VISUAL DESIGN & STORYTELLING

Petra Isenberg

informatics mathematics
Inria

APPLICATIONS OF VISUALIZATIONS

ANALYSIS EXPLORATORY

PRESENTATION EXPLANATORY

See also https://vimeo.com/98986594

A FEW MISTAKES THAT WE ALL MAKE

- Making meaningful comparisons
- Inferring trends and differences from noise
- Assumptions about the meaning of correlations
- Claims of “significance”

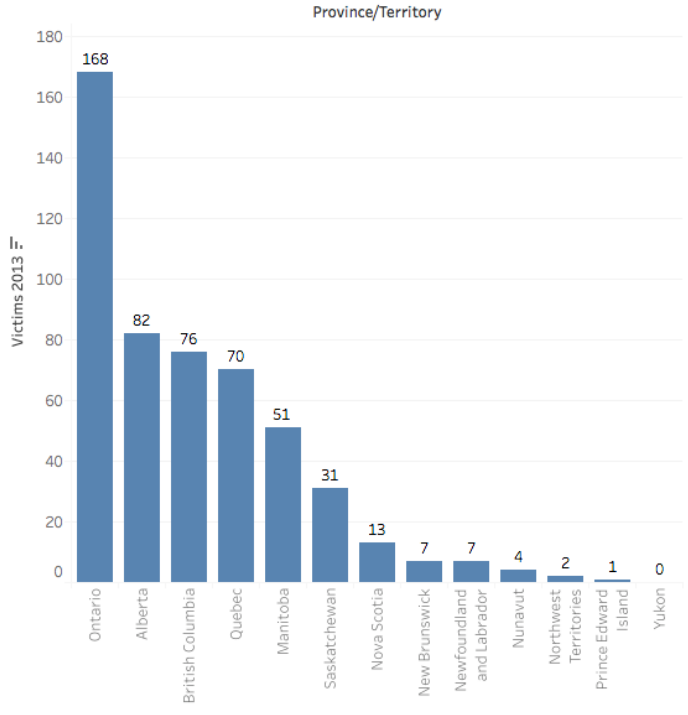
MAKING MEANINGFUL COMPARISONS

- **Normalized** vs. **Non-normalized** Counts
- Murders / Capita
- Failing grades / 100 Students
- Etc.

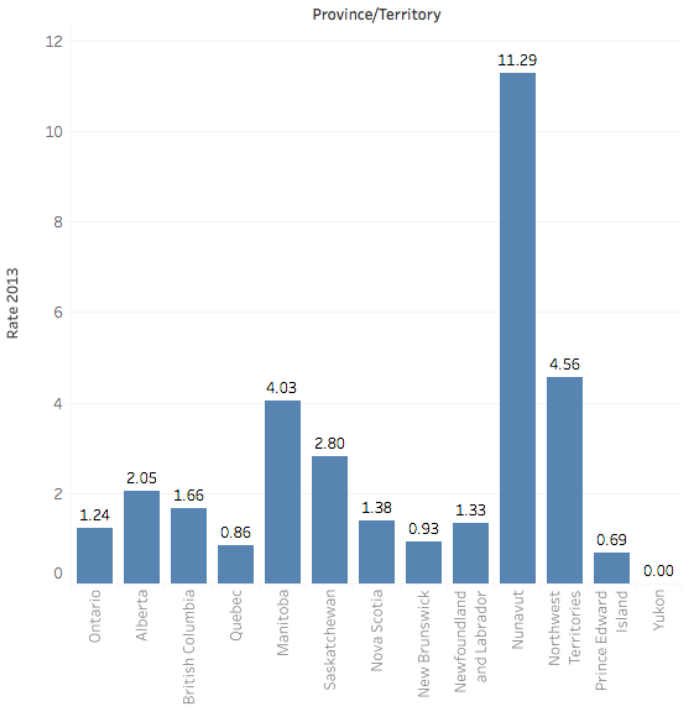
- **Counts** vs. **Distinct Counts**
- # visits vs. # of customers

WHAT IS THE MOST DANGEROUS PROVINCE?

Victims by Province/Territory 2013



Victims per 100,000 residents by Province/Territory 2013

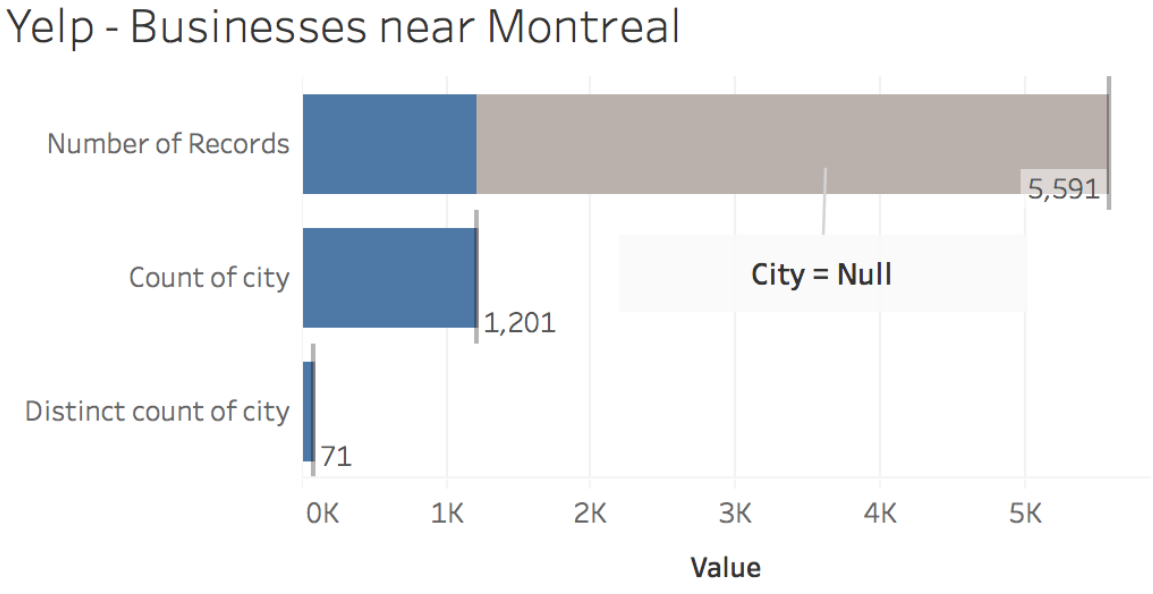


COUNT VS COUNT DISTINCT

- **Number of Records** =
- How many individual rows are there?

- **Count** =
- How many rows have a value for this column?

- **Count Distinct** =
- How many distinct values are there in this column?



A FEW MISTAKES THAT WE ALL MAKE

- Making meaningful comparisons
- Inferring trends and differences from noise
- Assumptions about the meaning of correlations
- Claims of “significance”

WE ALMOST ALWAYS KNOW LESS THAN WE THINK WE DO

(Even after we've looked at the data.)

LOOKING FOR PATTERNS IN STATIC

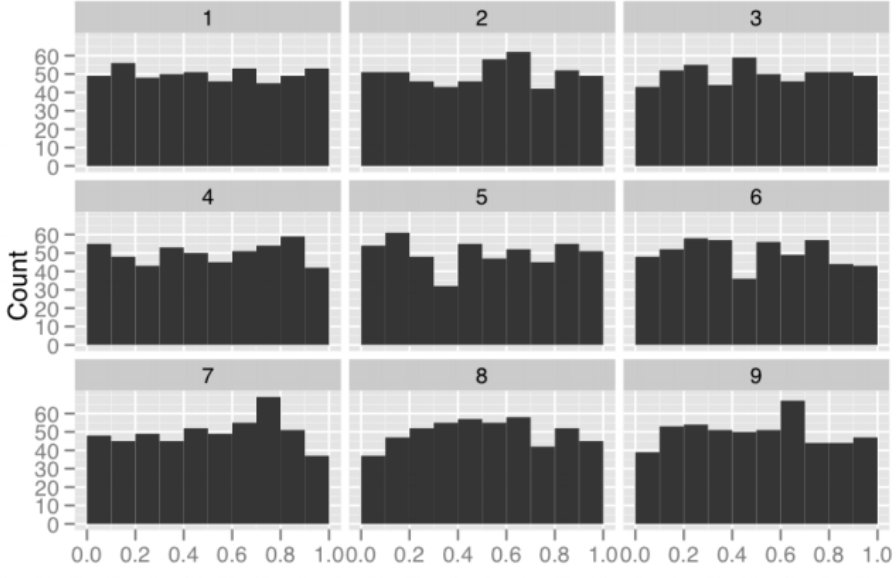
- Almost all data has noise, errors, and variability.

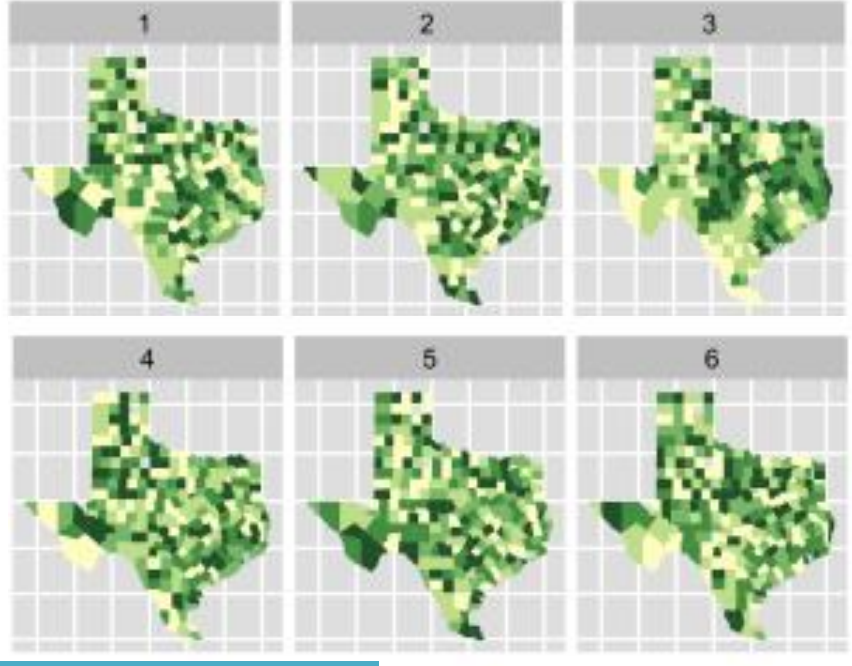
- We are great at seeing patterns — **even when we shouldn't.**

IT’S VERY EASY TO TELL STORIES AROUND DATA

…but it’s harder to show that those stories are robust!

RANDOM DATA VS REAL DATA





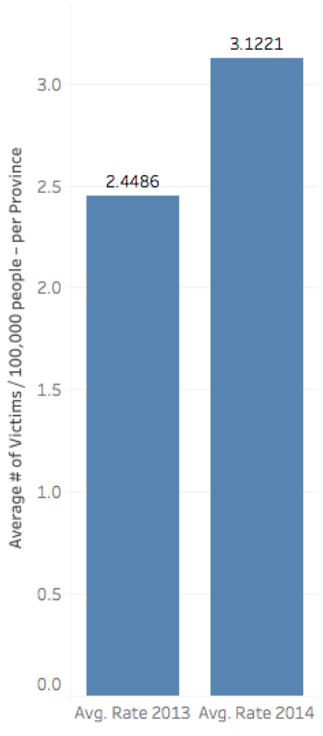
Wickham et al. 2010

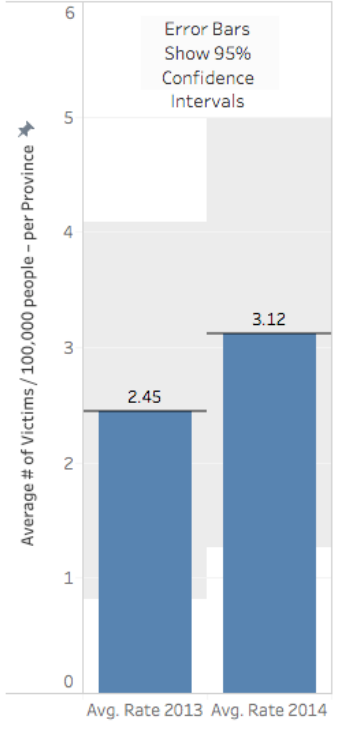
A “RORSCHACH” PROTOCOL

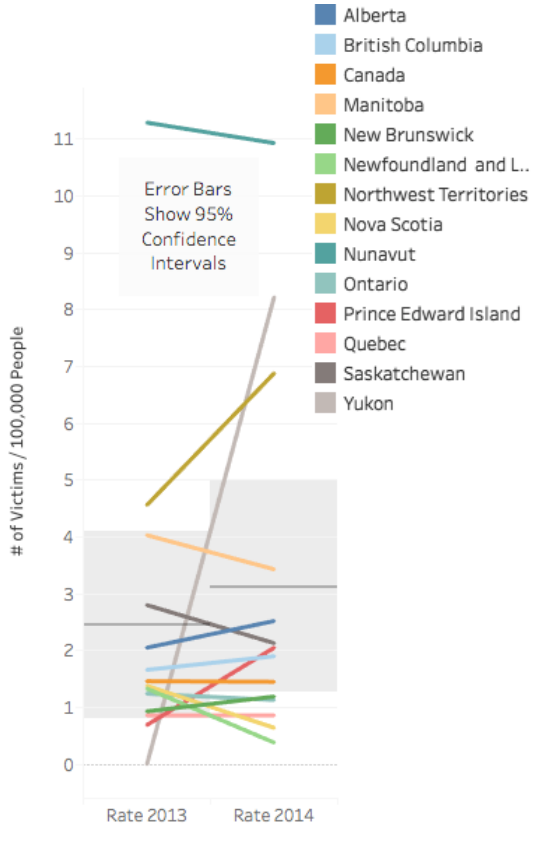
IGNORING EFFECT SIZE AND VARIABILITY

Victims by Province Territory Table

Province/Territory	Rate 2013	Rate 2014
Alberta	2.05	2.52
British Columbia	1.66	1.90
Manitoba	4.03	3.43
New Brunswick	0.93	1.19
Newfoundland and Labra..	1.33	0.38
Northwest Territories	4.56	6.88
Nova Scotia	1.38	0.64
Nunavut	11.29	10.93
Ontario	1.24	1.13
Prince Edward Island	0.69	2.05
Quebec	0.86	0.86
Saskatchewan	2.80	2.13
Yukon	0.00	8.22







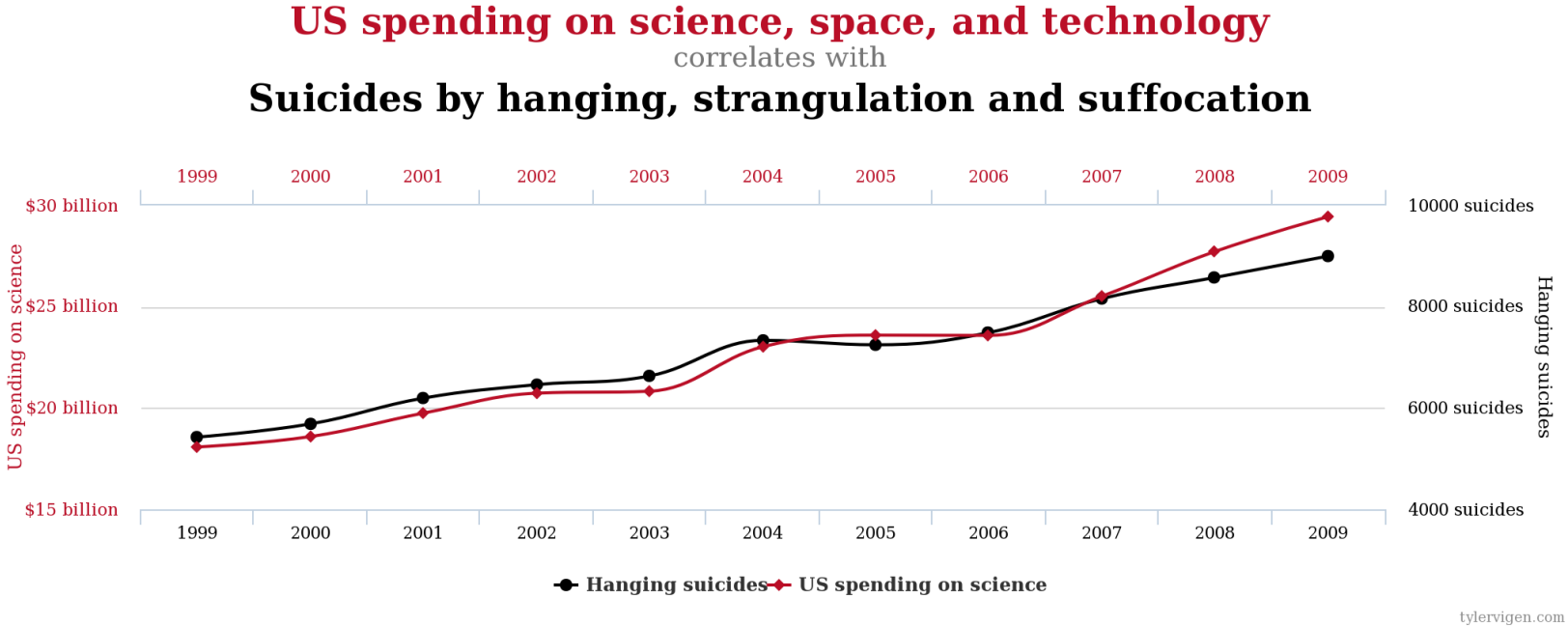
A FEW MISTAKES THAT WE ALL MAKE

- Making meaningful comparisons
- Inferring trends and differences from noise
- Assumptions about the meaning of correlations
- Claims of “significance”

CORRELATIONS

- Is there **really** a correlation?
- How **strong** is it?
- Is it **corroborated** by other data?
- Does it **make sense**?

