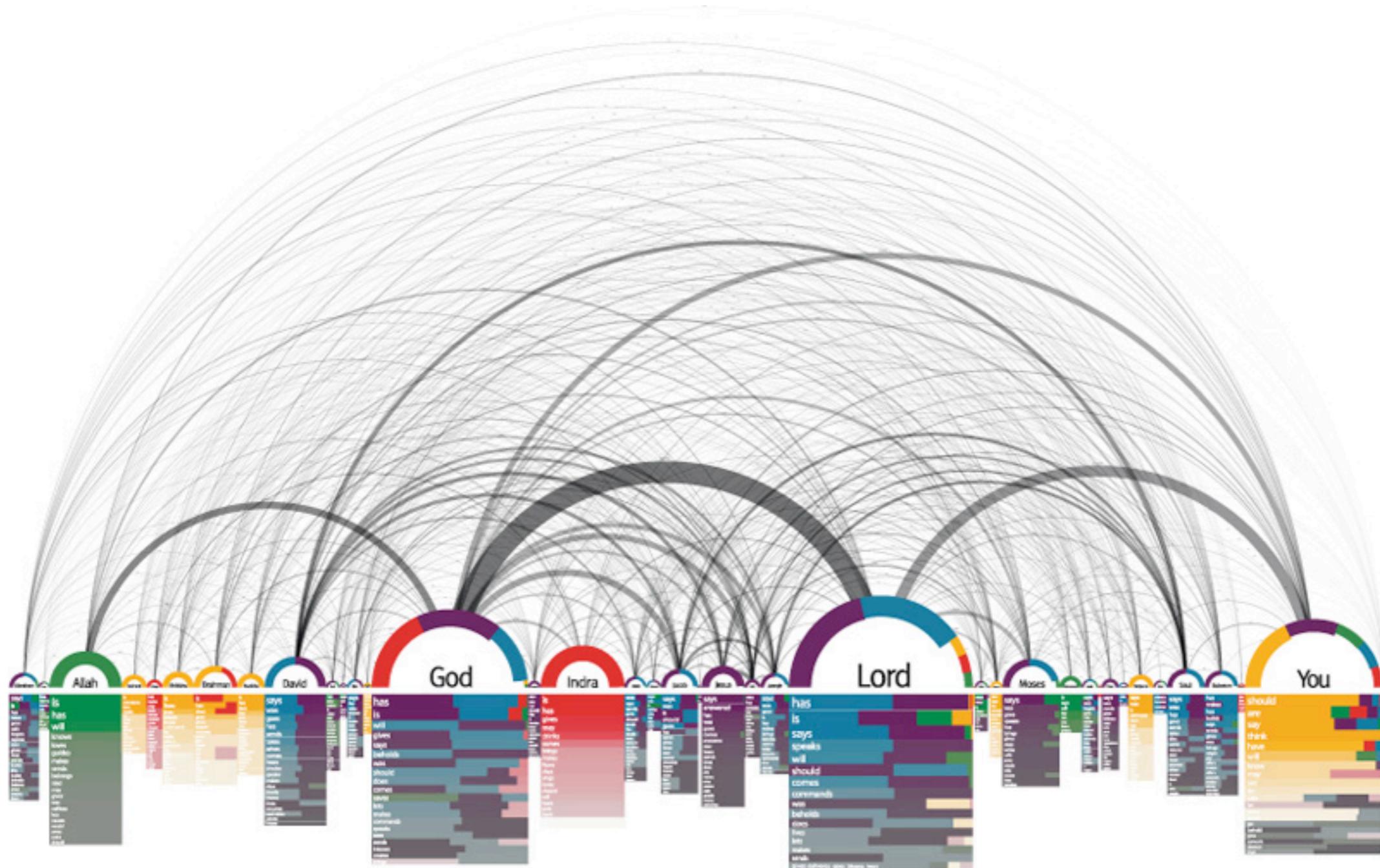
Die Visualisierung zeigt 2000 Zufallszahlen.

Zufallszahlen produziert werden. Plaziert man die produzierten Zufallszahlen in einem zweidimensionalen Raum, wird immer eine zufällig eingesetzte Ziffer (z.B. 0, 1, und 2) berücksichtigt, um so sich bei der Aufteilung auf die Werte zu den charakteristischen Kosten. Diese Angabewertes werden darauf hin, dass die Zufallszahlen

bestimmt Zahlen bewegen zeigt. Beispielsweise einige nie produziert werden, das ist ein Zeichen für einen qualitativ schlechten Zufall. Bei modernen Zufallszahlen ist der „Zufallszahlen“ aus dem Jahre 1999, der keine Wiederholung aufweist.

<http://www.random-walk.com>

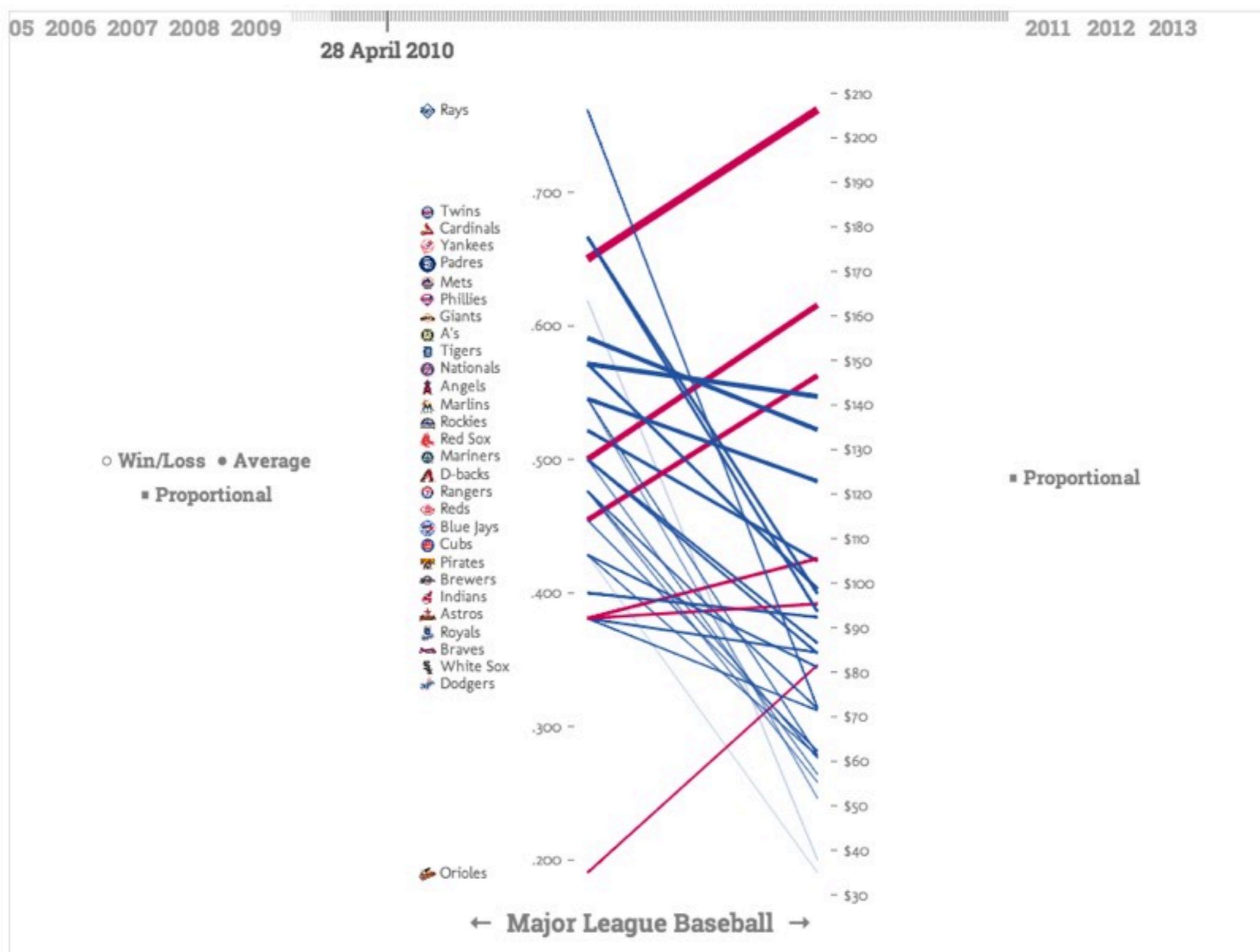
# Similar Diversity



<http://similardiversity.net/project/>

# Exploratory

# Salary vs Performance



<http://fathom.info/salaryper/>

# Gun control in America: A state-by-state breakdown

## Laws on file

If no colour appears, there is no such law on file

- 2012 election results
- Background check law
- Permit required to purchase
- Licence required to sell
- Records kept on file
- Firearms banned from workplace