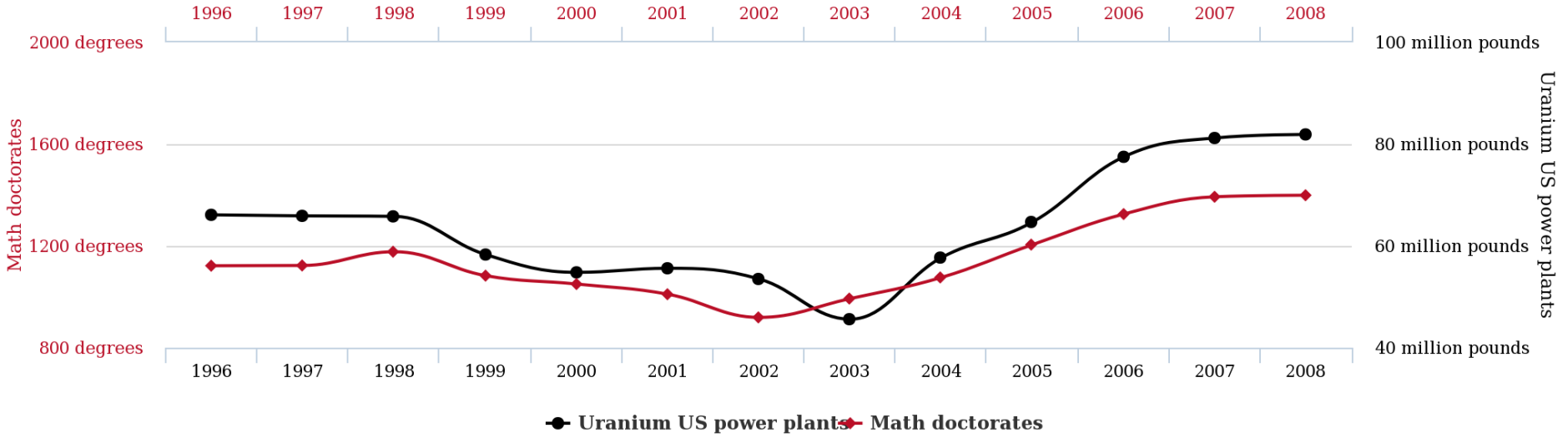
EVEN STRONG CORRELATIONS MIGHT NOT MEAN ANYTHING!



Math doctorates awarded

correlates with

Uranium stored at US nuclear power plants



tylervigen.com

TRY THIS!

http://tylervigen.com/view_correlation

A FEW MISTAKES THAT WE ALL MAKE

- Making meaningful comparisons
- Inferring trends and differences from noise
- Assumptions about the meaning of correlations
- Claims of “significance”

THE “LITERALLY” OF DATA ANALYSIS

“SIGNIFICANTLY… DIFFERENT

HIGHER/LOWER

BIGGER/SMALLER

MORE/LESS

MORE IMPORTANT

ETC…

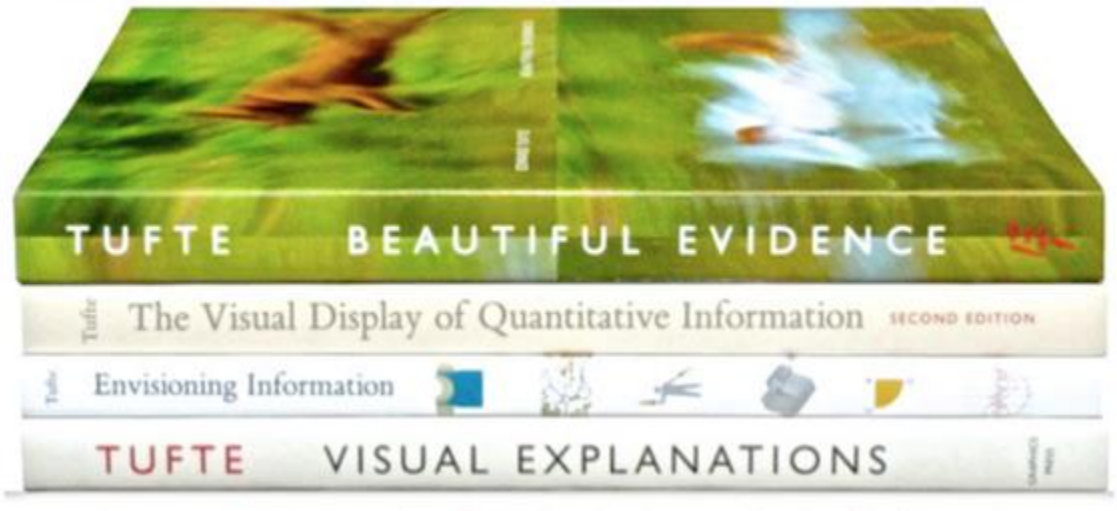
NEVER SAY THIS …

UNLESS YOU’RE SURE THAT YOU HAVE PERFORMED THE CORRECT **STATISTICAL SIGNIFICANCE TEST** AND CAN REPORT **P-VALUES, EFFECT SIZES**, ETC.

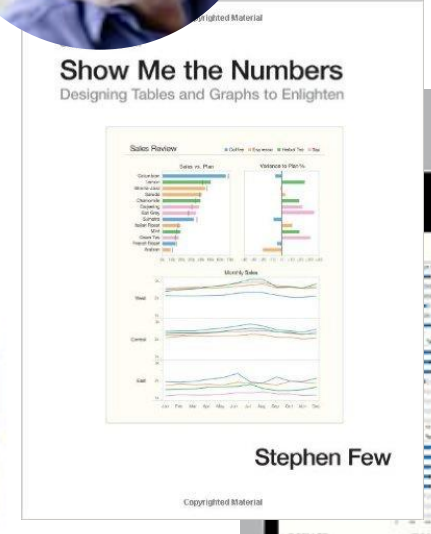
COMMUNICATING ASSUMPTIONS AND LIMITATIONS

A good analysis must avoid overstating claims, and be honest about what you don’t or can’t know!

Edward Tufte



Stephen Few



GRAPHICAL INTEGRITY

- **Well-designed presentation** of **interesting data**
  - Substance, statistics, and design
- Complex ideas communicated with **clarity**, **precision** and **efficiency**
- Gives the viewer **greatest number of ideas** in the **shortest amount of time**, with the **least ink** and **smallest space**
- Nearly always **multivariate**
- Requires **telling the truth**

Edward Tufte

HOW TO COMMUNICATE DATA HONESTLY TO AN AUDIENCE

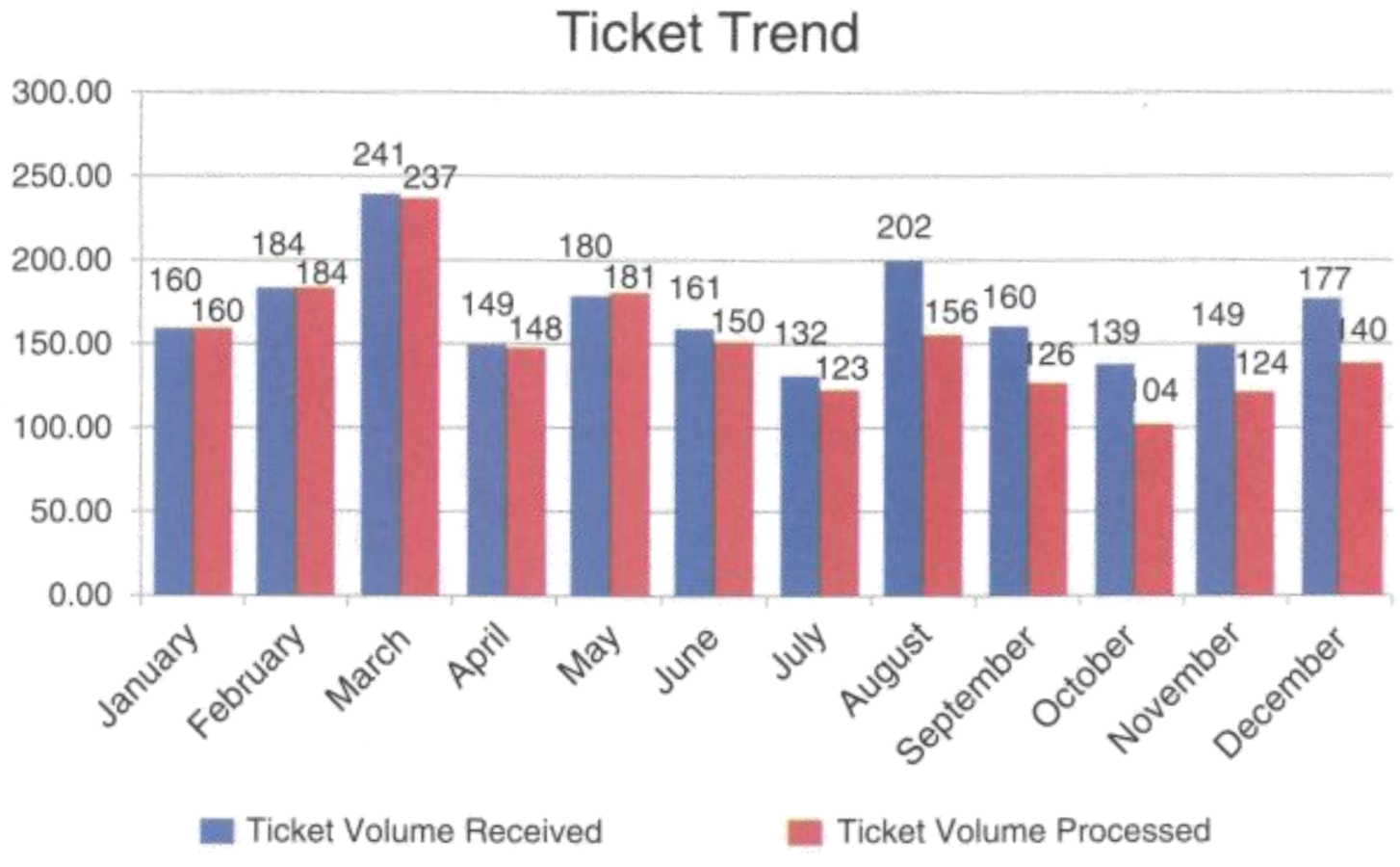
(W. Willett)

1. Be clear
2. Emphasize the important parts
3. Acknowledge assumptions and ambiguity
4. Avoid overstating results

STORYTELLING WITH DATA

Design of Visualization for Communication

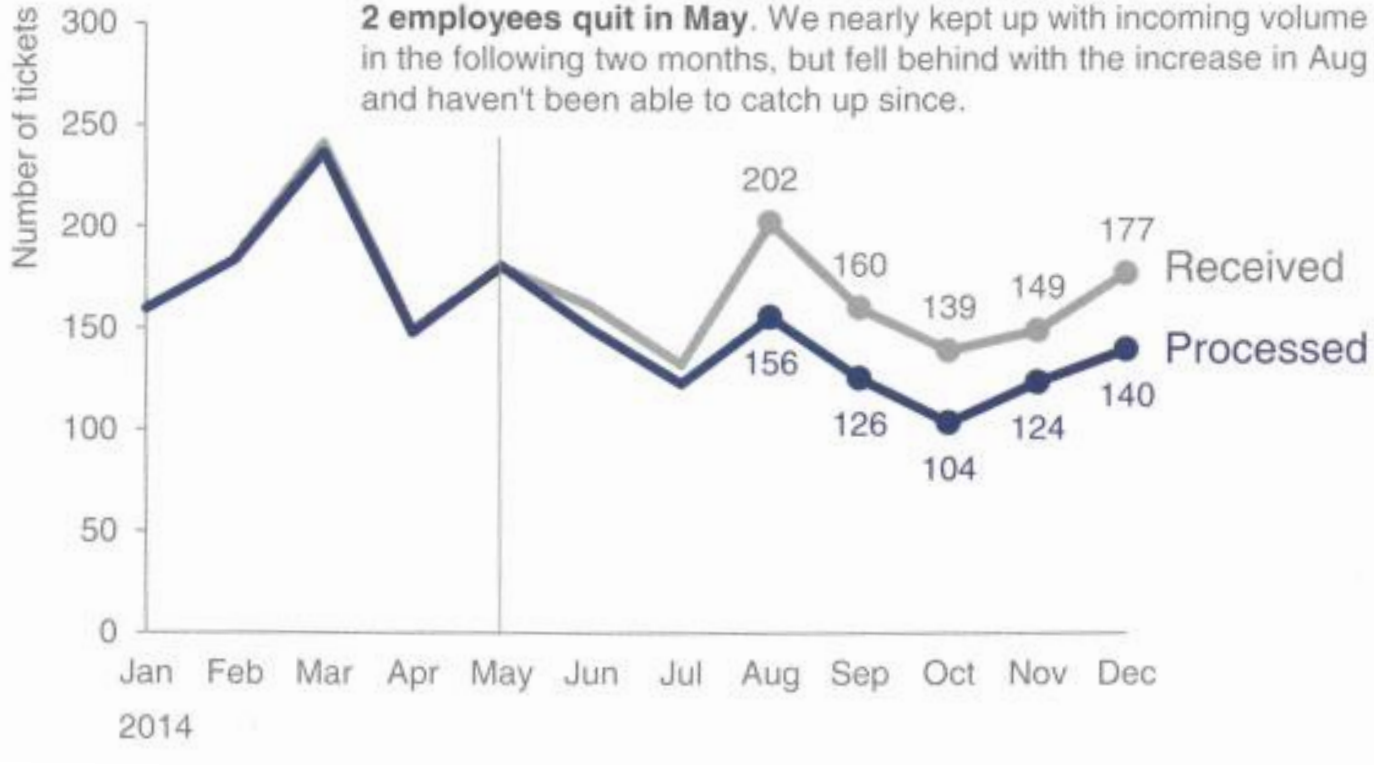
The chart was designed to argue for the hire of more two employees



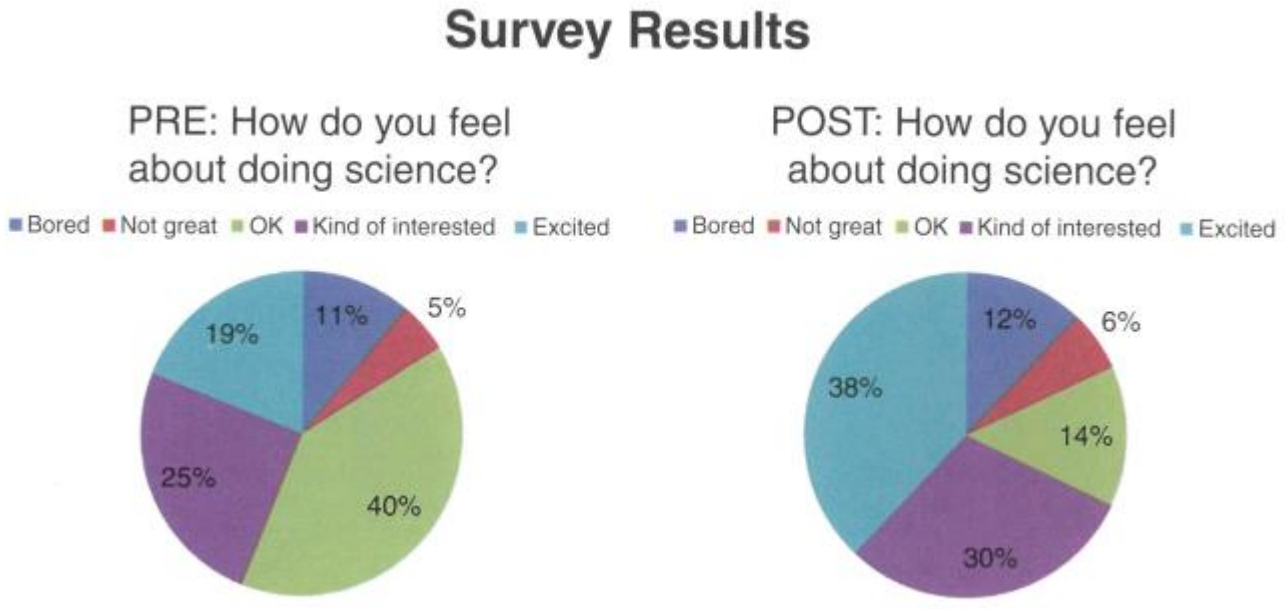
Please approve the hire of 2 FTEs

to backfill those who quit in the past year

Ticket volume over time



EXAMPLE - EXERCISE



survey conducted on 100 students before and after a pilot program

SKETCH – 10 MINUTES

DESIGN A CHART THAT BETTER CONVEYS THE OUTCOME OF THE PROGRAM

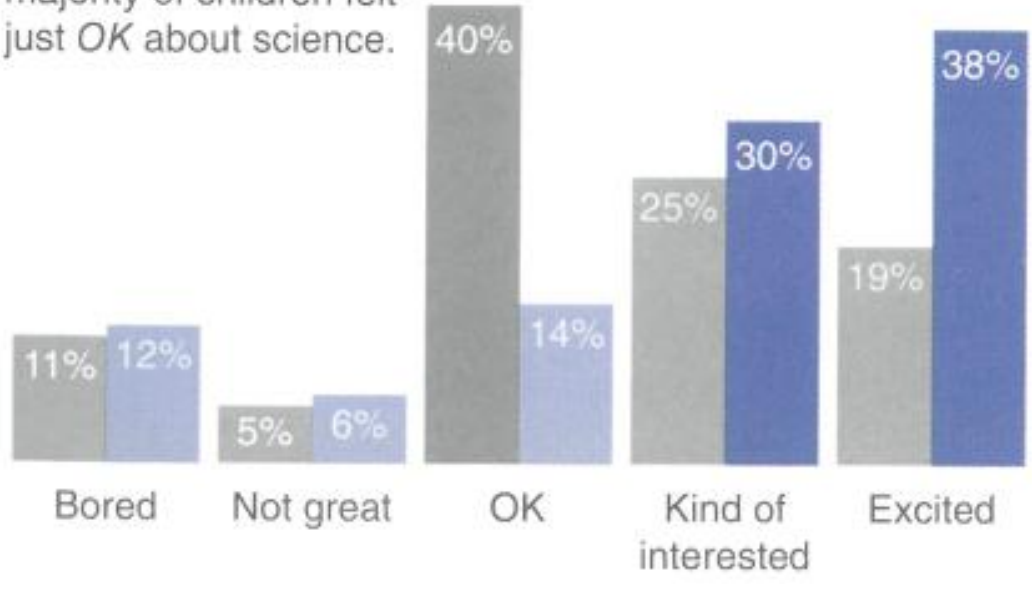
QUESTIONS ON YOUR

- WHAT **POINT** DID YOU TRY TO MAKE?
- WHAT **LAYOUT** DID YOU CHOOSE?
- DID YOU PUT A **TITLE**?
- DID YOU PUT A **SUBTITLE**?
- DID YOU **HIGHLIGHT** ANY DATA?
- DID YOU ADD ANYTHING ELSE TO HELP **COMMUNICATE**?