## Vermont

- Voted for Obama in the 2012 election
- **Background check:** not required for handguns
- **Permit:** not required to buy firearms
- **Licence:** not required for dealers
- **Records:** kept on file for handgun owners
- **Workplace:** firearms not allowed in parking lots

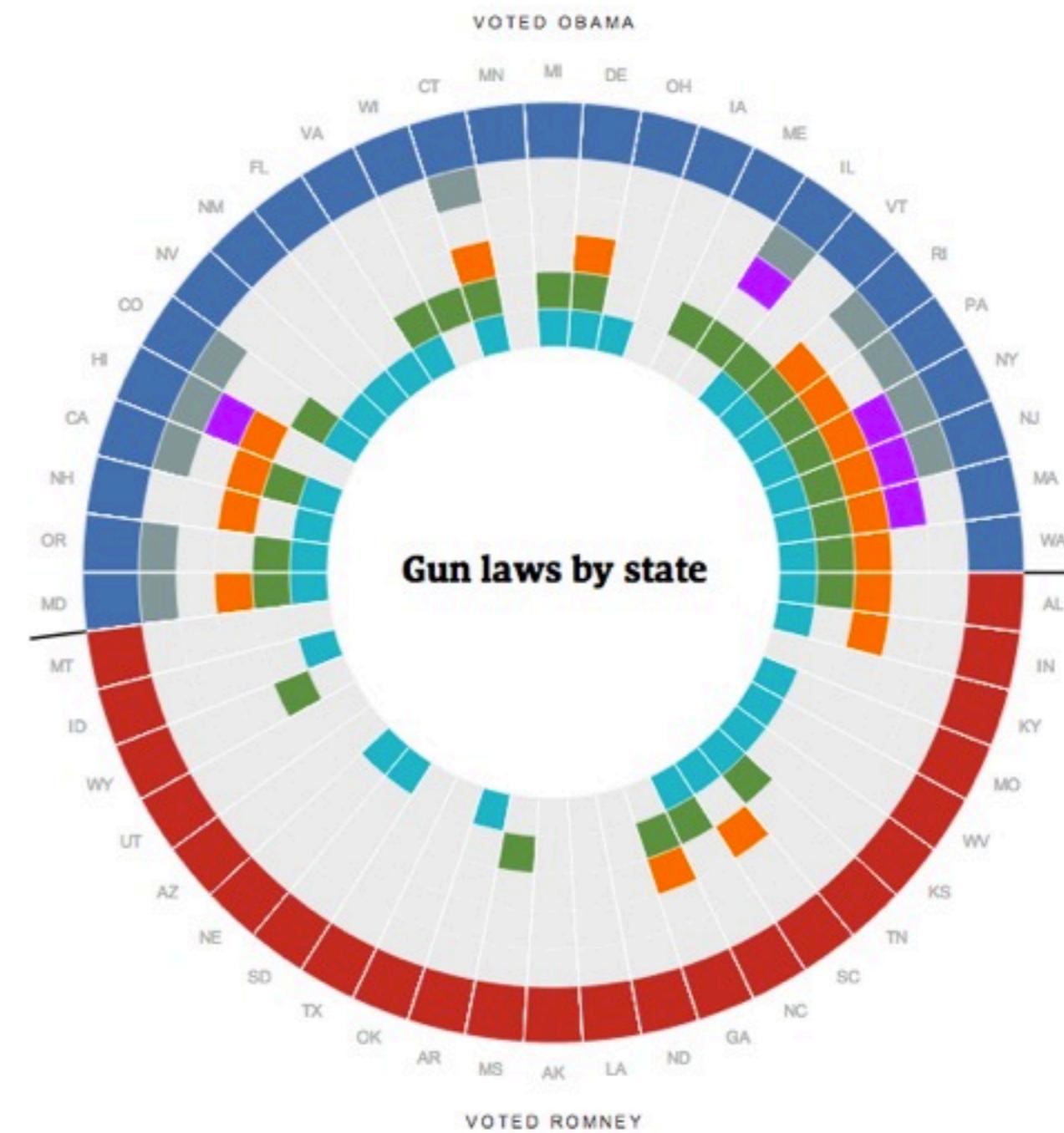
## Overall gun control score: 6

Vermont has a **Brady Campaign score** of 6, which is lower than the national average of 16. The score comes from measuring these and other gun laws according to a weighted points system.

## Murder rate: 0.75

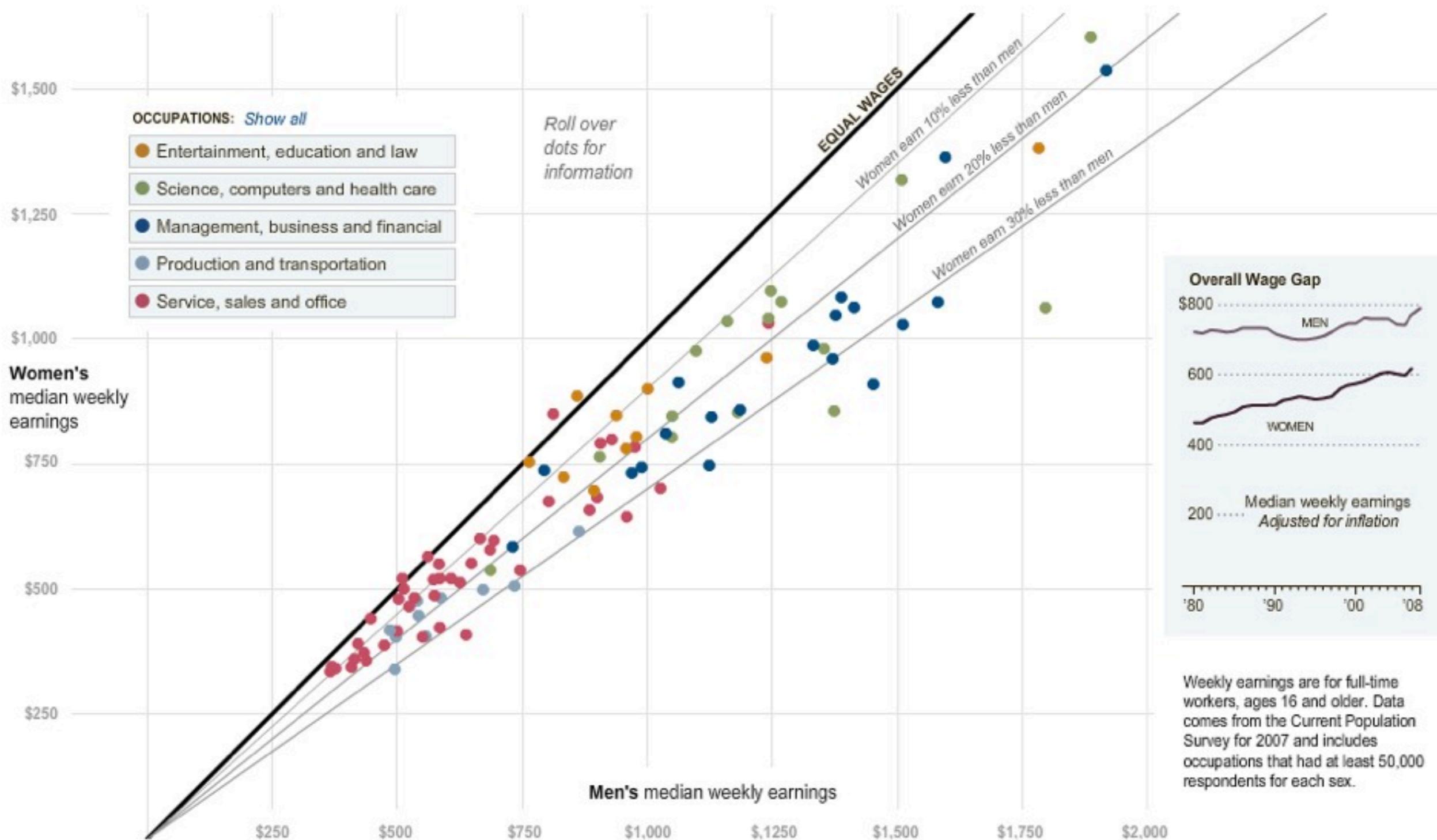
There were 0.75 firearm murders per 100,000 people in Vermont during 2011, which is lower than the national average of 2.77. Overall, it is ranked #43 in murder rates out of 48 states with this data.