Pilot program was a success

How do you feel about science?

BEFORE program, the majority of children felt just *OK* about science.



AFTER program, more children were *Kind of interested* & *Excited* about science.

KNOW YOUR CONTEXT

AUDIENCE, MEDIUM, MESSAGE

WHO DO YOU WANT TO COMMUNICATE TO?

YOUR AUDIENCE

AVOID:

ANYONE WHO IS INTERESTED

INTERNAL AND EXTERNAL STAKEHOLDERS

BE MORE SPECIFIC, FIND OUT ABOUT THEM:

WILL THEY BE SUPPORTIVE OF YOUR MESSAGE?

DO THEY KNOW THE DATA?

YOUR AUDIENCE

WHAT DO THEY WANT TO KNOW?

WHAT DO THEY NEED TO DO?

accept | agree | begin | believe | change | collaborate | commence | create | defend | desire | differentiate | do | empathize | empower | encourage | engage | establish | examine | facilitate | familiarize | form | implement | include…

WHAT IS YOUR MEDIUM?

MEDIUM

- how much control does the audience have over the presentation?
- how much detail can they get?

LIVE PRESENTATION vs. ONLINE VISUALIZATION

WHAT DO YOU WANT TO SHOW?

QUESTIONS

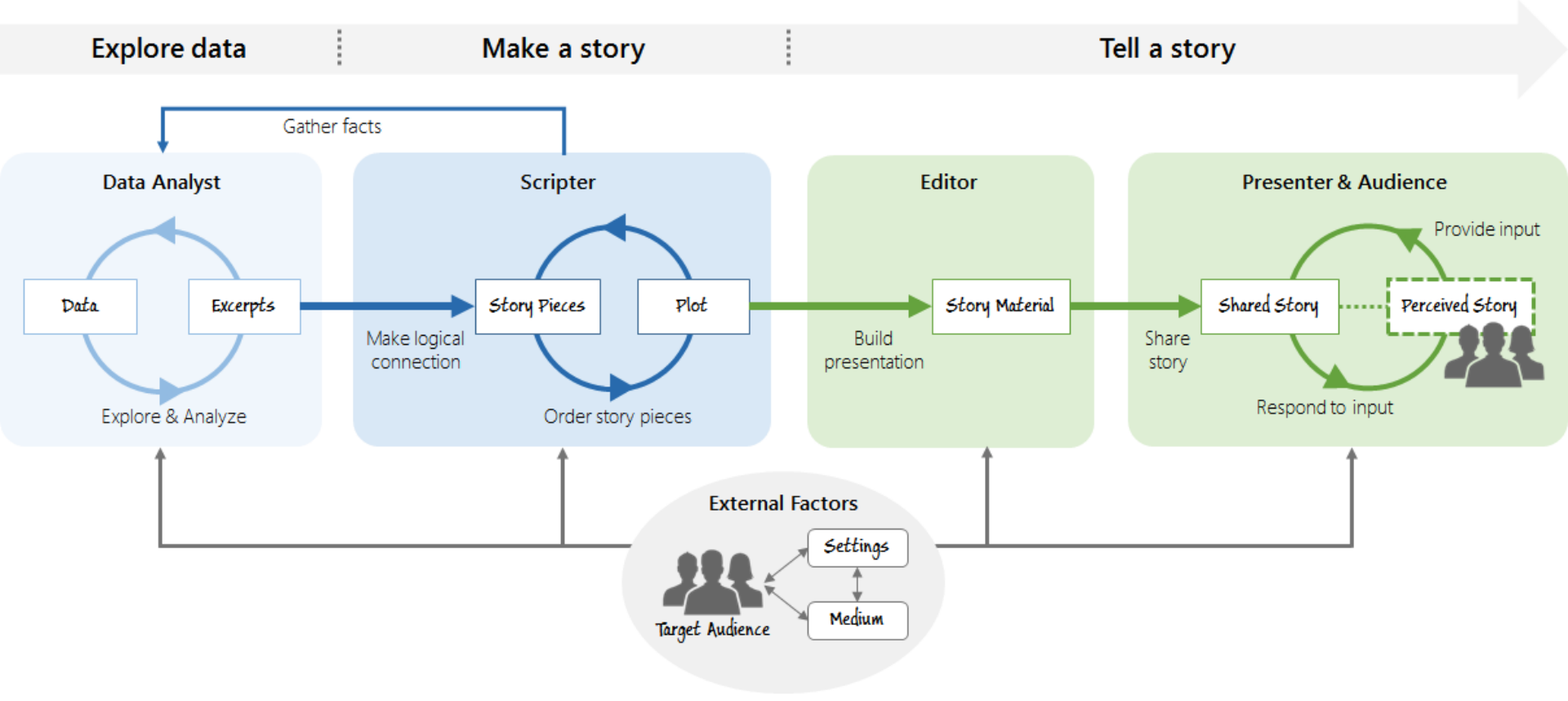
IN A SINGLE SENTENCE

IN 3 MINUTES

WHAT IS YOUR MESSAGE?

WHAT DOES YOUR AUDIENCE NEED TO KNOW?

FIGURE THIS OUT BEFORE YOU IMPLEMENT ANYTHING



Lee et al. 2015

LAYOUT

FEATURED

U.S. Says It May Not Need Apple's Help to Unlock iPhone

By KATIE BENNER and MATT APUZZO 2:51 PM ET

Marcio Jose Sanchez/Associated Press

A court hearing set for Tuesday was canceled in the Justice Department's bid to gain access to phone data in the San Bernardino mass shooting inquiry.

404 Comments

- **Breaking Down Apple's iPhone Fight With the U.S. Government**
- **White Collar Watch: Apple May Be Willing to Risk Contempt Charge**

MORE NEWS

Chip-Card Payment System Delays Frustrate Retailers

By RACHEL ABRAMS 3:53 PM ET

Many complications were widely predicted, but a lag in certifying payment terminals has added an unexpected wrinkle — and lots of finger-pointing.

TECH TIP

Keeping Up With Android Security Patches

By J. D. BIERSDORFER

After a nasty Android bug surfaced last summer, Google has been sending out monthly updates for the software on its Nexus hardware.

Apple and Yahoo Each Struggle for Control of Their Futures

Daily Report

By QUENTIN HARDY

Apple is in a courtroom fight with the Justice Department, while Yahoo is contending with a sliding stock price and an activist hedge fund.

CrowdSignals Aims to Create a Marketplace for Smartphone Sensor Data

By STEVE LOHR

A new project seeks to collect, label and pay for mobile sensor data and encourage innovation in many fields.

Andrew S. Grove, Intel Chief Who Spurred Semiconductor Revolution, Dies at 79

By JONATHAN KANDELL

The semiconductor chip was a development as momentous as hydrocarbon fuels, electricity and telephones were in

BITS

Insight and analysis on Silicon Valley and the technology industry.

Continue to Bits »

PERSONAL TECHNOLOGY

Instagram May Change Your Feed, Personalizing It With an Algorithm

By MIKE ISAAC

As our online networks of friends have grown and the social media companies have matured, feeds are evolving, too.

APP SMART

Checklists and Tips to Help Streamline Spring Cleaning

By KIT EATON

It's time for spring cleaning again, and some apps can help users stay organized while getting their homes in order.

TECH TIP

Speaking Your Mind to Google Docs

By J. D. BIERSDORFER

An external microphone can help you be better understood by Google's online word-processing program when you type by talking.

TECH TIP

Marking Up a Mac's iBook Pages

By J. D. BIERSDORFER

Apple's e-books program for OS X includes tools for making margin notes, highlighting passages and sharing your favorite parts of the story.

TECH TIP

Recording Live Television in Windows 10

By J. D. BIERSDORFER

If you miss the digital-video recording functions of Windows Media Center, you can find other ways to watch and record your favorite broadcast shows.

TECH TIP

Getting the Weather Report From Windows

By J. D. BIERSDORFER

Windows 10 offers several ways to get a forecast on your screen.

APP SMART

Mobile Games to Make Time Fly

By KIT EATON

Here are some of the best games to take the boredom out

Sign Up for the Bits Newsletter

Get caught up on the latest news, insight and analysis from our reporters and editors delivered to your inbox six days a week.

Enter your email address Sign Up

Receive occasional updates and special offers for The New York Times's products and services.

SEE SAMPLE | PRIVACY POLICY

@NYTIMESBITS ON TWITTER
For news and analysis, plus interesting links curated by our journalists. Staff Twitter List »
FOLLOW

MOST EMAILED | MOST VIEWED

1. Andrew S. Grove, Intel Chief Who Spurred Semiconductor Revolution, Dies at 79
2. U.S. Says It May Not Need Apple's Help to Unlock iPhone
3. Amazon Leans on Government in Its Quest to Be a Delivery Powerhouse
4. CrowdSignals Aims to Create a Marketplace for Smartphone Sensor Data
5. Bits: Flinging Emojis, Twitch Chatters Revel as Julia Child Cooks
6. Apple vs. the F.B.I.: How the Case Could Play Out
7. Breaking Down Apple's iPhone Fight With the U.S. Government
8. Apple's New iDevices Say: Small Is Beautiful, Too
9. Judge in Apple Case Seen as Unfazed by Stress, Even a Plane Crash
10. Tech Tip: Logging Into Windows 10 With a Favorite Photo

Go to Complete List »

TIMESVIDEO More Technology Videos »

U.S.

The Terminator and the Washing Machine

What the legendary matches between supercomputer Deep Blue and chess grandmaster Garry Kasparov reveal about today's artificial intelligence and machine learning fears.

LIAR

LIAR

Most of us like to think we can get ahead in life while keeping our noses clean. But, as ***Ian Leslie*** *explains, we only got to the top of the evolutionary tree because we had a gift for misrepresentation*

You could call it humanity's dirty little secret. What helped to make us the most intelligent species on Earth was, to be honest, our talent for deception.

The human brain, possibly evolution's most impressive achievement, is also a bit of a mystery. We have much bigger brains, relative to our bodies, than any other mammal. Our hominid ancestors had brains about a third the size of ours. At some point between 2 and 1.5 million years ago, our ancestors' brains began to expand, and at quite a rate. Scientists have never been sure why.

For a long time, the nearest thing to an accepted explanation was that our intelligence resulted from our facility for making tools. But in the early 1980s, two young primatologists at the University of St Andrews began to wonder if it wasn't linked to something less flattering to our self-image: a capacity for deceit.

Richard Byrne and Andy Whiten had read descriptions of chimpanzee trickery in the works of Jane Goodall, and during their own fieldwork in the Drakensberg mountains of South Africa they noticed baboons engaging in deceptive behaviour. For instance: a young baboon gets in trouble with several elders, including his mother, for attacking another member of the group. When he hears them coming for him, grunting aggressively, he stands and stares into the distance. The elders, thinking that a predator or rival troop must be approaching, stop and stare too. There is no threat. But the elders are distracted enough to forget what they came running over for.

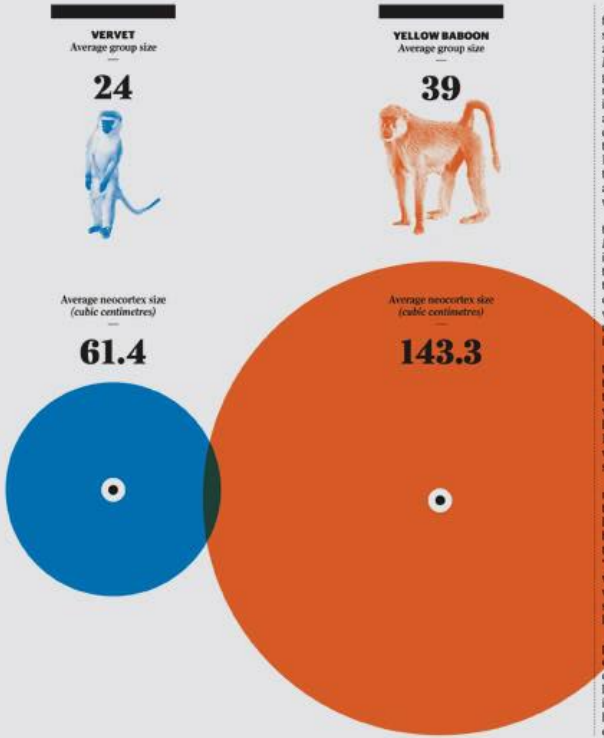
Another example: an adult male baboon shoves a female off her feeding patch. Rather than protest or retreat, she flicks her gaze in a characteristic way from him to a younger male who is happily feeding nearby. The first male charges over to the younger one and chases him away. The female, meanwhile, returns to her patch and resumes feeding.

When Byrne and Whiten asked around, their colleagues regaled them with similar anecdotes. The two developed a hunch: that these stories represented something beyond aberrant aspects of primate behaviour, and that our closest relatives — chimps, gorillas and orang-utans — are practised, habitual deceivers. Byrne and Whiten also began to suspect that such behaviour might be linked to the development of primate intelligence: those animals with the mental sophistication to trick their way into getting more food, as our female baboon did, would have had a reproductive edge. Through the slow work of natural selection, the primate brain evolved to cope with the demands of such trickery.

So a connection between deception and mental capacity in our primate ancestors might help to explain the development of our own brains. This was an exciting thought. But initially, Byrne and Whiten found it hard to get any of their research published despite amassing a substantial body of evidence. Deception just was not a subject that many in their field took seriously.

BRAIN SIZE

2.5-1.6 million years ago	1.8-1 million years ago	600,000 years ago	200,000 years ago
(Homo habilis)	*(Homo erectus)*	*(Homo neanderthalensis)*	*(Homo sapiens)*



In 1982, however, they gained new impetus from a book that gave a gripping account of the shifting relationships within a colony of chimpanzees in a Dutch zoo. Franz de Waal's *Chimpanzee Politics* reads like the script of a soap opera or gangster movie. Alliances are formed, broken and re-formed, individuals are manipulated, violence is selectively employed, females are fought over and seduced. De Waal prefaced his book with quotes from Hobbes and Machiavelli, suggesting that this was a vision of human politics in the raw. Byrne and Whiten were fascinated, particularly by those episodes that showed deceptive behaviour, as when a chimp, presenting himself as a friend, would suddenly attack an unsuspecting rival.

In 1988 the two primatologists finally published their work in the form of a book, *Machiavellian Intelligence*. An unsettling read, it explored "the idea that intelligence began in social manipulation, deceit and cunning co-operation", showing that animals, far from living in a state of innocence, are as manipulative and underhand as the worst of our own species. It was persuasive too, making a big impact not only in primatology but in psychology, anthropology and medicine.

Byrne and Whiten believed that what they termed Machiavellian intelligence was linked to the size of the group an animal lived in: the bigger the group, the more complex the calculations individuals needed to make to survive. But there was little hard evidence for this until 1992, when Robin Dunbar, at the University of Liverpool, came up with a way to demonstrate a link between brain size and the complexity of an animal's social life.

Dunbar, too, had noticed that the size of a primate's brain appeared to be related to the size of the group it lived in. Baboons have big brains and live in big groups; vervets, who have smaller brains, live in smaller groups. He decided to investigate by looking at the neocortex. This is the "thinking" part of the brain: the part that deals with abstraction, self-reflection and planning. It was also the part that showed such rapid expansion in primates — especially humans — two million years ago.

Dunbar plunged into the vast accumulation of primate data from around the world, looking for a correlation between the size of an animal's neocortex and the size of its social groups. He found a link so strong that he was able to predict, with impressive accuracy, the group size of a species he hadn't looked at, just by knowing its brain size. He even came up with a prediction for human →

SEEING IS DECEIVING

Many species, not just primates, practise deception as one of their survival strategies. The eastern hognose snake will, if threatened, fake its own death by rolling over on its back, emitting a foul stench and letting its tongue loll out of its mouth. The mimic octopus, found in the waters off Bali in Indonesia, can disguise itself as one of several other sea creatures, all the better to lure its prey.

Even plants deceive. The mirror orchid of North Africa produces small flowers to attract potential pollinators. The flowers have no nectar, but the orchids have a special ruse to seduce the wasps that pollinate them: they impersonate female wasps. The blue-violet centre of the flower resembles the wings of a female wasp at rest, while a thick set of long red hairs imitates the hairs on the insect's abdomen. It's bait — insect porn for horny male wasps.

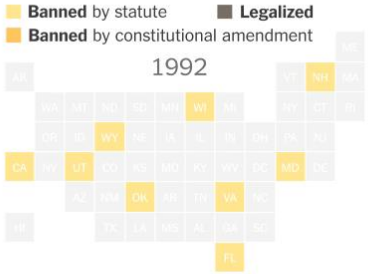
THE MIMIC OCTOPUS...

... as a sea snake

... as a lion fish

... and a flatfish

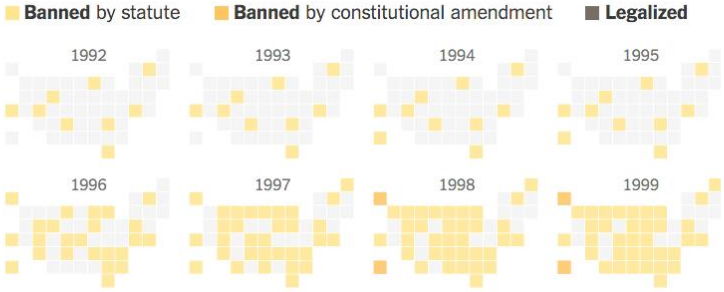
SHARE



Gay Marriage State by State: From a Few States to the Whole Nation

By HAEYOUN PARK

The Supreme Court in June said that same-sex couples had a constitutional right to marry, effectively requiring that the 13 states that prohibit such unions reverse those bans. Over the last two years, the number of states authorizing gay marriage had expanded rapidly because of legislative decisions, referendums or court orders.



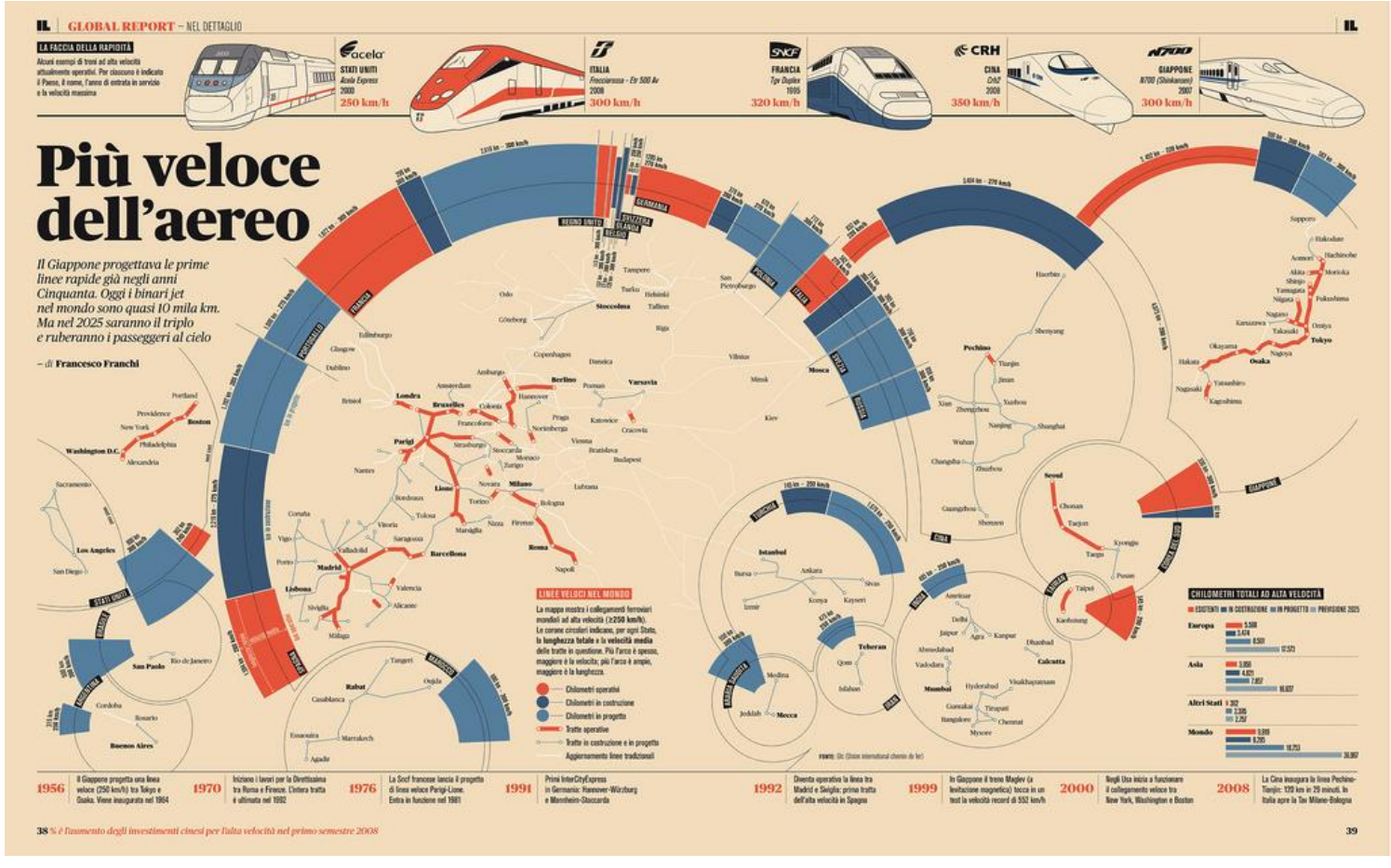
A ruling by the Hawaii Supreme Court in 1993 allowing same-sex marriage, along with rising demands for marriage equality nationwide, prompted a backlash. A majority of states, including Hawaii, adopted laws or constitutional amendments that limited marriage to a man and a woman. In 1996, Congress passed the Defense of Marriage Act, banning federal recognition of same-sex marriage.

NYTIMES 2015

ESPECIALLY IMPORTANT WHEN INTEGRATING VISUALIZATIONS INTO SOMETHING BIGGER

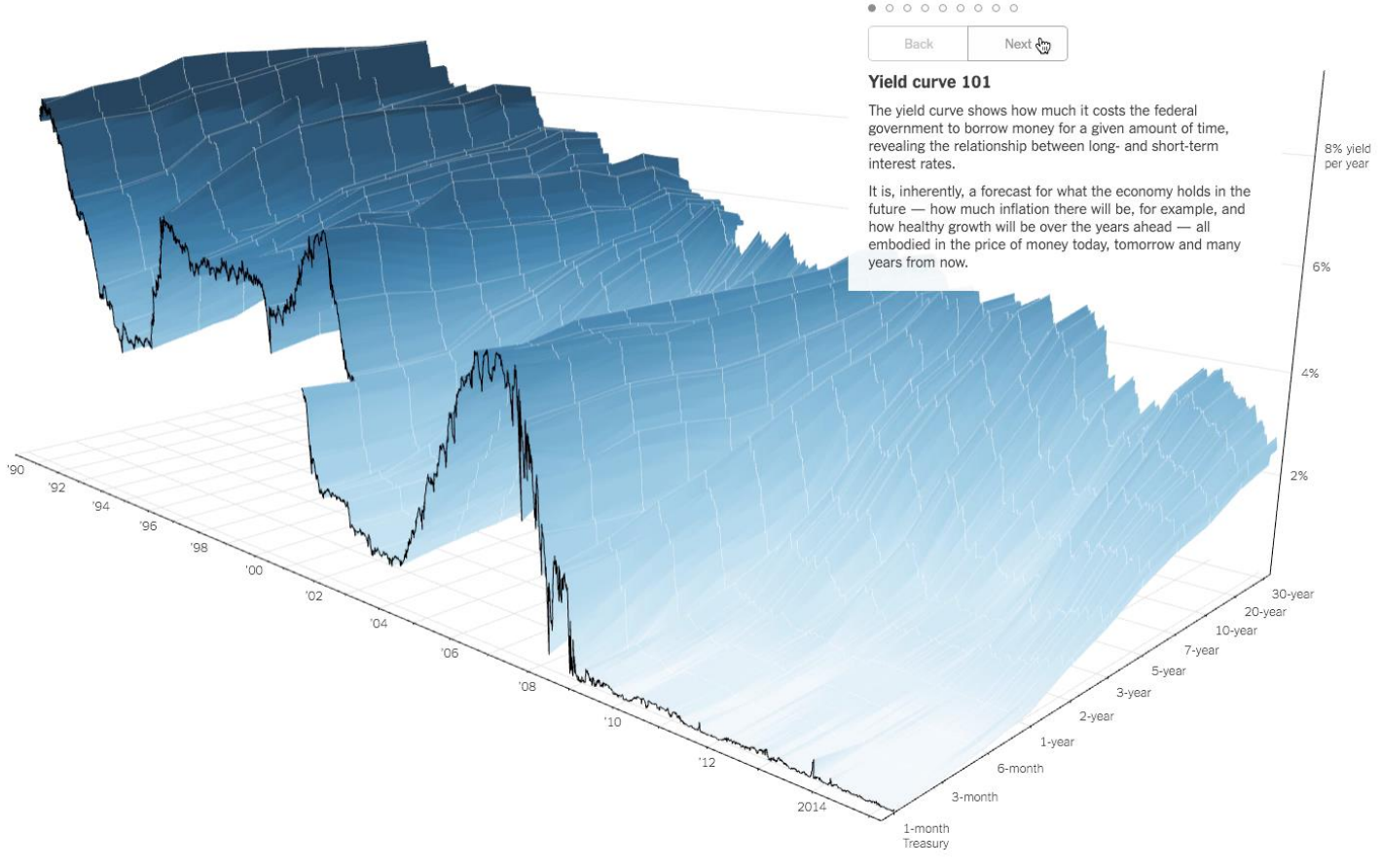
A STORY, A BIGGER INTERACTIVE, ETC.

BUT LAYOUT IS ALSO IMPORTANT FOR INTRODUCING SELF-CONTAINED **INFOGRAPHICS** AND **INTERACTIVE CHARTS**



A 3-D View of a Chart That Predicts The Economic Future: The Yield Curve

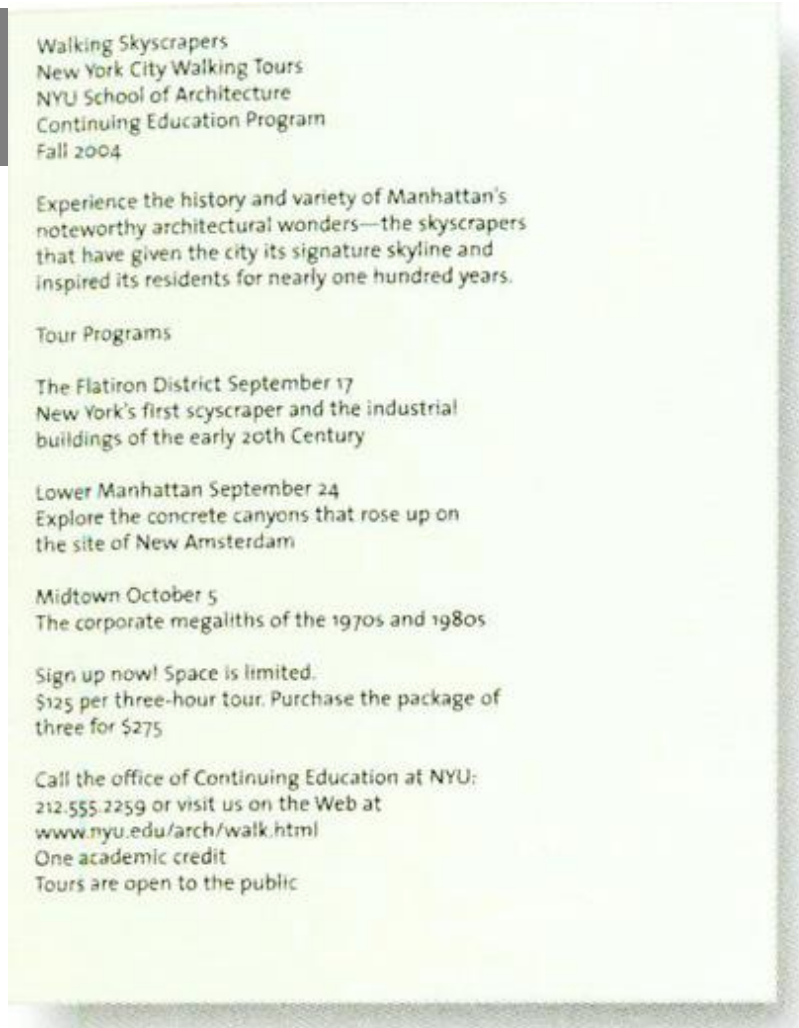
By GREGOR AISCH and AMANDA COX MARCH 18, 2015



DIRECT ATTENTION

DRAW ATTENTION TO ONE THING FIRST.

THEN USE COLOR, SIZE, SPACE, AND PLACEMENT TO DIRECT VIEWERS TO THE NEXT IMPORTANT POINT.



Walking Skyscrapers
New York City Walking Tours
NYU School of Architecture
Continuing Education Program
Fall 2004

Experience the history and variety of Manhattan's noteworthy architectural wonders—the skyscrapers that have given the city its signature skyline and inspired its residents for nearly one hundred years.

Tour Programs

The Flatiron District September 17
New York's first scyscraper and the industrial buildings of the early 20th Century

Lower Manhattan September 24
Explore the concrete canyons that rose up on the site of New Amsterdam

Midtown October 5
The corporate megaliths of the 1970s and 1980s

Sign up now! Space is limited.
$125 per three-hour tour. Purchase the package of three for $275

Call the office of Continuing Education at NYU:
212.555.2259 or visit us on the Web at
www.nyu.edu/arch/walk.html
One academic credit
Tours are open to the public

Walking Skyscrapers
New York City Walking Tours
NYU School of Architecture
Continuing Education Program
Fall 2004

Experience the history and variety of Manhattan's noteworthy architectural wonders—the skyscrapers that have given the city its signature skyline and inspired its residents for nearly one hundred years.

Tour Programs

The Flatiron District September 17
New York's first scyscraper and the industrial buildings of the early 20th Century

Lower Manhattan September 24
Explore the concrete canyons that rose up on the site of New Amsterdam

Midtown October 5
The corporate megaliths of the 1970s and 1980s

Sign up now! Space is limited.
$125 per three-hour tour. Purchase the package of three for $275

Call the office of Continuing Education at NYU:
212.555.2259 or visit us on the Web:
www.nyu.edu/arch/walk.html
One academic credit
Tours are open to the public

Fall 2004
NYU School of Architecture
Continuing Education Program

Experience the history and variety of Manhattan's noteworthy architectural wonders – the skyscrapers that have given the city its signature skyline and inspired its residents for nearly one hundred years.

Walking Skyscrapers

New York City Walking Tours

Tour Programs

September 17 **The Flatiron District**
New York's first scyscraper and the industrial buildings of the early 20th Century

September 24 **Lower Manhattan**
Explore the concrete canyons that rose up on the site of old New Amsterdam

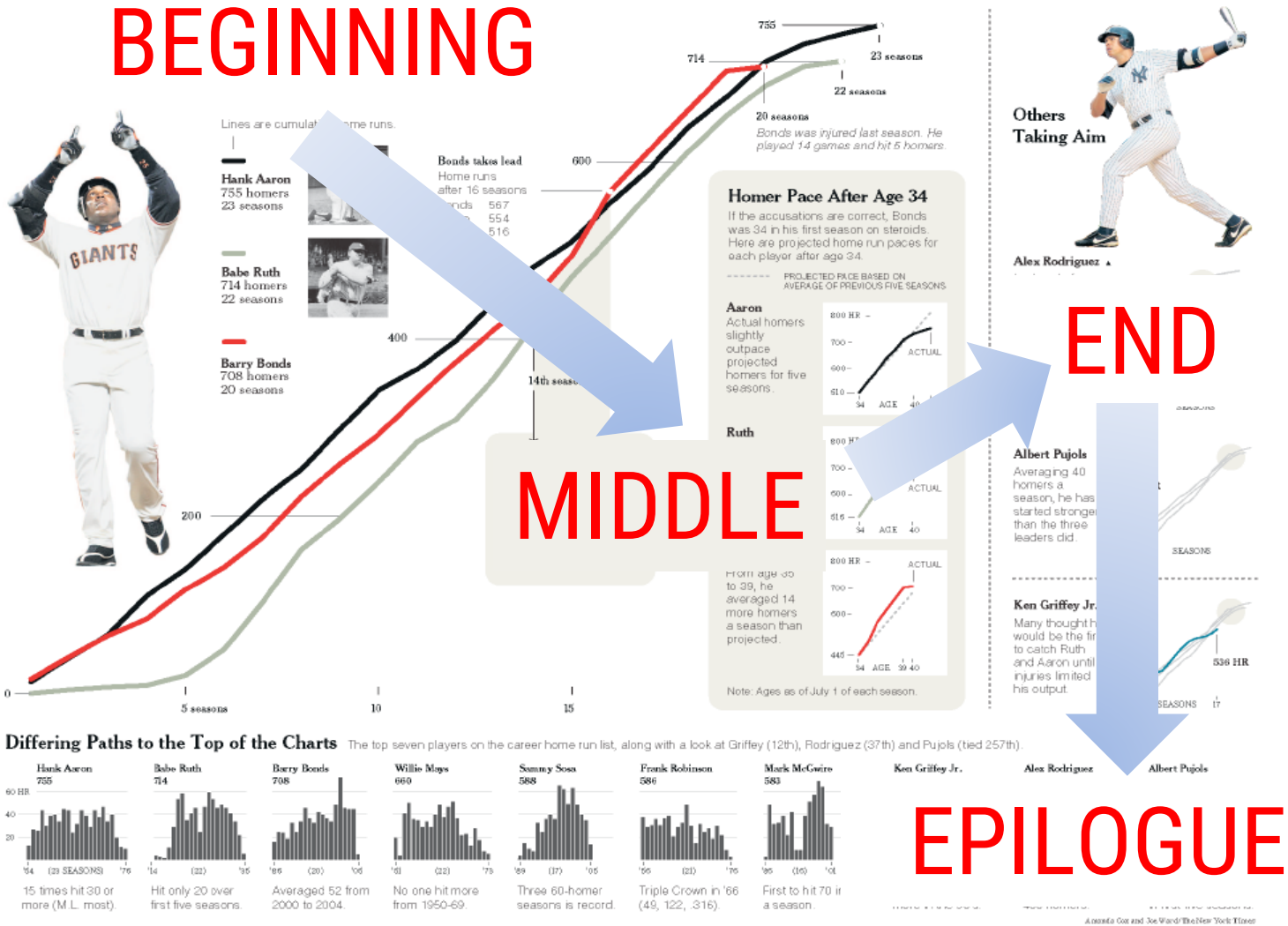
October 5 **Midtown**
The corporate megaliths of the 1970s and 1980s

Sign up now!
Space is limited.
Call the office of Continuing Education at NYU:
212.555.2259
or visit us on the Web:
www.nyu.edu/arch/walk.html

WE TEND TO SCAN **TOP TO BOTTOM**
THEN **LEFT TO RIGHT**

BUT...