Sort states by: POLITICS REGION ALPHABETICAL



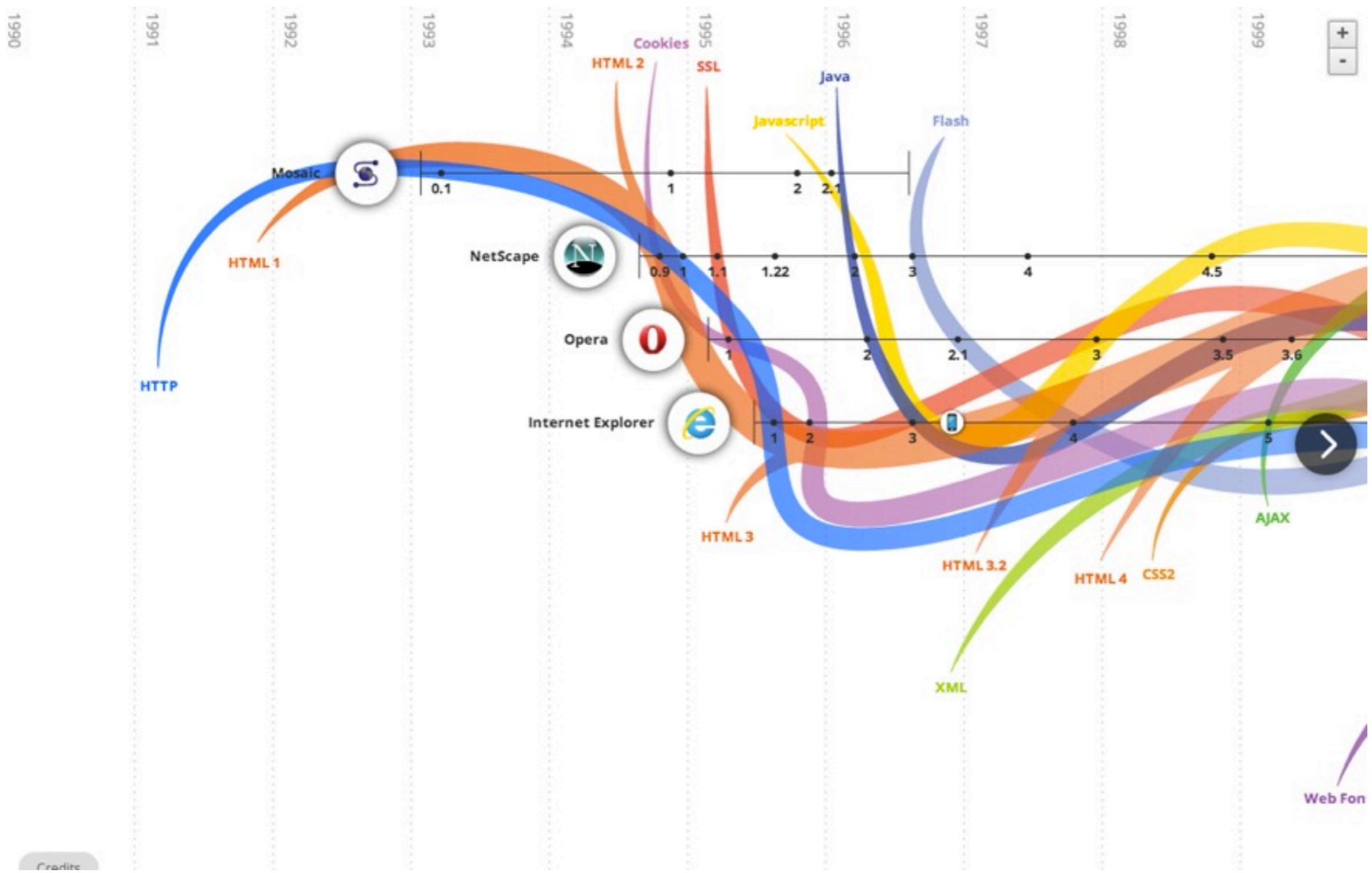
<http://www.theglobeandmail.com/news/world/gun-control-in-america-a-state-by-state-breakdown/article6465107/>

# Why Is Her Paycheck Smaller?



[http://www.nytimes.com/interactive/2009/03/01/business/20090301\\_WageGap.html?\\_r=1&](http://www.nytimes.com/interactive/2009/03/01/business/20090301_WageGap.html?_r=1&)

# The Evolution Of the Web



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

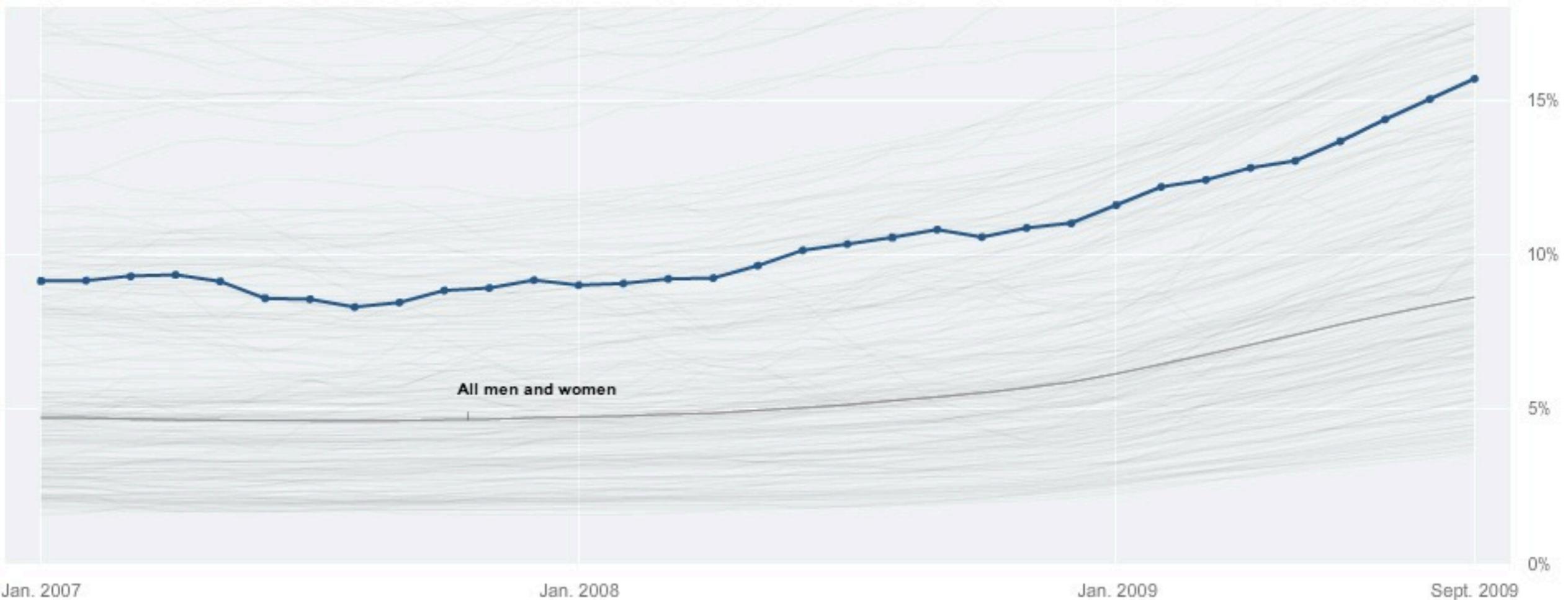
# The Jobless Rate for People Like You



UNEMPLOYMENT RATE,  
12 MONTH AVG. ENDING SEPT. '09

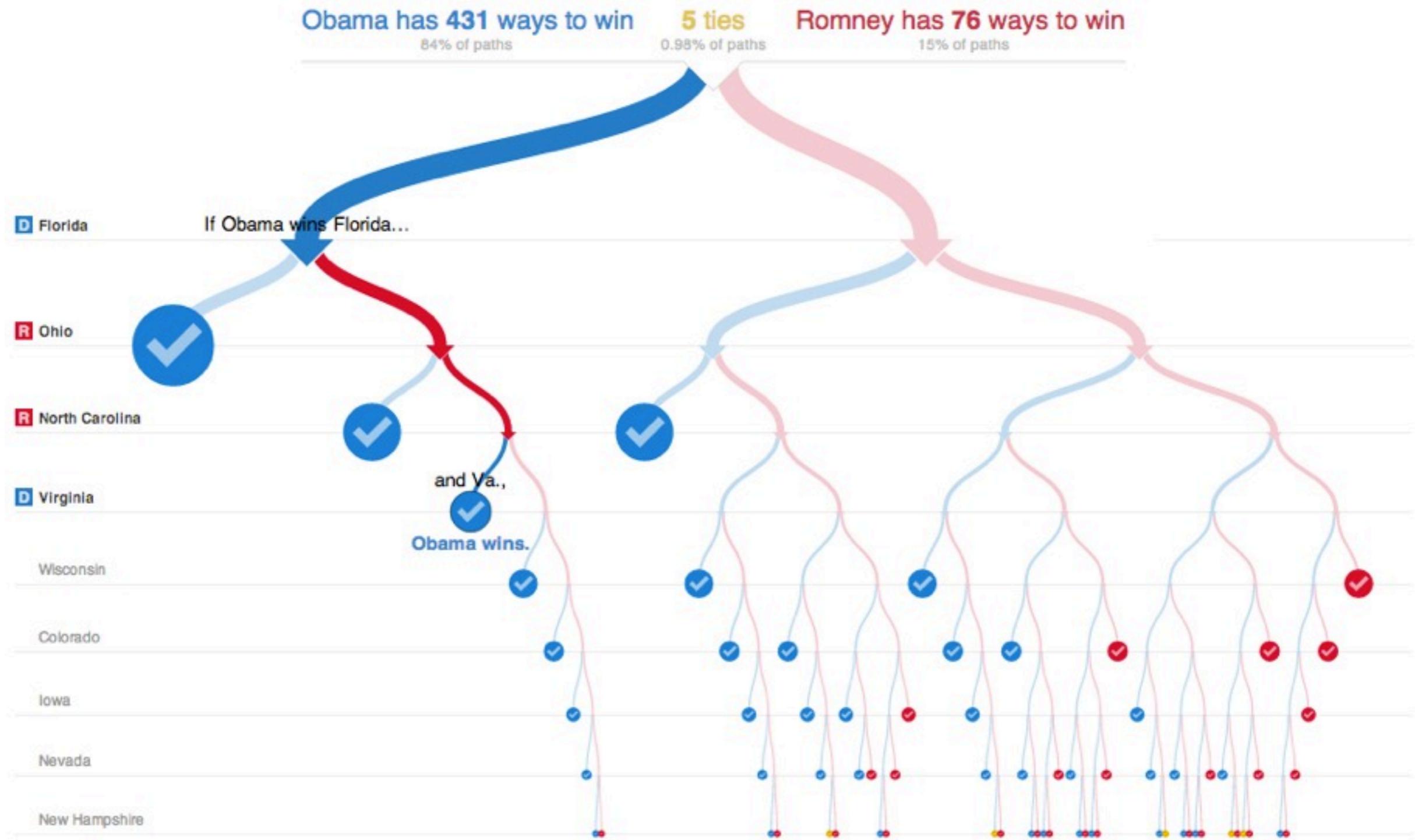
**15.7%**

For Asian and American Indian women  
and women of more than one race ages 15  
to 24



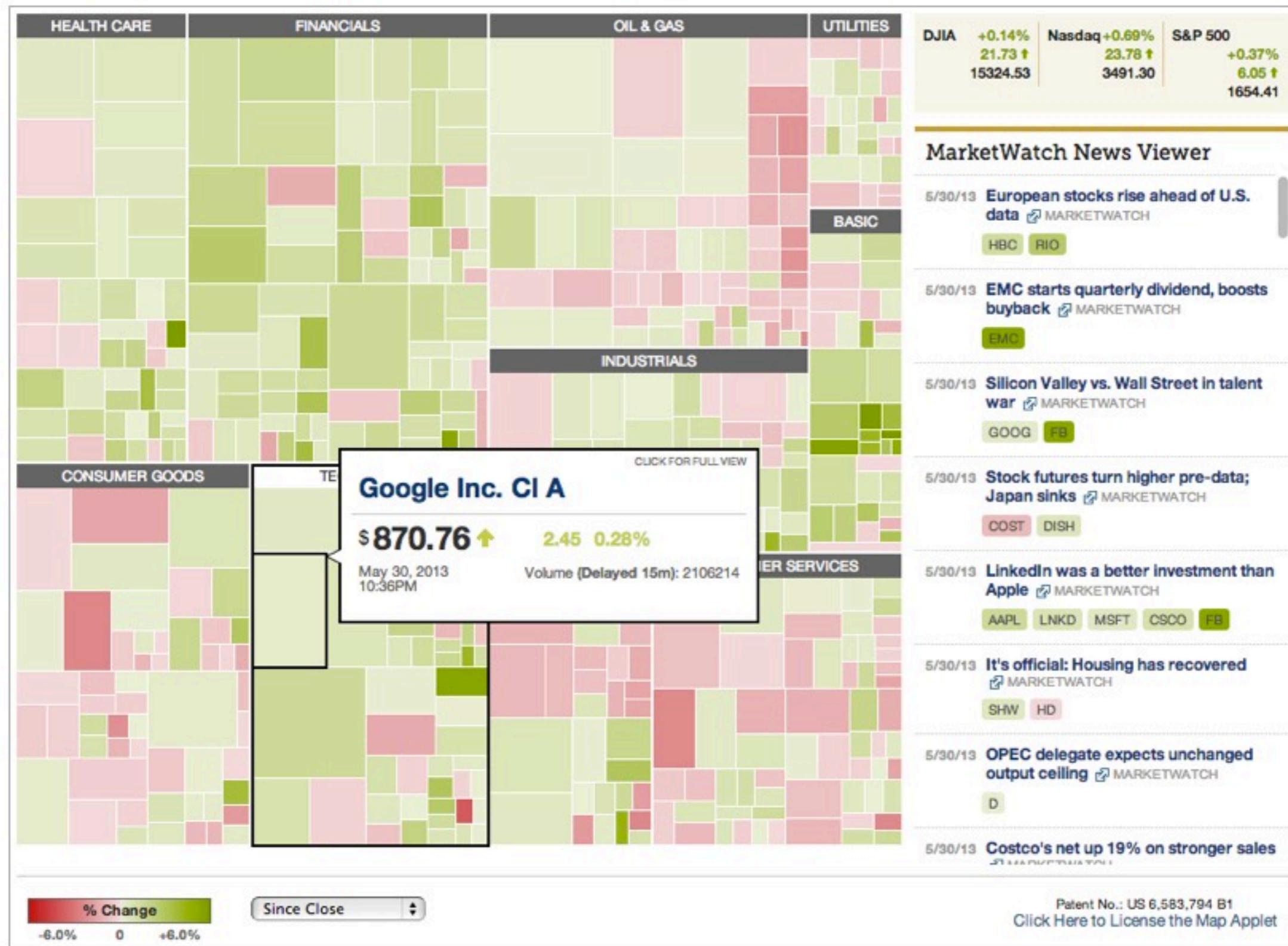
<http://www.nytimes.com/interactive/2009/11/06/business/economy/unemployment-lines.html>