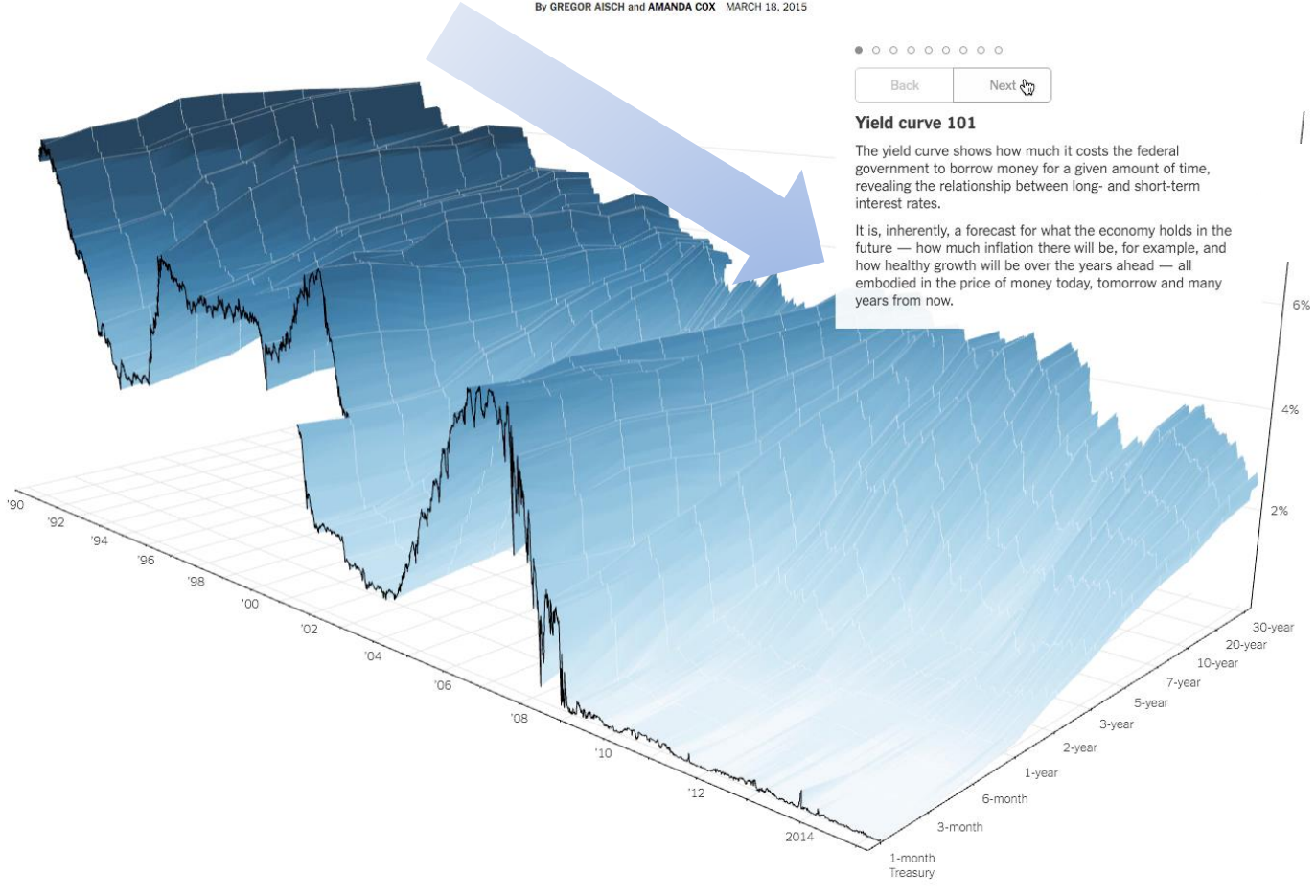
SIZE & COLOR CAN PREEMPT THAT ORDER


BEGINNING
MIDDLE
END
EPILOGUE
Lines are cumulative home runs.
Hank Aaron
755 homers
23 seasons
Babe Ruth
714 homers
22 seasons
Barry Bonds
708 homers
20 seasons
Bonds takes lead
Home runs
after 16 seasons
567
554
516
14th season
755
714
23 seasons
22 seasons
20 seasons
Bonds was injured last season. He played 14 games and hit 5 homers.
600
400
200
0
5 seasons
10
15
Homer Pace After Age 34
If the accusations are correct, Bonds was 34 in his first season on steroids. Here are projected home run paces for each player after age 34.
PROJECTED PACE BASED ON AVERAGE OF PREVIOUS FIVE SEASONS
Aaron
Actual homers slightly outpace projected homers for five seasons.
Ruth
From age 35 to 39, he averaged 14 more homers a season than projected.
Note: Ages as of July 1 of each season.
Others Taking Aim
Alex Rodriguez
Albert Pujols
Averaging 40 homers a season, he has started stronger than the three leaders did.
Ken Griffey Jr.
Many thought he would be the first to catch Ruth and Aaron until injuries limited his output.
536 HR
Differing Paths to the Top of the Charts
The top seven players on the career home run list, along with a look at Griffey (12th), Rodriguez (37th) and Pujols (tied 257th).
Hank Aaron 755
15 times hit 30 or more (M.L. most).
Babe Ruth 714
Hit only 20 over first five seasons.
Barry Bonds 708
Averaged 52 from 2000 to 2004.
Willie Mays 660
No one hit more from 1950-69.
Sammy Sosa 588
Three 60-homer seasons is record.
Frank Robinson 586
Triple Crown in '66 (49, 122, .316).
Mark McGwire 583
First to hit 70 in a season.
Ken Griffey Jr.
Alex Rodriguez
Albert Pujols
Amanda Cox and Joe Ward/The New York Times

BEGINNING

A 3-D View of a Chart That Predicts The Economic Future: The Yield Curve

By GREGOR AISCH and AMANDA COX MARCH 18, 2015



NEXT

THE STRUCTURE OF NEWS AND PRINT ARTICLES

CAN ALSO BE USEFUL FOR VISUALIZATIONS

HEADLINE

LIAR LIAR

Most of us like to think we can get ahead in life while keeping our noses clean. But, as ***Ian Leslie*** *explains, we only got to the top of the evolutionary tree because we had a gift for misrepresentation*

DECK OR **STANDFIRST** (ARTICLE SUMMARY)
INTRODUCE CONTENT/PROVIDE INSTRUCTIONS

Y

ou could call it humanity's dirty little secret. What helped to make us the most intelligent species on Earth was, to be honest, our talent for deception.

The human brain, possibly evolution's most impressive achievement, is also a bit of a mystery. We have much bigger brains, relative to our bodies, than any other mammal. Our hominid ancestors had brains about a third the size of ours. At some point between 2 and 1.5 million years ago, our ancestors' brains began to expand, and at quite a rate. Scientists have never been sure why.

For a long time, the nearest thing to an accepted explanation was that our intelligence resulted from our facility for making tools. But in the early 1980s, two young primatologists at the University of St Andrews began to wonder if it wasn't linked to something less flattering to our self-image: a capacity for deceit.

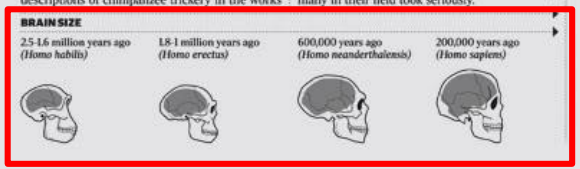
Richard Byrne and Andy Whiten had read descriptions of chimpanzee trickery in the works

threat. But the elders are distracted enough to forget what they came running over for.

Another example: an adult male baboon shoves a female off her feeding patch. Rather than protest or retreat, she flicks her gaze in a characteristic way from him to a younger male who is happily feeding nearby. The first male charges over to the younger one and chases him away. The female, meanwhile, returns to her patch and resumes feeding.

When Byrne and Whiten asked around, their colleagues regaled them with similar anecdotes. The two developed a hunch: that these stories represented something beyond aberrant aspects of primate behaviour, and that our closest relatives — chimps, gorillas and orang-utans — are practised, habitual deceivers. Byrne and Whiten also began to suspect that such behaviour might be linked to the development of primate intelligence: those animals with the mental sophistication to trick their way into getting more food, as our female baboon did, would have had a reproductive edge. Through the slow work of natural selection, the primate brain evolved to cope with the demands of such trickery.

So a connection between deception and mental capacity in our primate ancestors might help to explain the development of our own brains. This was an exciting thought. But initially, Byrne and Whiten found it hard to get any of their research published despite amassing a substantial body of evidence. Deception just was not a subject that many in their field took seriously.



SIDEBARS
USEFUL SPACES FOR SUPPLEMENTAL VISUALIZATIONS, LEGENDS, AND OTHER IMPORTANT DETAILS

1982, however, they gained new impetu
a book that gave a gripping account of th
g relationships within a colony of chimpan
a Dutch zoo. Franz de Waal's *Chimpanze*
s reads like the script of a soap opera o
er movie. Alliances are formed, broken an
ned, individuals are manipulated, violenc
tively employed, females are fought ove
duced. De Waal prefaced his book wit
from Hobbes and Machiavelli, suggestin
that this was a vision of human politics in the raw
Byrne and Whiten were fascinated, particularly h
those episodes that showed deceptive behaviou
as when a chimp, presenting himself as a friend
would suddenly attack an unsuspecting rival.

In 1988 the two primatologists finally publishe
their work in the form of a book, *Machiavellia*
Intelligence. An unsettling read, it explored "th
idea that intelligence began in social manipula
tion, deceit and cunning co-operation", showin
that animals, far from living in a state of inno
cence, are as manipulative and underhand as th
worst of our own species. It was persuasive toc
making a big impact not only in primatology bu
in psychology, anthropology and medicine.

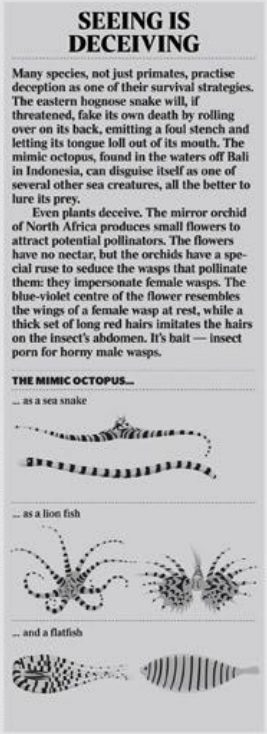
Byrne and Whiten believed that what the
termed Machiavellian intelligence was linked t
the size of the group an animal lived in: the bigge
the group, the more complex the calculations indi
viduals needed to make to survive. But there wa
little hard evidence for this until 1992, when Robi
Dunbar, at the University of Liverpool, came u
k between brai
mal's social life.
the size of a pri
ed to the size o
e big brains an
o have smalle
decided to inves
tex. This is th
e part that deal
and planning.
ch rapid expan
mans — two mil

accumulation o
rld, looking for
an animal's neo
oups. He found
to predict, wit
e of a species h
its brain size. H
for human

SEEING IS DECEIVING

Many species, not just primates, practise deception as one of their survival strategies. The eastern hognose snake will, if threatened, fake its own death by rolling over on its back, emitting a foul stench and letting its tongue loll out of its mouth. The mimic octopus, found in the waters off Bali in Indonesia, can disguise itself as one of several other sea creatures, all the better to lure its prey.

Even plants deceive. The mirror orchid of North Africa produces small flowers to attract potential pollinators. The flowers have no nectar, but the orchids have a special ruse to seduce the wasps that pollinate them: they impersonate female wasps. The blue-violet centre of the flower resembles the wings of a female wasp at rest, while a thick set of long red hairs imitates the hairs on the insect's abdomen. It's bait — insect porn for horny male wasps.



ECONOMY

SHARE

The Changing Nature of Middle-Class Jobs

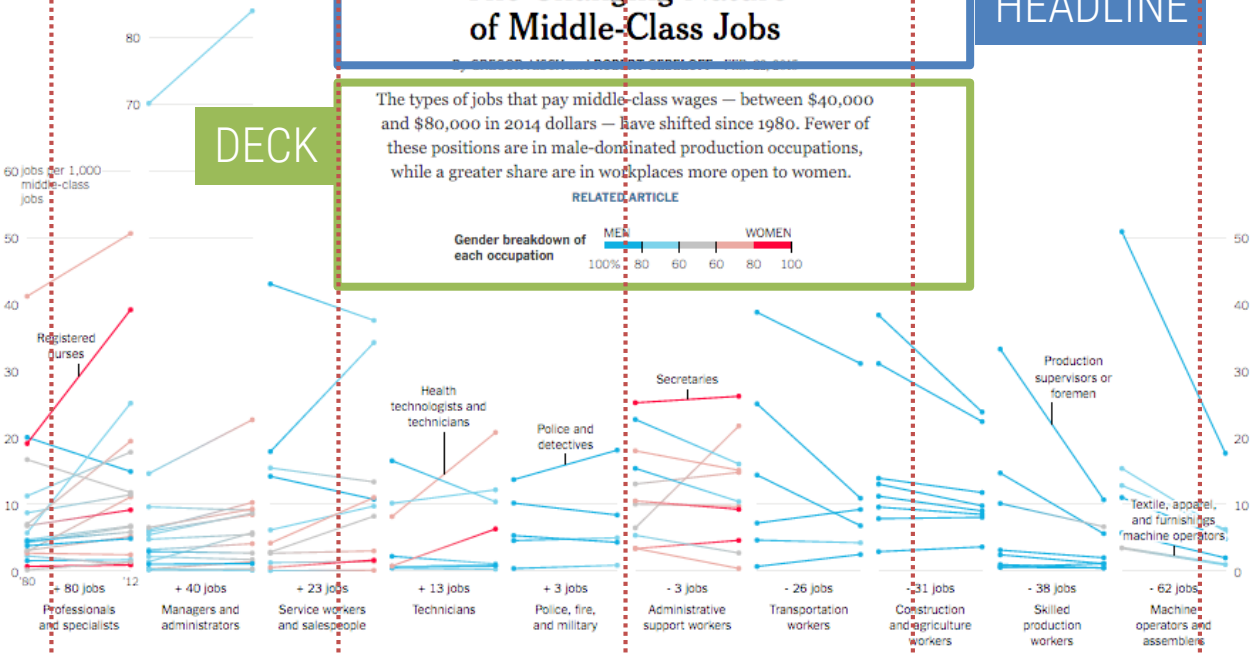
HEADLINE

DECK

The types of jobs that pay middle-class wages — between $40,000 and $80,000 in 2014 dollars — have shifted since 1980. Fewer of these positions are in male-dominated production occupations, while a greater share are in workplaces more open to women.

RELATED ARTICLE

Gender breakdown of each occupation: MEN 100% 80 60 | 60 80 100 WOMEN



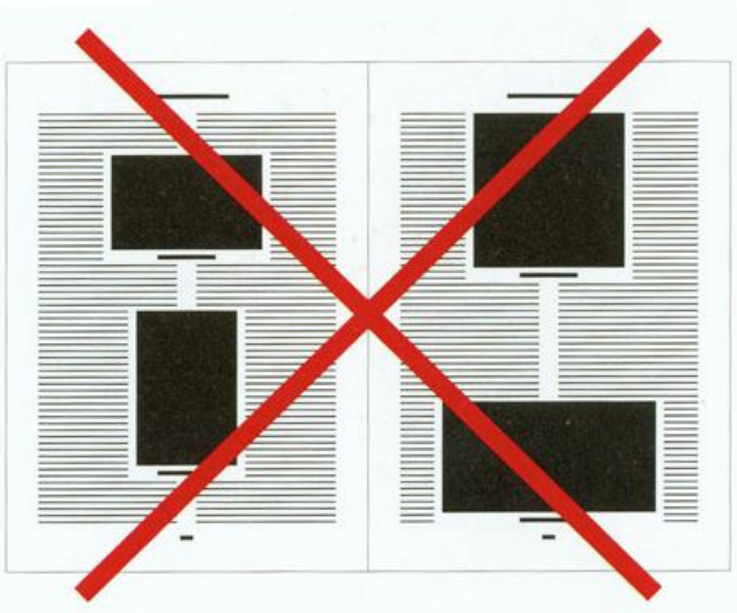
Biggest Gainers and Losers

Registered nurses and other speciality occupations accounted for the largest share of growth in the middle-class wage range. In 1980, 19 of every 1,000 middle-class jobs were held by registered nurses. Today, the rate is 39 per 1,000.