# 512 Paths to the White House



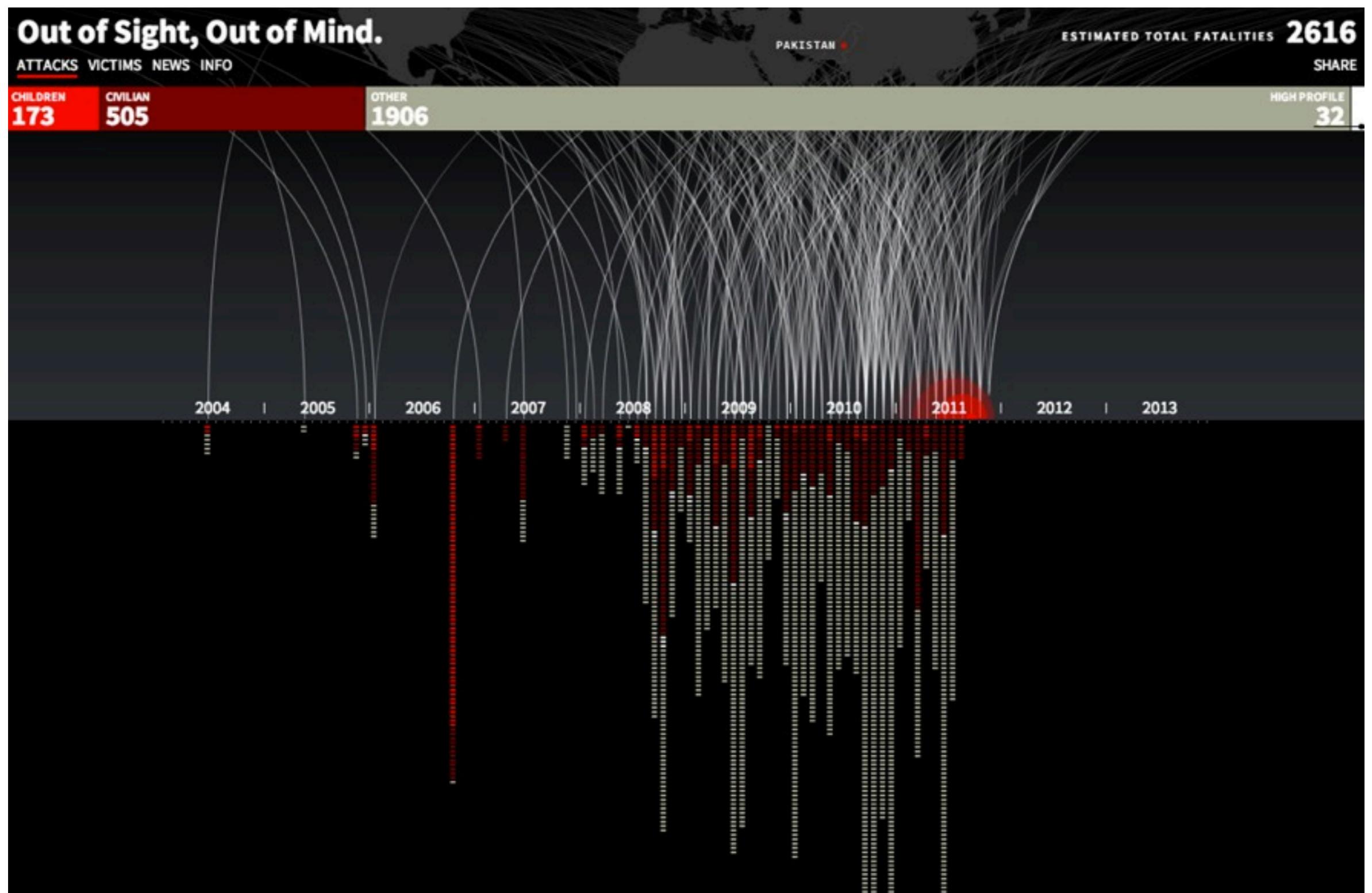
[http://www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html?\\_r=0](http://www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html?_r=0)

# Map of the Market



<http://www.smartmoney.com/map-of-the-market/>

## Out of Sight, Out of Mind



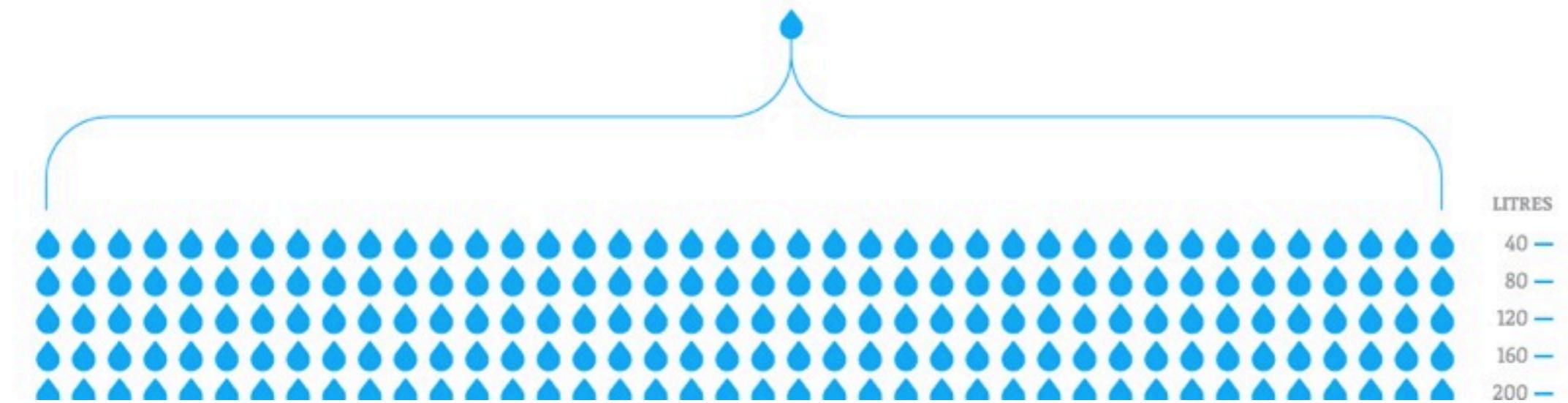
<http://drones.pitchinteractive.com/>

# Narrations

Water

What if I told you:

**you eat 3496 litres of water**



<http://www.angelamorelli.com/water/>

NYTimes - Usain Bolt vs. 116 years of Olympic sprinters

# One Race, Every Medalist Ever

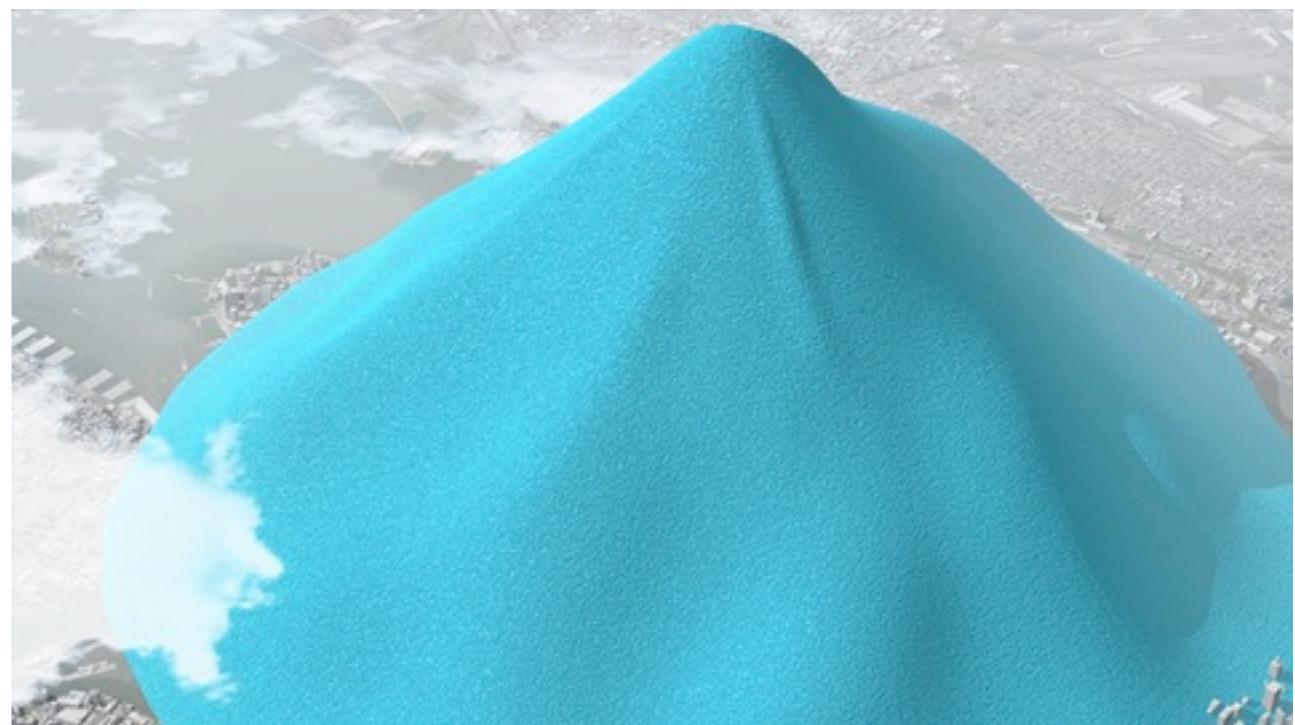
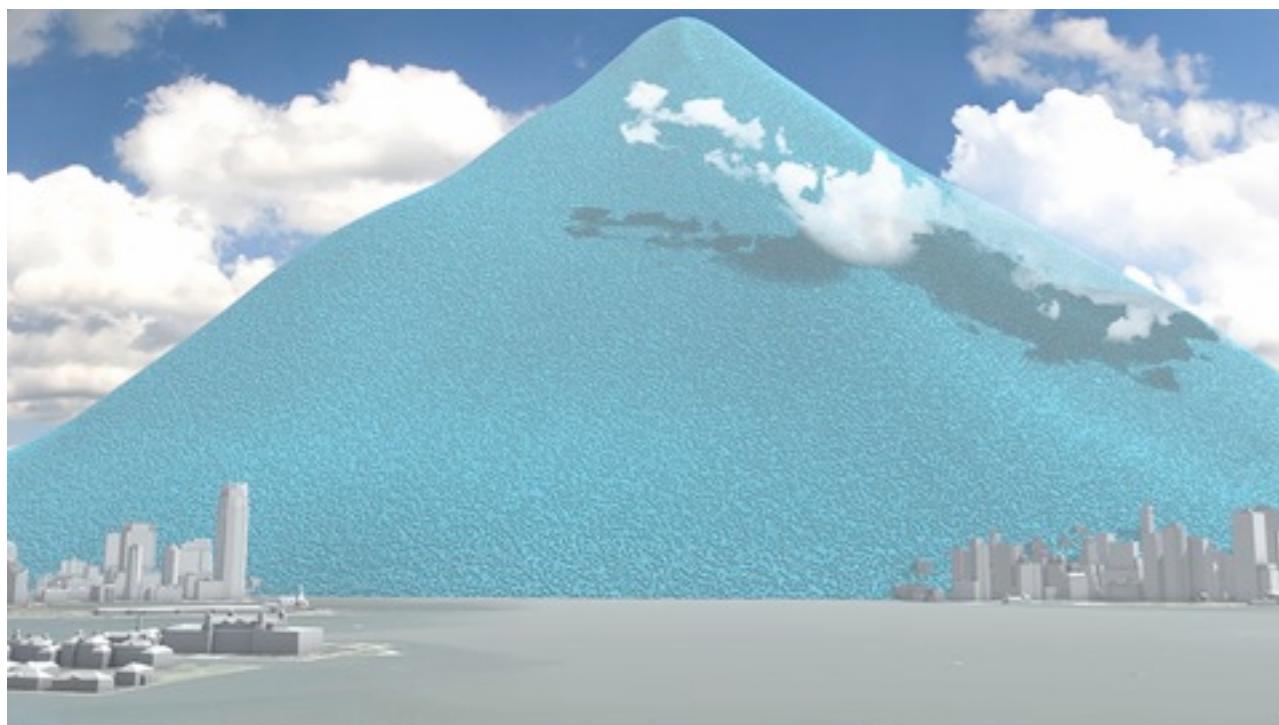
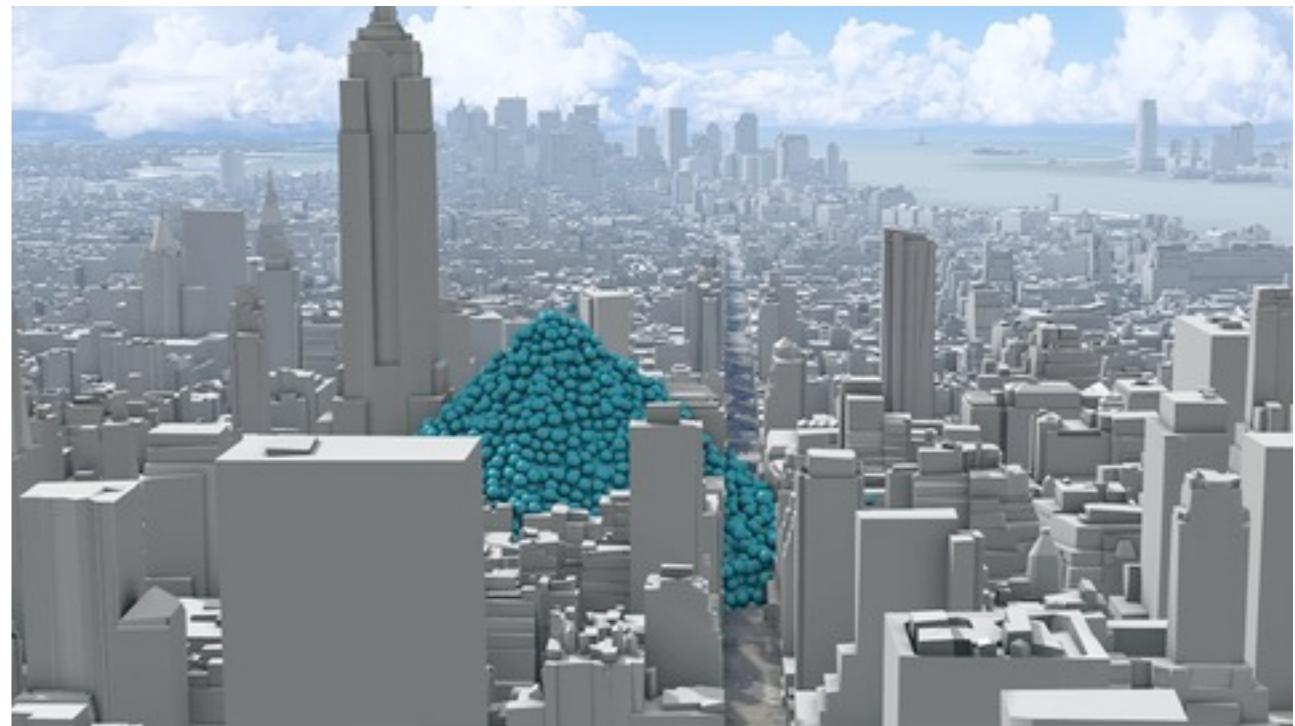
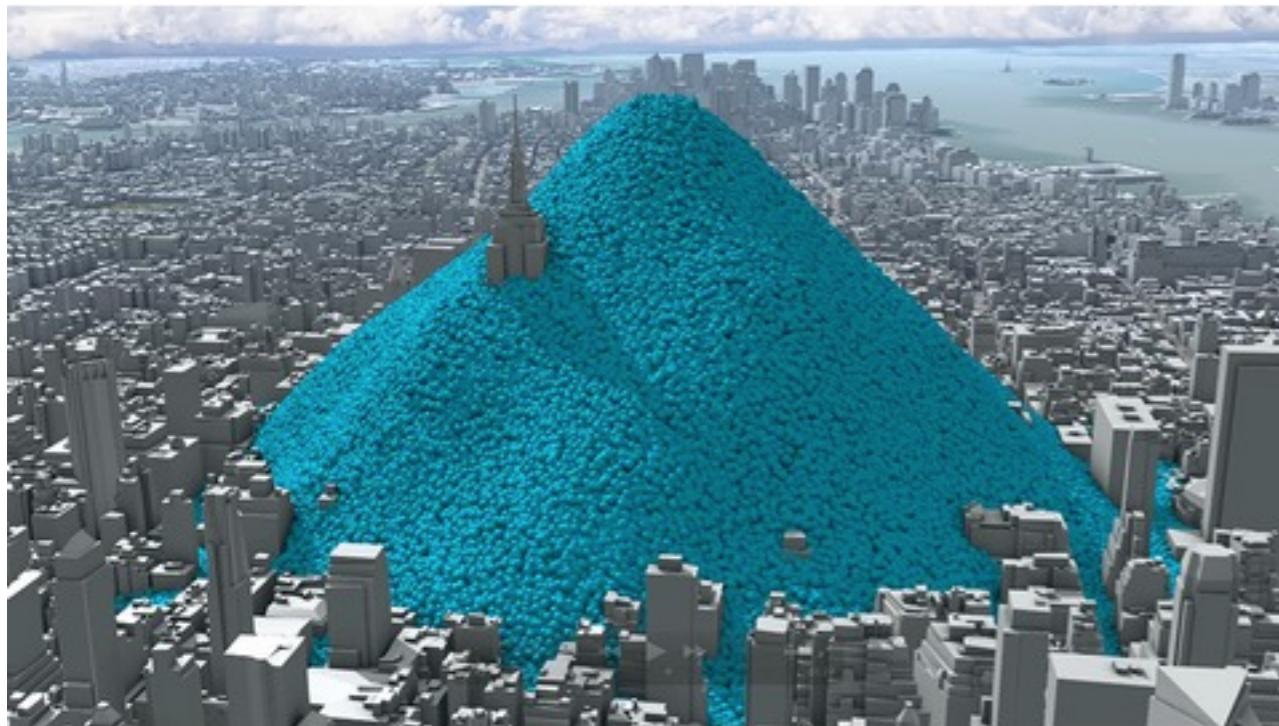
Usain Bolt's 9.63 set an Olympic record in the 100.  
So how far ahead of every Olympic medalist is he?

By KEVIN QUEALY and GRAHAM ROBERTS



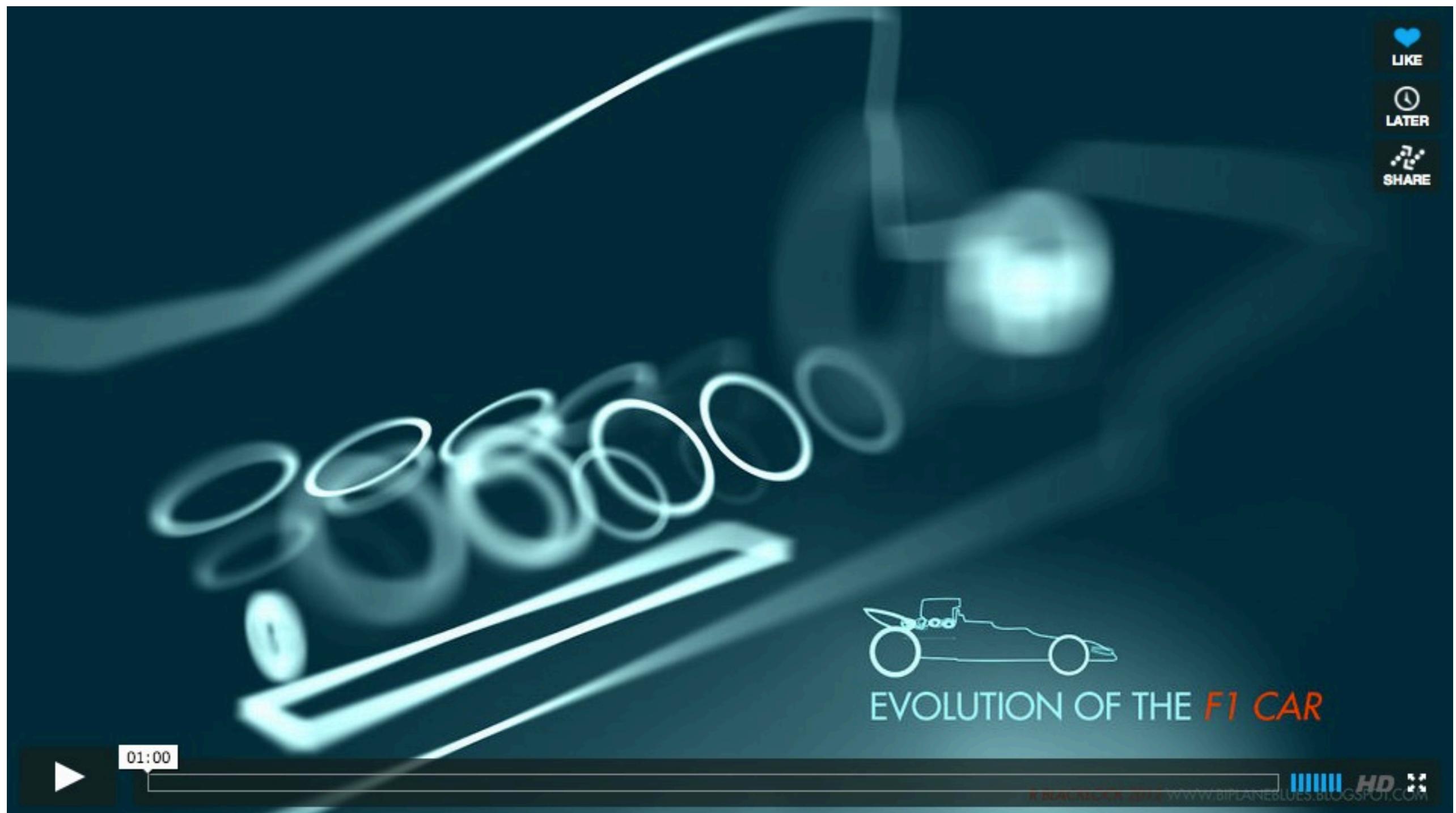
<http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html>