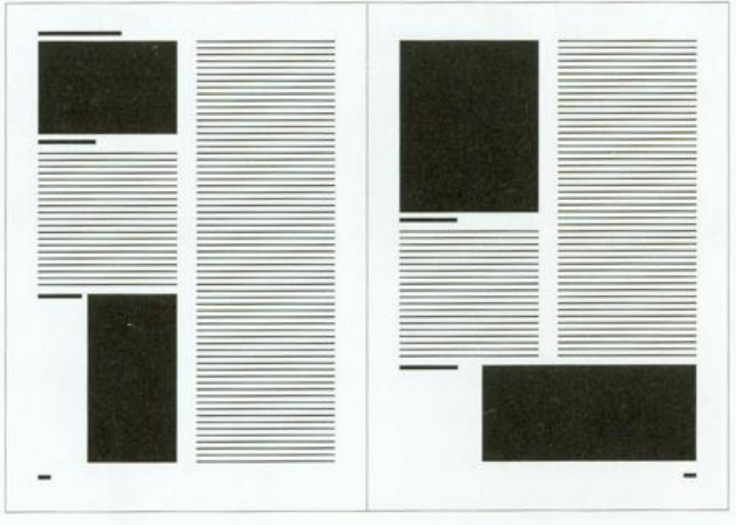
Top 20 occupations that gained share	Jobs per 1,000 middle-class jobs 1980	2012	Change
Registered nurses	19	39	+20
Mathematical and computer scientists	6	25	+19
Supervisors and proprietors of sales jobs	18	34	+16
Adjusters and investigators	6	22	+15
Managers and administrators	70	84	+14
Health technologists and technicians	8	21	+13
Other teachers and counselors	7	19	+12
Elementary school teachers	41	51	+9
Health therapists	3	11	+8
Accountants and auditors	15	23	+8
Health assistants	4	11	+7

Top 20 occupations that lost share	Jobs per 1,000 middle-class jobs 1980	2012	Change
Machine operators and tenders, except precision	51	18	-33
Production supervisors or foremen	33	11	-23
Construction trades, except electricians	38	24	-15
Freight, stock and material handlers	25	11	-14
Assemblers of electrical equipment	15	6	-9
Precision metal working occupations	15	6	-9
Vehicle and mobile equipment mechanics and repairers	31	22	-9
Truck, delivery and tractor drivers	39	31	-8
Transporation occupations	14	7	-8

VISUALS ANCHOR THE TEXT



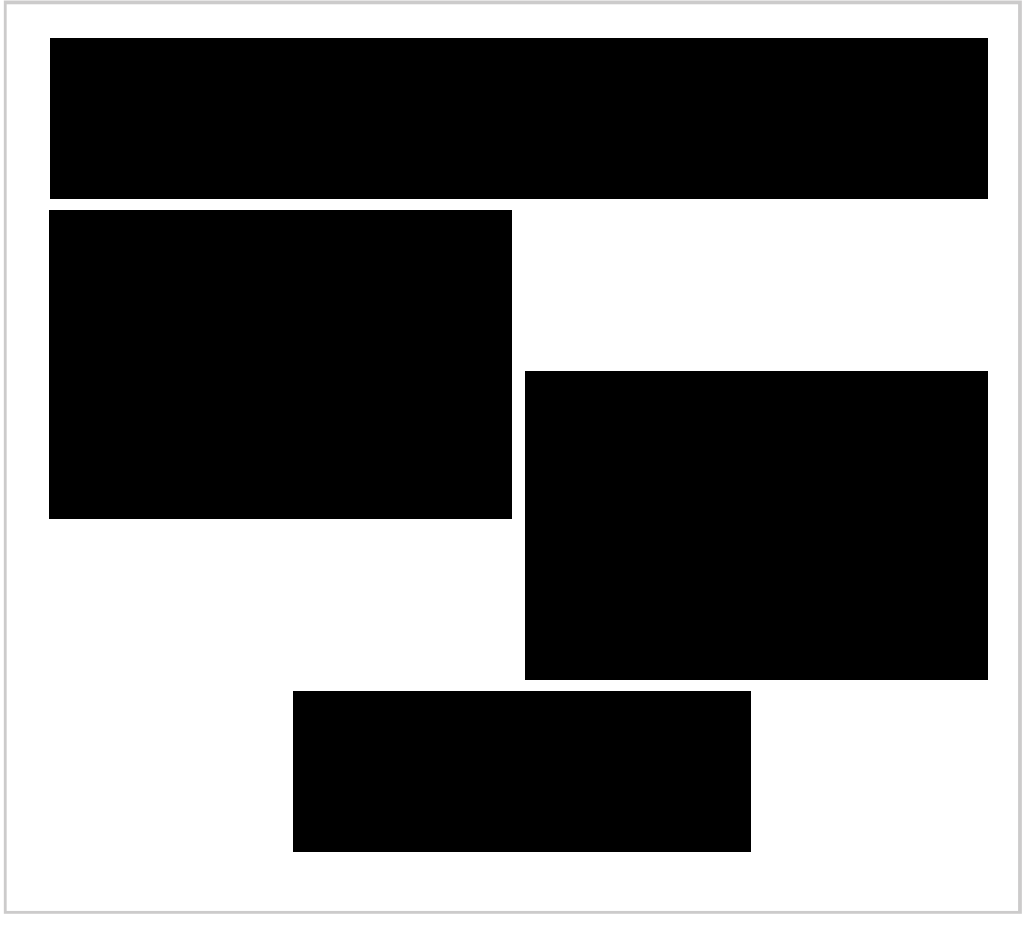
THE NEW TYPOGRAPHY
Diagram, 1928
(redrawn)
Designer and author:
Jan Tschichold



Tschichold's diagram of good and bad magazine design advocates staggering images in relation to content instead of forcing text to wrap around blocks moored at the center of the page. Explaining this experiment, Tschichold wrote that his redesigned pages would be even more effective if the photographic halftones (called "blocks") were produced in fixed rather than arbitrary sizes.

POSITIVE AND NEGATIVE SPACE

YOU DON'T NEED TO USE ALL OF THE AVAILABLE SPACE



NEGATIVE SPACE CAN ALSO GUIDE ATTENTION

MINIMALISM

IF YOU CAN DO IT WITH LESS, **DO IT!**

TRY TO SHOW **ONLY WHAT'S NECESSARY**.

USE DESIGN TO **COMMUNICATE**, NOT DECORATE.

TYPOGRAPHY

ALMOST EVERY VISUALIZATION
USES TEXT

…AND ALMOST EVERY VISUALIZATION
CAN BENEFIT FROM GOOD USE OF
TYPOGRAPHY

Serif

Sans Serif

TYPE ON THE WEB

USED TO BE VERY
LIMITED

Arial
Arial Black
Comic Sans MS
Courier New
Georgia
Impact
Times New Roman
Trebuchet MS
Verdana

NOW…LOTS OF GREAT OPTIONS

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Open Sans, 10 Styles by Steve Matteson

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Noto Sans, 4 Styles by Google

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Roboto, 12 Styles by Christian Robertson

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

PT Serif, 4 Styles by ParaType

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Lato, 10 Styles by Łukasz Dziedzic

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Alegreya Sans, 14 Styles by Juan Pablo del Peral

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Slabo 27px, 1 Style by John Hudson

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Titillium Web, 11 Styles by Multiple Designers

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Roboto Condensed, 6 Styles by Christian Robertson

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Passion One, 3 Styles by Fontstage

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

Normal 400

Grumpy wizards make toxic brew for the evil Queen and Jack.

NUMBERS

CHOOSE FONTS AND WEIGHTS TO MAXIMIZE LEGIBILITY AT THE SIZE THEY'LL BE DISPLAYED

For Numbers...

Din

0123456789

Helvetica Neue

0123456789

Myriad

0123456789

Gills Sans

0123456789

Tahoma

0123456789

Azuro

1 2 3 4 5 6 7 8 9 0

Lucida Sans

0123456789

USE TWO TYPEFACES MAXIMUM

(OFTEN EVEN ONE IS ENOUGH.)

YOU CAN ALSO USE:

WEIGHT

COLOR

Italics

SIZE

KEEP TYPE LARGE AND LEGIBLE

40-60pt (or Bigger) for Headlines

12-16 for body text, captions, and visualization text.

You should almost **never** use 10pt or smaller.
(Even IN your visualizations.)

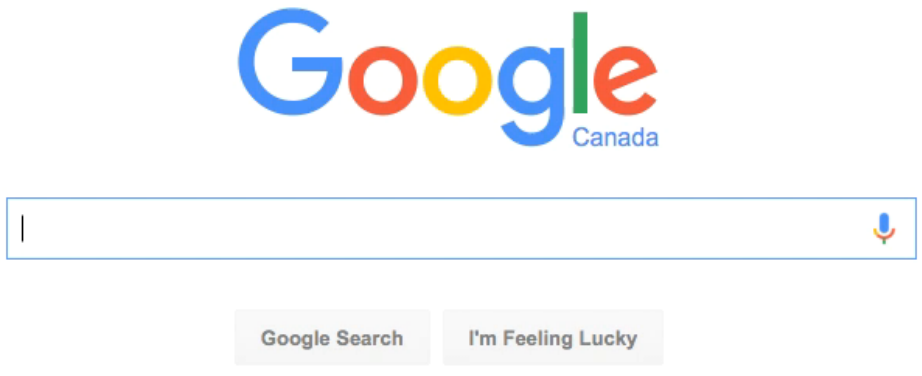
TYPE AND CONTRAST

Be careful with small differences in luminosity.

What works on your display may not work in general.

TYPE CAN SUGGEST

10 YEARS AGO

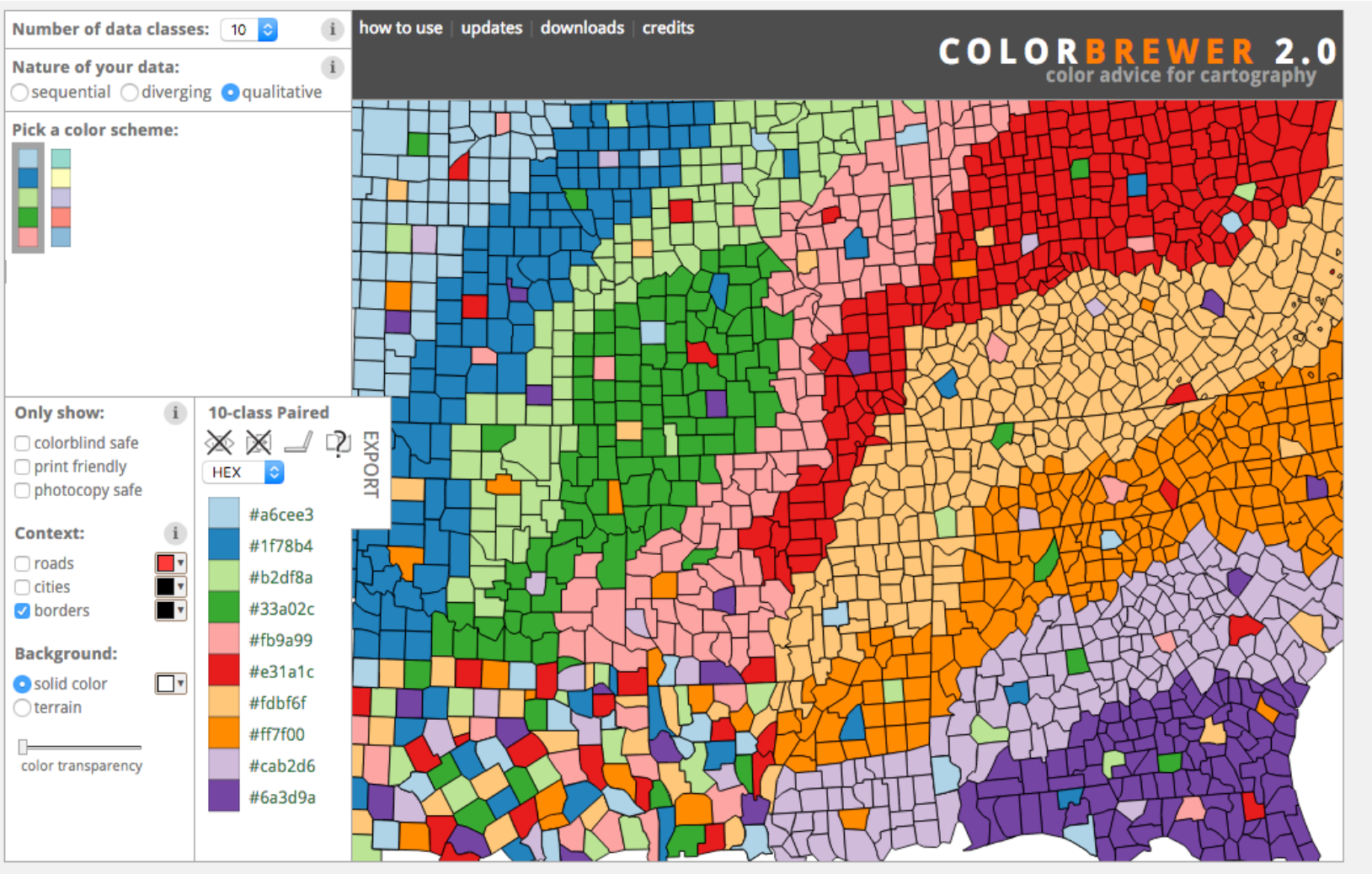


TODAY

(CUES CAN BE SUBTLE)

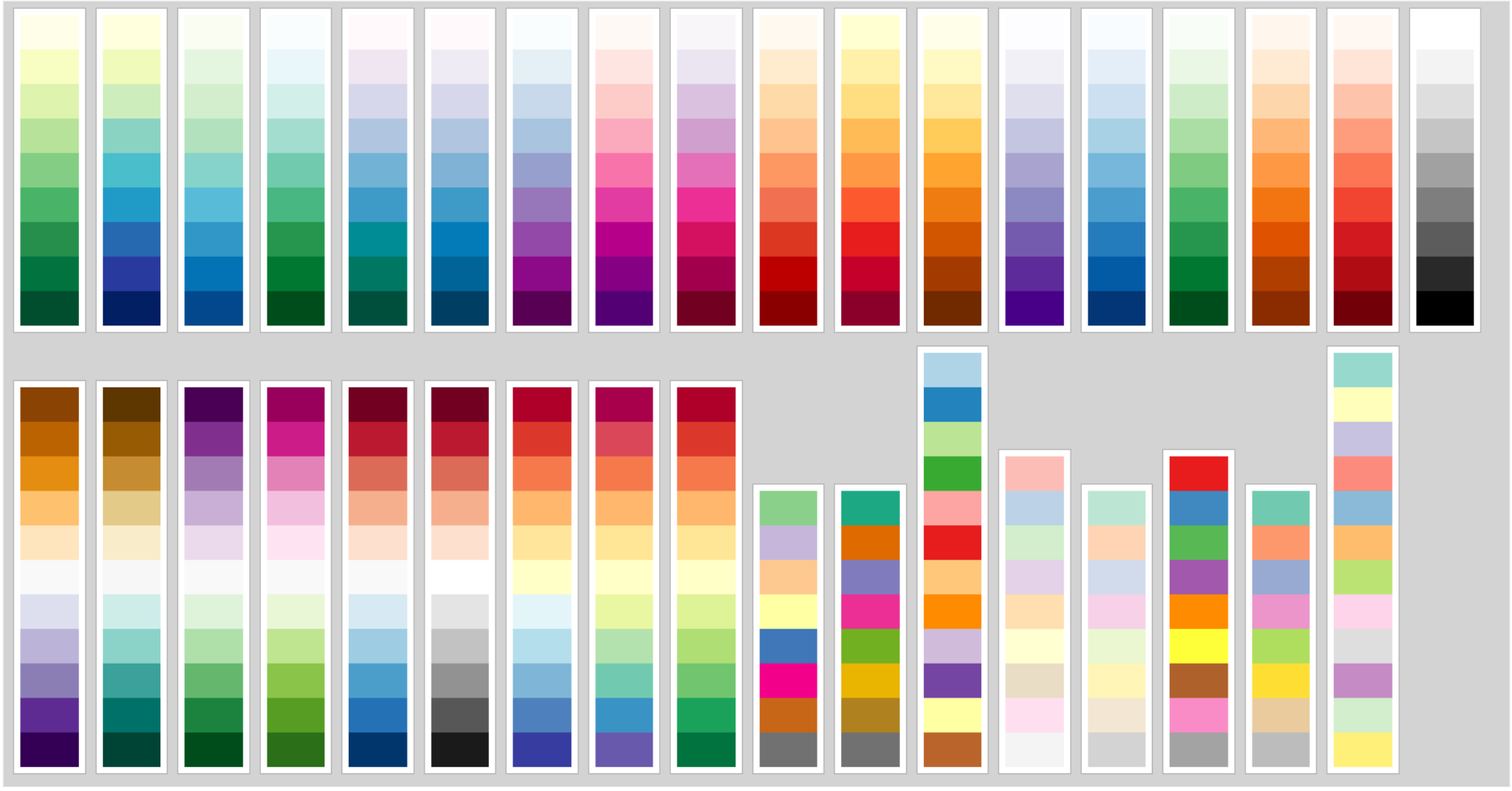
COLOR

(WE’VE SEEN THIS BEFORE.)



USE [COLORBREWER](#)!

Every ColorBrewer Scale



MIKE BOSTOCK

SYMBOLS AND ICONOGRAPHY

SEMIOTICS (THE STUDY OF SIGNS)

SIGNIFIED
A THING OR IDEA

SIGNIFIER
A REPRESENTATION
OF THE THING OR IDEA
(A WORD, PICTURE, SOUND, ETC.)

warmth
heat
danger
etc.

SENSE
THE UNDERSTANDING A
VIEWER GETS FROM
SEEING THE SIGNIFIED
(OR THE SIGNIFIER!)

TYPES OF SIGNS

ICON
PHYSICALLY RESEMBLES WHAT IT STANDS FOR

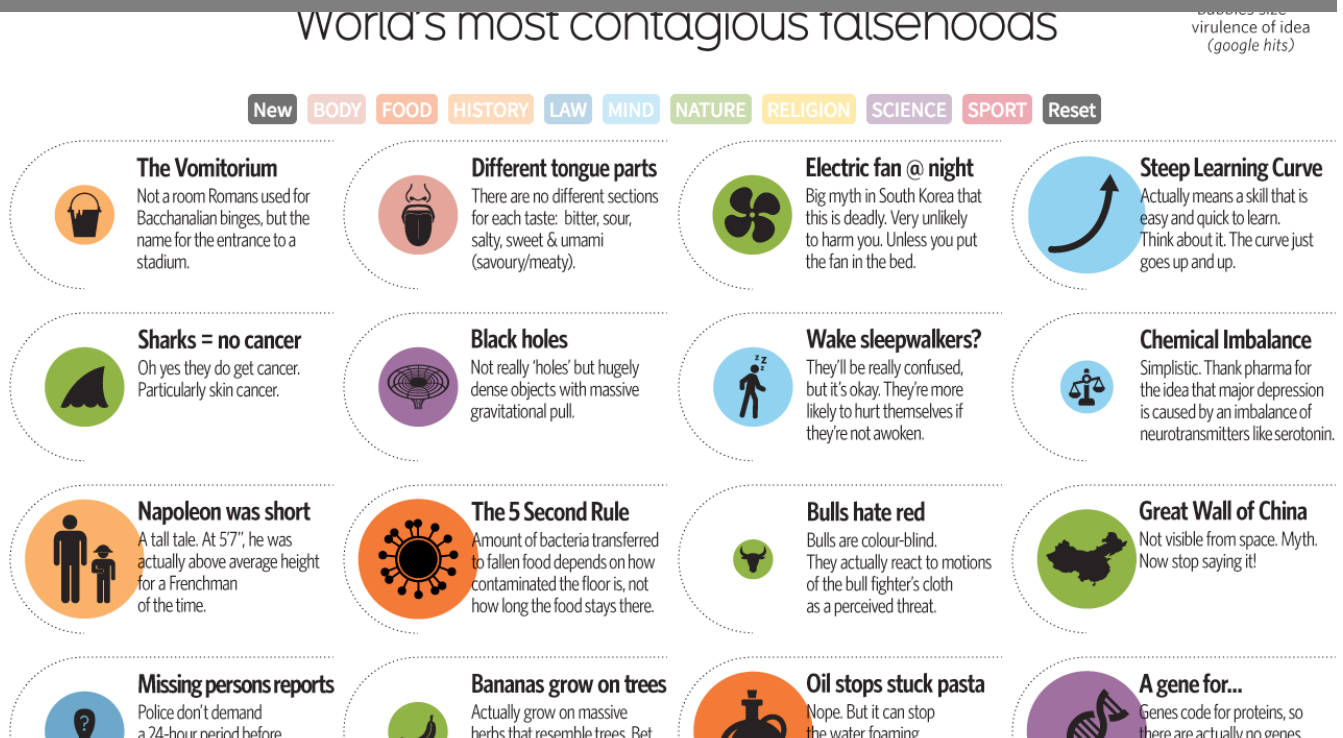
INDEX
IMPLIES / POINTS TO SOMETHING (CORRELATION)

SYMBOL
POINTS TO SOMETHING

RELATIONSHIP HAS TO BE LEARNED

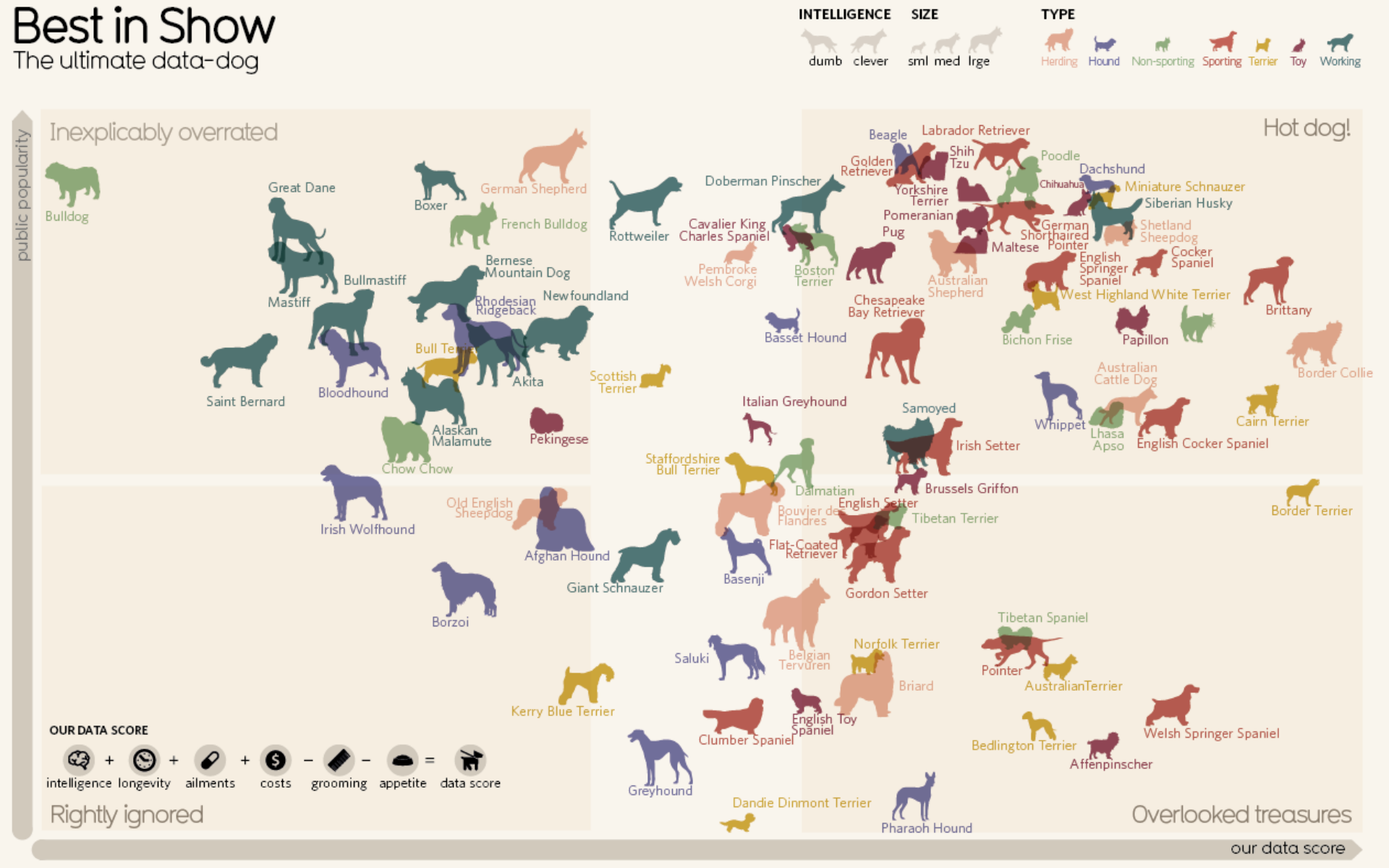
USING SIGNS TO **ILLUSTRATE** AND **PROMPT RECOGNITION**

DAVID MCCANDLESS
LINK

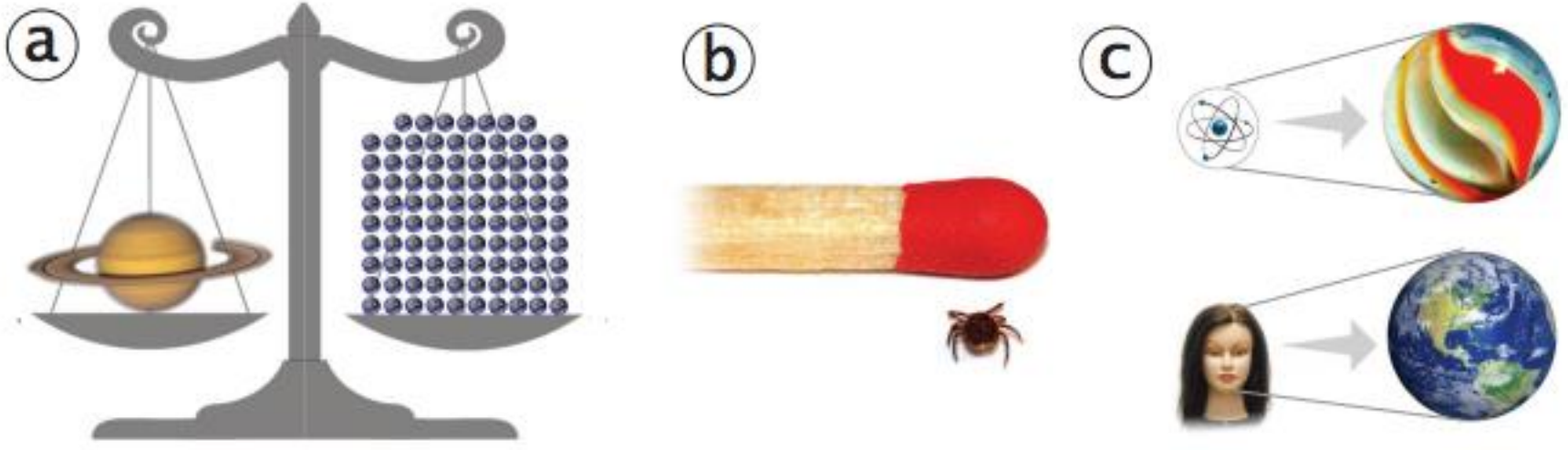


Best in Show

The ultimate data-dog



USING SIGNS TO MAKE DATA **RELATABLE**



USING CONCRETE SCALES

CHEVALIER ET AL. 2013 LINK

BUYING POWER
Here are 120 million Monopoly pieces, roughly one for every household in the United States.

Mainly in Finance and Energy

Finance 64
Majority in hedge funds, private equity or venture capital.

Energy and natural resources 17
Mostly oil and gas.

Real estate and construction 15

Media and entertainment 12
Hollywood moguls like Steven Spielberg, J.J. Abrams and Jeffrey Katzenberg.

Health 12
Woody Johnson, owner of the New York Jets, whose family founded Johnson & Johnson.

Technology 10

Transportation 9
Trucking, autos, cruise ships.

Retail and manufacturing 6

Food, beverage, agriculture 5
Includes citrus, poultry and sugar magnates.

Insurance 3

Other/unknown 5

DEATH IN SYRIA

By KAREN YOURISH, K.K. REBECCA LAI and DEREK WATKINS

SEPT. 14, 2015

More than 200,000 people

have been killed in the four-and-a-half-year Syrian civil war.

The death toll in the Gaza-Israel conflict

By Lazaro Gamio and Richard Johnson, Updated: Aug 7, 2014

Statistics on death tolls during active conflict are often difficult to track accurately. A note on our sourcing:

For death toll numbers from within Gaza, we receive daily or sometimes twice daily updates from the head of the Information Management Unit in the United Nations Office for the Coordination of Humanitarian Affairs in the Occupied Palestinian Territories field office in the West Bank. The field office gets updates from multiple sources within Gaza, including U.N. agencies and the Palestinian Medical Authorities. They then create and continually update a spreadsheet of all available data. These numbers are often not complete, but represent the best available data and do tend to clarify over time. Israel disputes the numbers provided by the United Nations, saying that a large number of those killed, particularly males over 18, were armed terrorists and not civilians.

For death toll numbers of Israeli soldiers, we rely on Israel Defense Forces press releases and their Twitter account. For Israeli civilian deaths, we rely on news reports and our reporters in Israel and Gaza. These numbers are similarly tentative initially but clarify over time.

Related articles: Reporters grapple with politics, erratic sources in reporting Israeli/Gaza death toll (Washington Post) | Caution needed with Gaza casualty figures (BBC) | Civilian or Not? New Fight in Tallying the Dead From the Gaza Conflict (New York Times)

1,958 Deaths up to **Aug. 6**

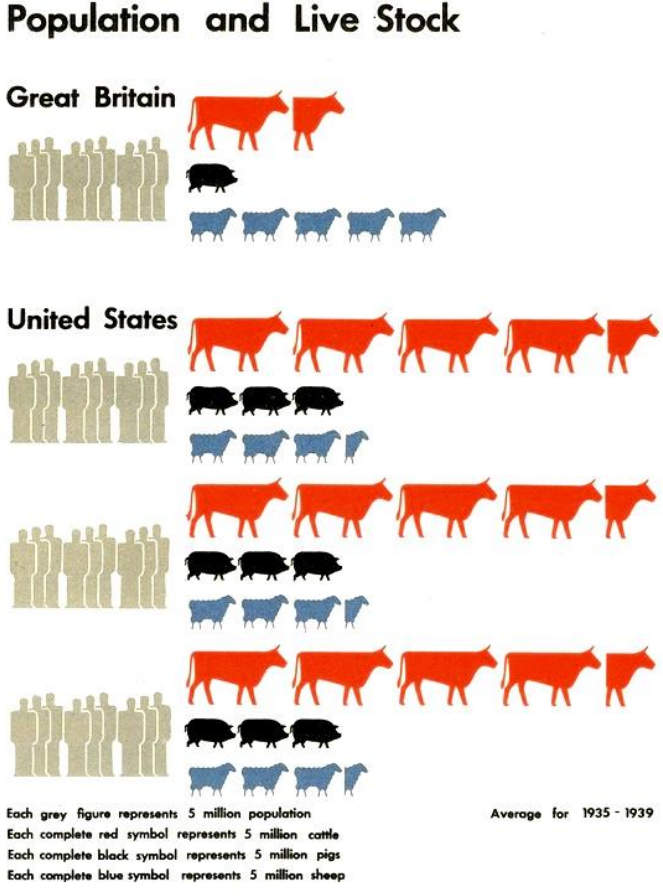
65 were Israeli soldiers.

3 were Israeli civilians.

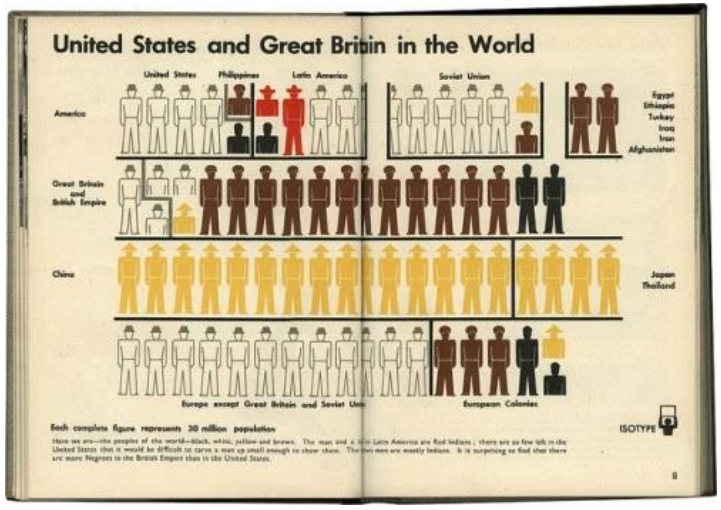
217 were armed Palestinian militants. Of those, **2** were children.

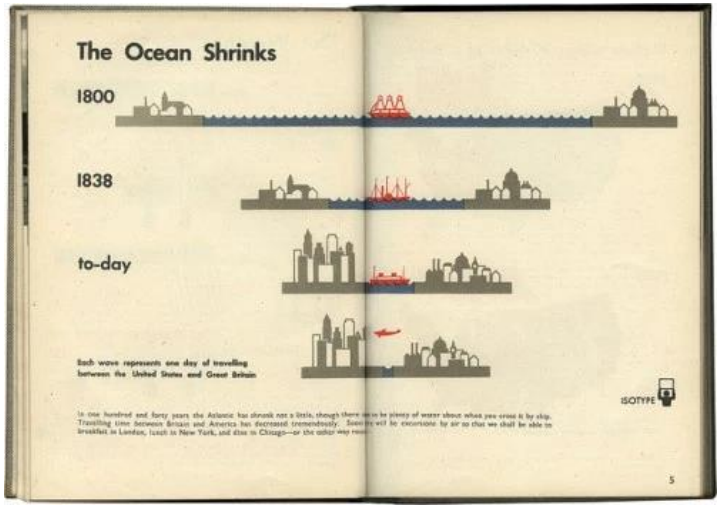
1396 were Palestinian civilians. Of those, **222** were women and **418** were children.