## New York's carbon emissions



<http://carbonvisuals.com/work/new-yorks-carbon-emissions-in-real-time>

# Evolution of the F1 Car



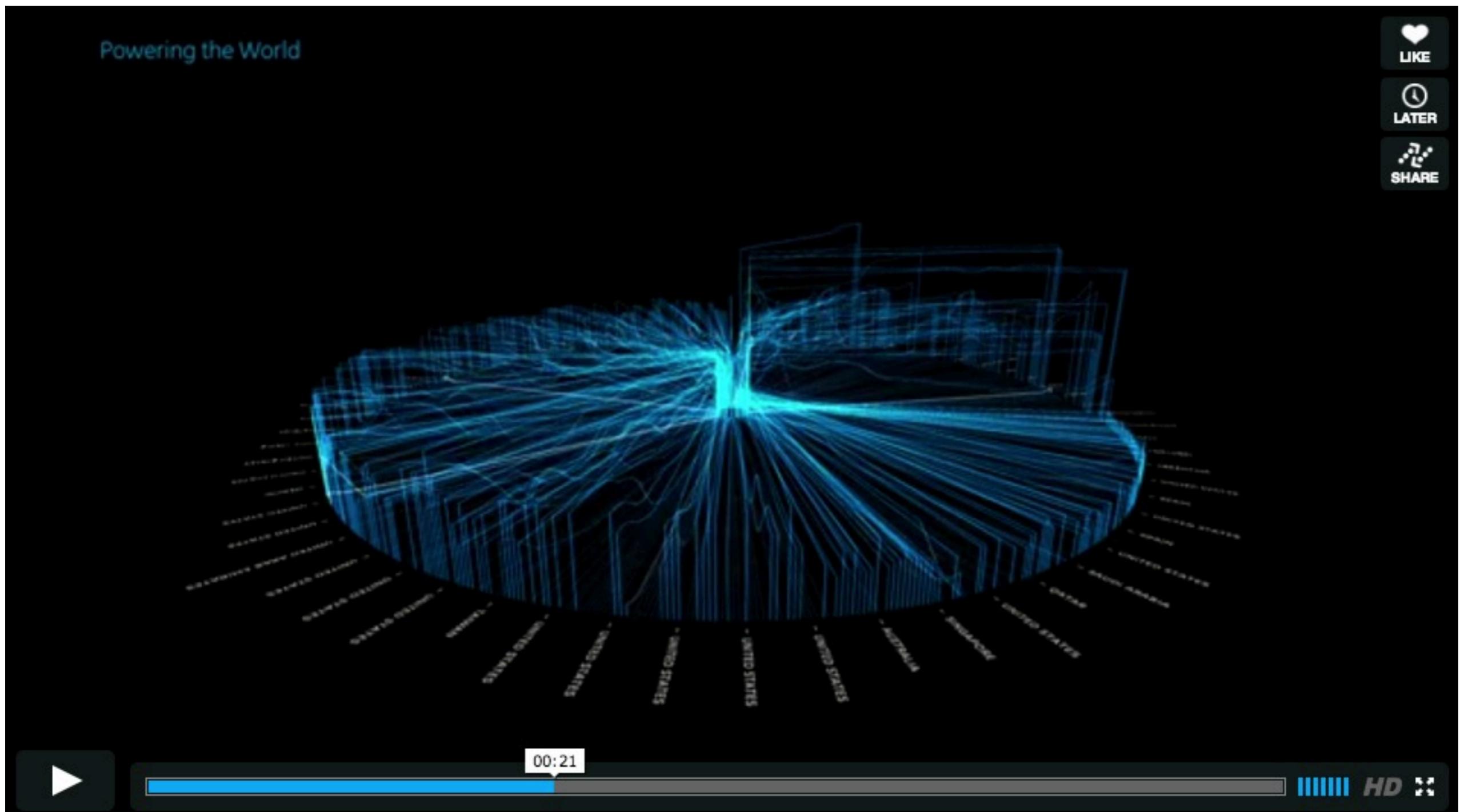
<https://vimeo.com/43233380>

# Just Landed



<https://vimeo.com/4587178>

# GE - Powering the World



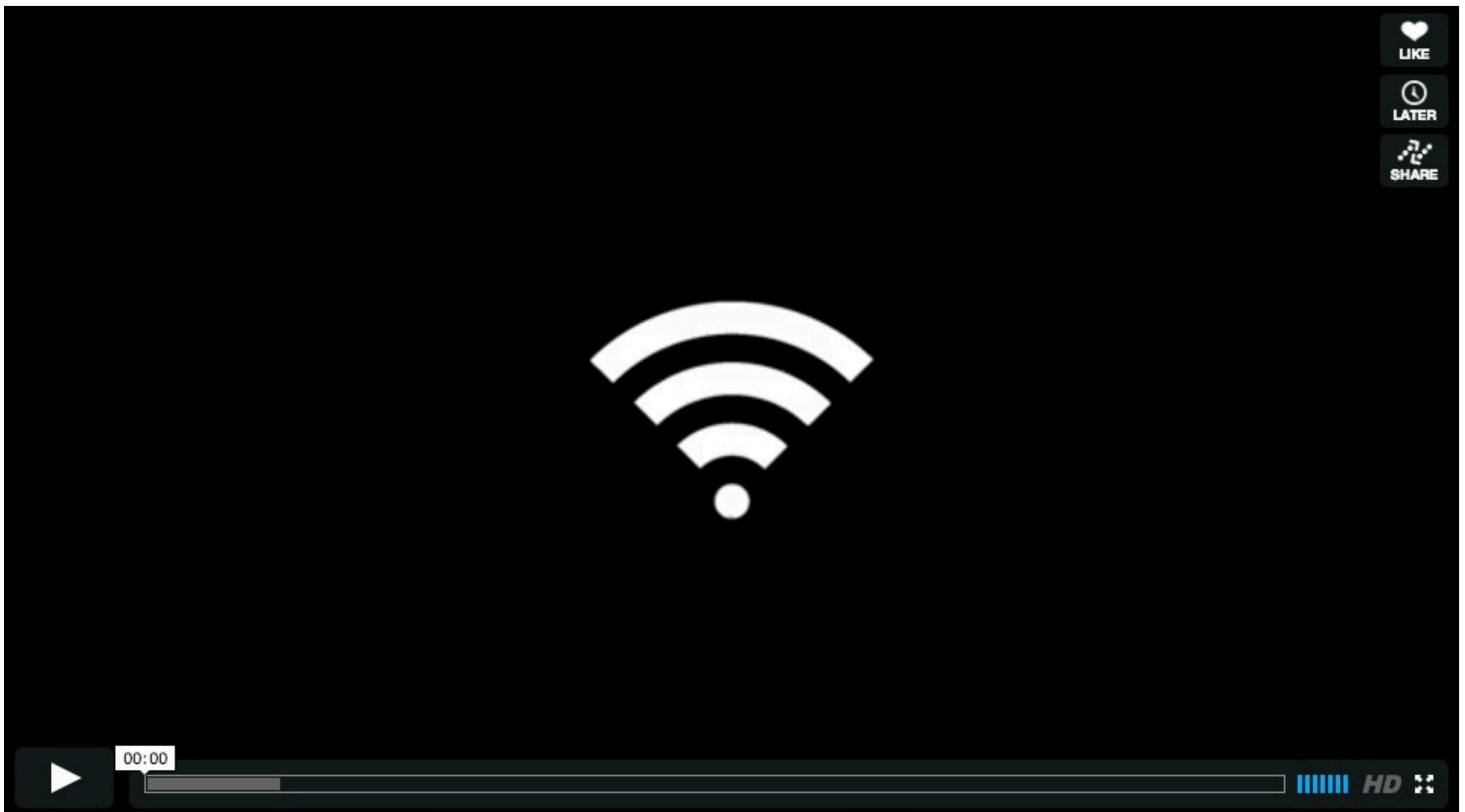
<https://vimeo.com/36354487>

# We Feel Fine



<http://www.wefelfine.org>

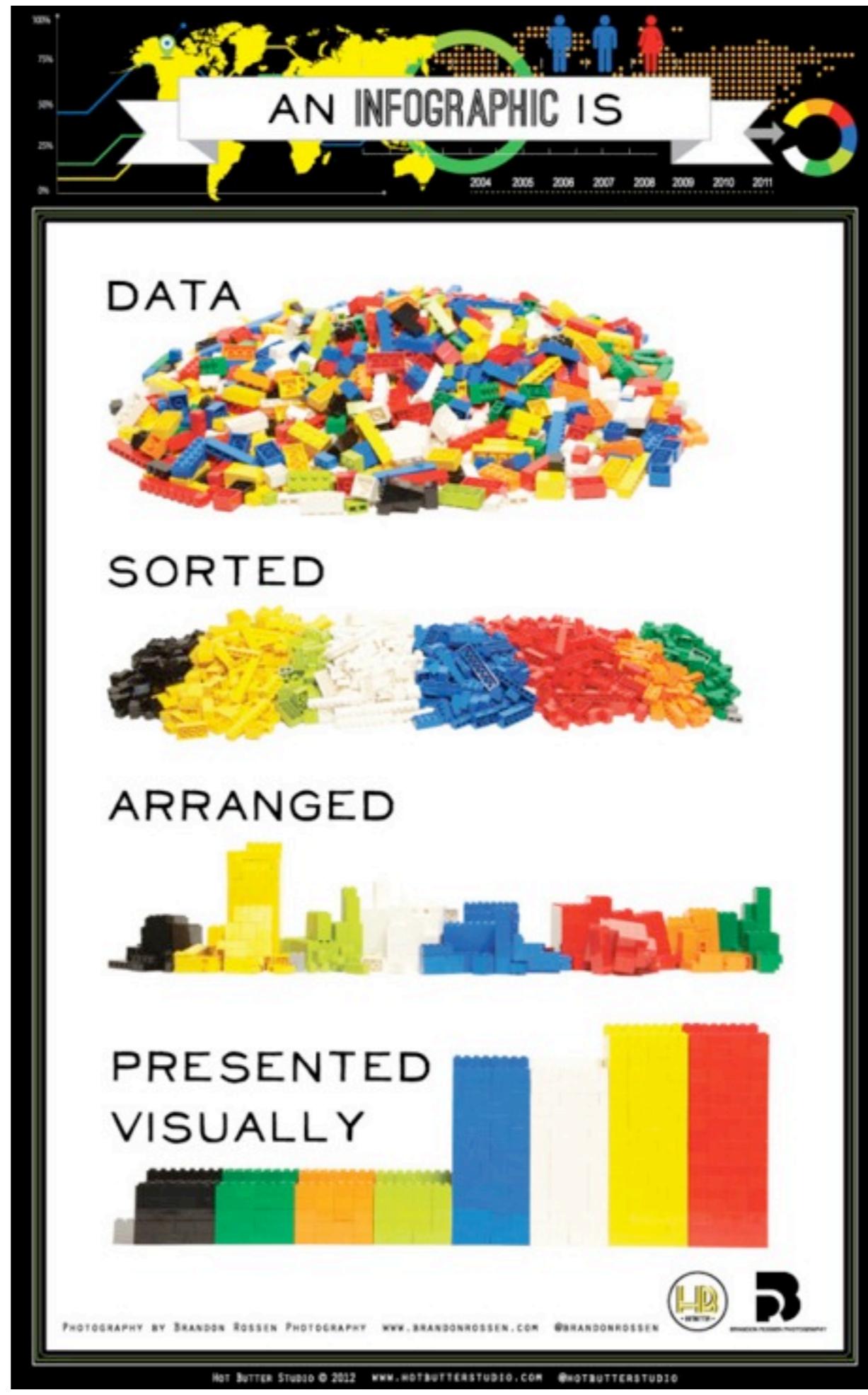
# Light painting WiFi



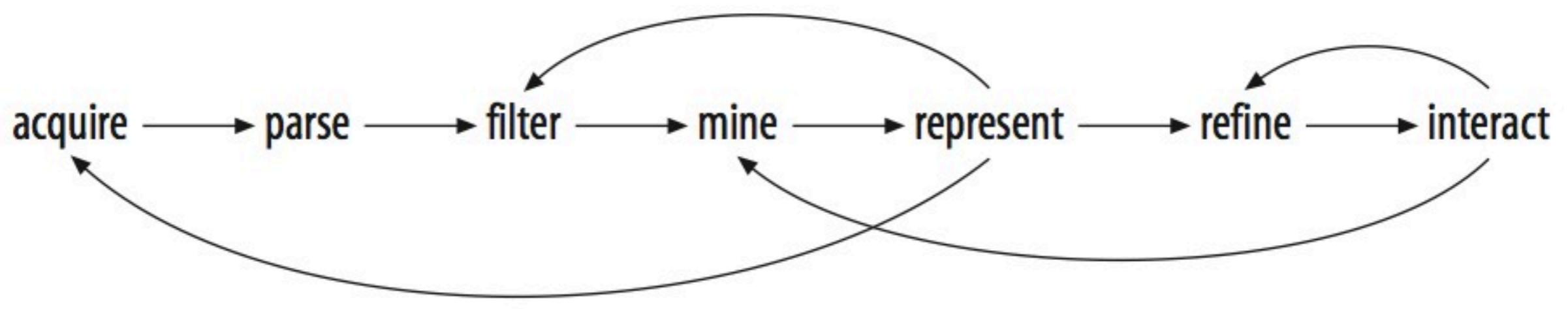
<https://vimeo.com/20412632>

# The Process

**A combination of many disciplines**



# Iterations



# Sum Up

Know your data

Know your data

Know your data

(no, it's not a typo)

Explore your data visually

Think about your target audience

Determine the message

Let users to explore

Let users to learn something

Draw attention to relevant data

Avoid junk elements

Use narration when possible

Provoke emotions is a good thing

Cite your sources

Thanks