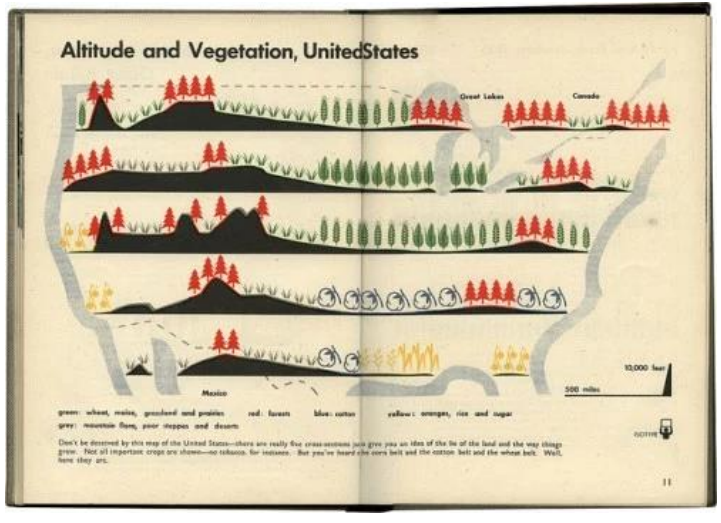
ISOTYPE VISUALIZATION

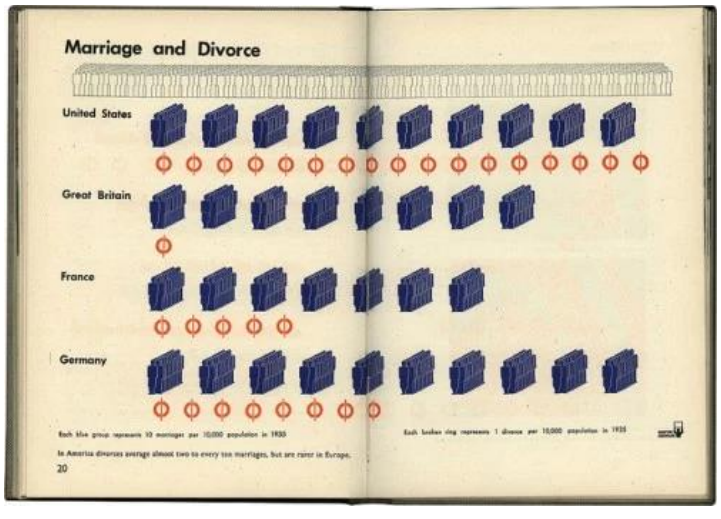


OTTO & MARIE NEURATH 1948









OTTO & MARIE NEURATH **1948** [MORE EXAMPLES]

ISOTYPE Visualization – Working Memory, Performance, and Engagement with Pictographs

Steve Haroz
Northwestern University
isotype@steveharoz.com

Robert Kosara
Tableau Research
rkosara@tableau.com

Steven L. Franconeri
Northwestern University
franconeri@northwestern.edu

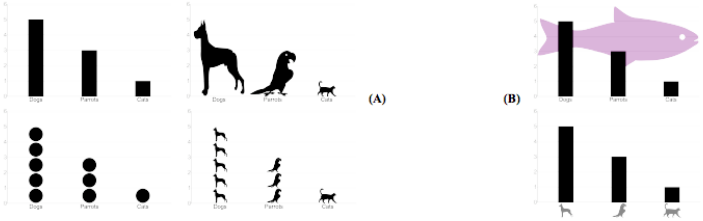


Fig. 1. Pictographic charts have been used for decades. (A) Which chart above most effectively conveys information? Which data is easiest to remember during a demanding task? Which is most engaging? (B) How integrated must a pictograph be to benefit the user? Do purely decorative background images offer the same benefits as simple axis labels? Or must they be used to convey data?

ABSTRACT
Although the infographic and design communities have used simple pictographic representations for decades, it is still unclear whether they can make visualizations more effective. Using simple charts, we tested how pictographic representations impact (1) memory for information just viewed, as well as under the load of additional information, (2) speed of finding information, and (3) engagement and preference in seeking out these visualizations. We find that superfluous images can distract. But we find no user costs – and some intriguing benefits – when pictographs are used to represent the data.

Author Keywords
Visualization; Psychophysics; Working Memory; User Performance; Pictograph; Embellishment; ISOTYPE

INTRODUCTION
The International System Of TYpographic Picture Education (ISOTYPE) uses simple pictographic elements to convey many types of information, including numerical data. Otto and Marie Neurath defined the term in the 1920s [21], though this type of chart was first described by Willard Brinton in 1914 [6]. Together with Gerd Arntz, the Neuraths created many ISOTYPE designs over several decades [1].

The goal was a universally understandable system for communicating quantities of commercial, social, or economic information (e.g., automobile production or number of children born per year). Symbols, each representing a fixed quantity, were stacked to provide an intuitive representation of a total amount (Fig. 2). Gerd Arntz's pictographs – simplified icons with minimal color – are highly recognizable and are still used in signs, traffic icons, and warning labels.

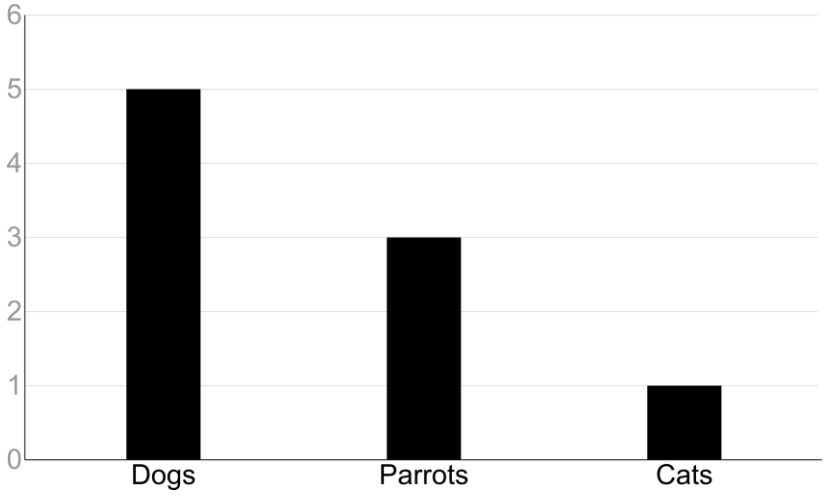
While the design community has largely embraced the simple style of ISOTYPE for pictographic embellishments [7, 17], the visualization and HCI communities tend to regard pictographs as 'chart junk' – a distraction from the data itself [24]. Here we examine how ISOTYPE-style embellishment affects viewer memory, speed, and engagement within simple visualizations.

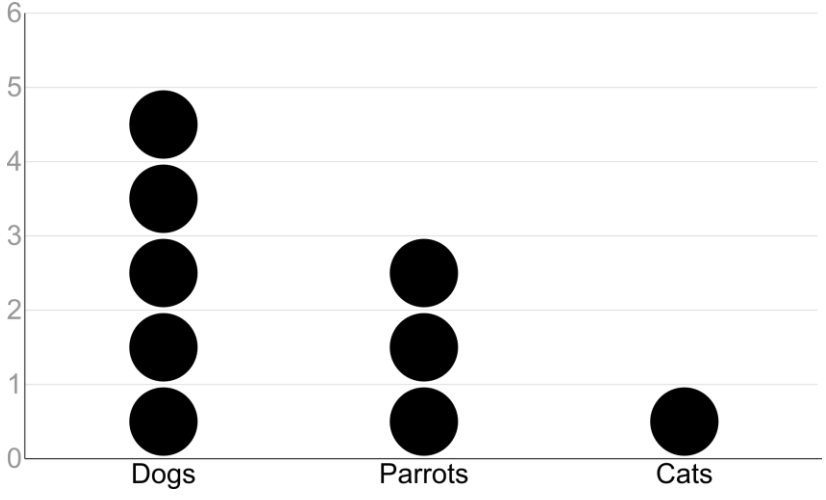
Recent work suggests that extraneous pictographic information can indeed improve the effectiveness of visualizations. Bateman et al. found that visualizations that integrate data with illustrations yielded better memory of the data compared to minimalistic outlines of bar charts [2]. Borkin et al. found a related result – that people can better recall having seen a visualization that includes pictures [4], though it is not clear if they would better recall the data, per se. When images and clip-art are embedded in the visualization's data representation, Borgo et al. found occasional impact to work-

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.
CHI 2015, April 18 - 23 2015, Seoul, Republic of Korea
Copyright is held by the owner/author(s). Publication rights licensed to ACM.
ACM 978-1-4503-3145-6/15/04…$15.00
http://dx.doi.org/10.1145/2702123.2702275

STACKED ICONS CAN:

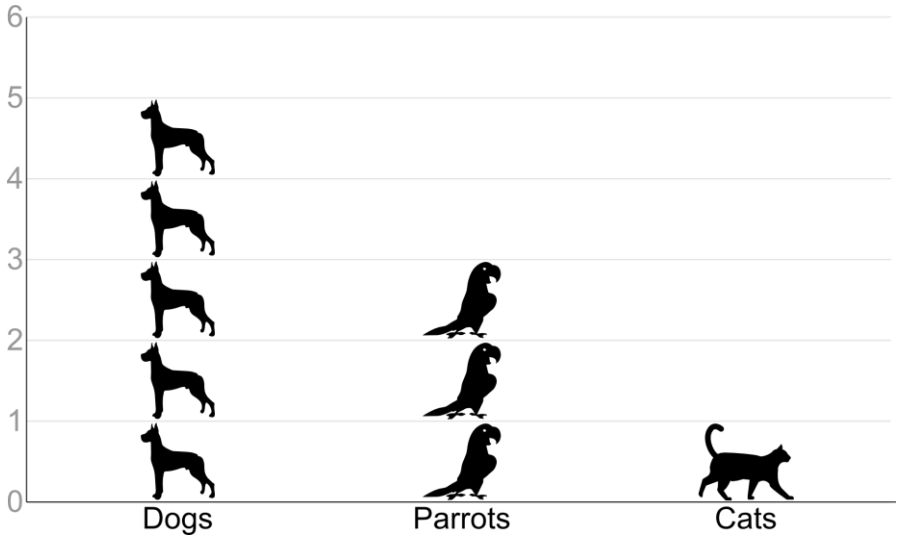
HAROZ ET AL. **2015** LINK





STACKED ICONS CAN:
ENCODE DATA AS BOTH LENGTH AND QUANTITY

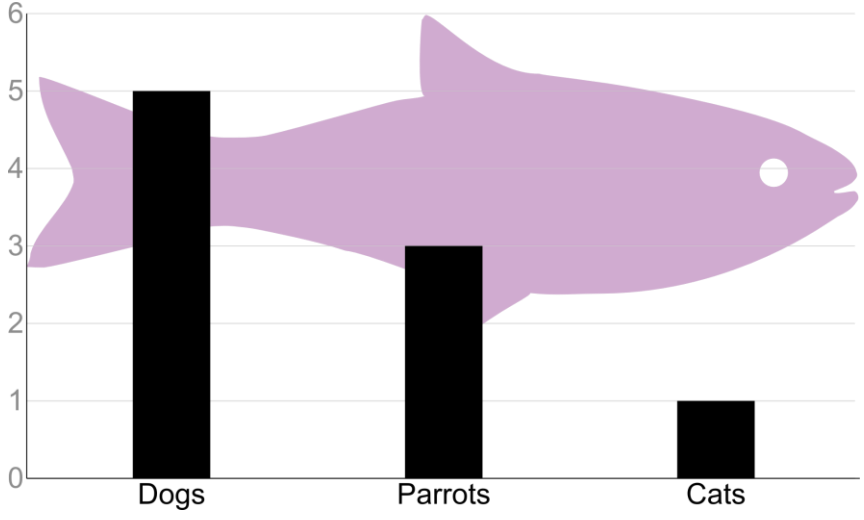
HAROZ ET AL. 2015 LINK



STACKED ICONS CAN:
ENCODE DATA AS BOTH LENGTH AND QUANTITY

(WHERE THIS WORKS)
ICONS CAN SUPPORT MEMORY & ENGAGEMENT

HAROZ ET AL. **2015** LINK



STACKED ICONS CAN:
ENCODE DATA AS BOTH LENGTH AND QUANTITY

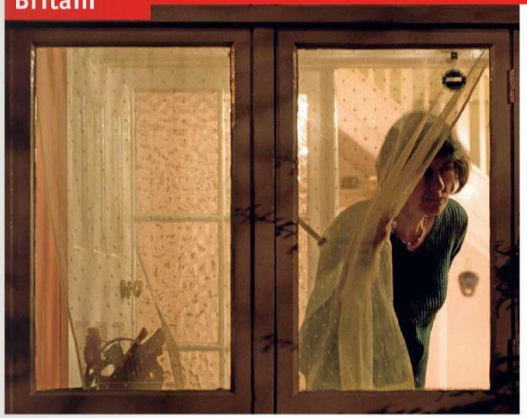
(WHERE THIS WORKS)
ICONS SUPPORT MEMORY & ENGAGEMENT

BUT! OTHER IMAGES ARE DISTRACTING

HAROZ ET AL. **2015** LINK

HOW TO USE DATA TO TELL A STORY?

(THERE ARE MANY, MANY CHOICES TO MAKE.)



Also in this section
64 Bagehot: Electoral reform

More articles about Britain are available to subscribers at
economist.com/britain

Britain's "broken society"

Through a glass darkly

Crime, family break-up, drunks and drugs: the Conservatives—and apparently plenty of voters—think that Britain has a "broken society". Does the claim stand up?

IT IS hard to believe that such appalling crimes could have been committed by anyone so young. Two boys in the north of England were subjected to a sadistic attack that caused parents across the country to shudder. The anguish of the children was awful enough. But in a grotesque twist, their tormentor was also a child, not yet even a teenager. The attacks had been carried out "solely for the pleasure and excitement" of it, the judge in the case said. What has society come to when such evil is found in those so young?

That was in 1968. Mary Bell, the daughter of a Tyneside prostitute and supposedly the victim of repeated abuse herself, became Britain's most famous child-killer when, just 11 years old, she was convicted of strangling two young boys. Now, a similar case is causing people to wonder again whether society has gone to the dogs. Two brothers from the South Yorkshire village of Edlington, aged ten and 11, were convicted on January 22nd of torturing and sexually abusing two younger boys in an ordeal that left one of them close to death.

The case was highlighted by David Cameron, the leader of the opposition, who on the day the boys were sentenced launched a chapter of his Conservative Party's election manifesto dedicated to dealing with what he calls Britain's "broken society". The Edlington case was not "just some isolated incident of evil", Mr Cameron said. Connecting it to four other infamous examples of callous brutality, he declared that it raised "deep questions about what is going wrong in our society". Britain is experiencing a social recession to match the economic one, he reckons.

Those good old days in full

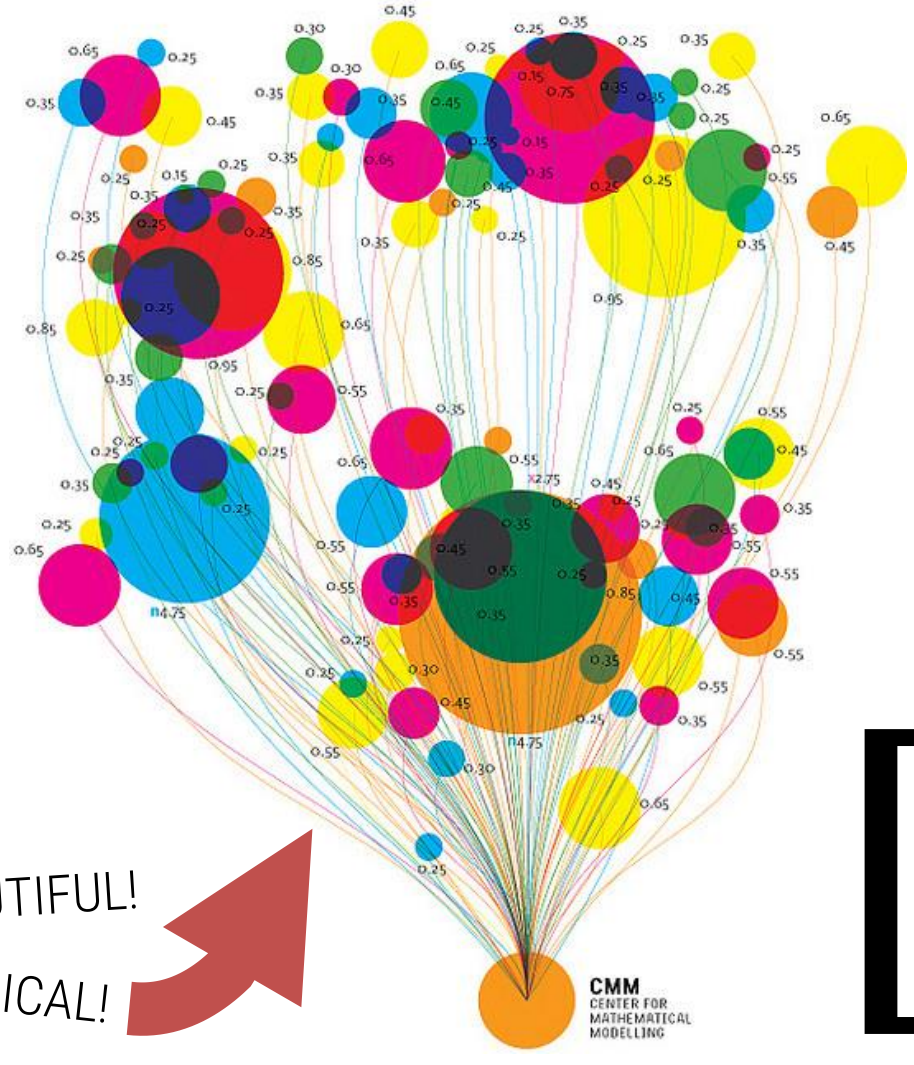
Was Mary Bell's Britain better than today's version? An increasing number of people seem to think so. Opinion pollsters around the world find that people are usually gloomy about the future, perhaps because it is inherently more uncertain than the past. But Britons are getting even more downbeat. When Labour came to power in 1997, 40% of the population thought the country was becoming a worse place to live in. By 2007 that had risen to 60%. A year on, and a year into Gordon Brown's spell as prime minister, the malcontents numbered 71%—and that was before the financial crash. There has been a "surge of nostalgia" for the good old days, says Ben Page, head of Ipsos-Mori, a polling firm.

Chief among people's worries is their security. Under Labour, fear of crime climbed until by 2007 it had become the issue that pollsters identified as the main complaint among voters. (Since then worries about the economy have eclipsed all else.) The heightened fears are a puzzle to criminologists, who point out that over the past 15 years Britain has experienced a steady, deep fall in crime. The statistics are notoriously hard to interpret, but according to the British Crime Survey, the Home Office's most reliable measure though still far from perfect, crime overall has dropped by 45% since its peak in 1995. A big chunk of that fall is owing to reductions in vehicle theft and domestic burglary, for which alarm manufacturers and increased householder vigilance probably deserve as much credit as the police. But violent crime has fallen too. It is now almost half what it was in 1995, and no higher than in 1981 (see chart 1).

Looking more carefully, the big fall in brutality has been in domestic violence, which has dropped by a staggering 70%. (No one is sure why; the best guess is that an improving economy has kept men out of the house and given women enough money to escape if they need to.) Violence

Powered

SMALL SUPPORT AFTERTHOUGHT BORING?



EXCITING!

BEAUTIFUL!

TECHNICAL!

[BUT]

WHAT DOES
IT MEAN?

Published: February 2, 2010

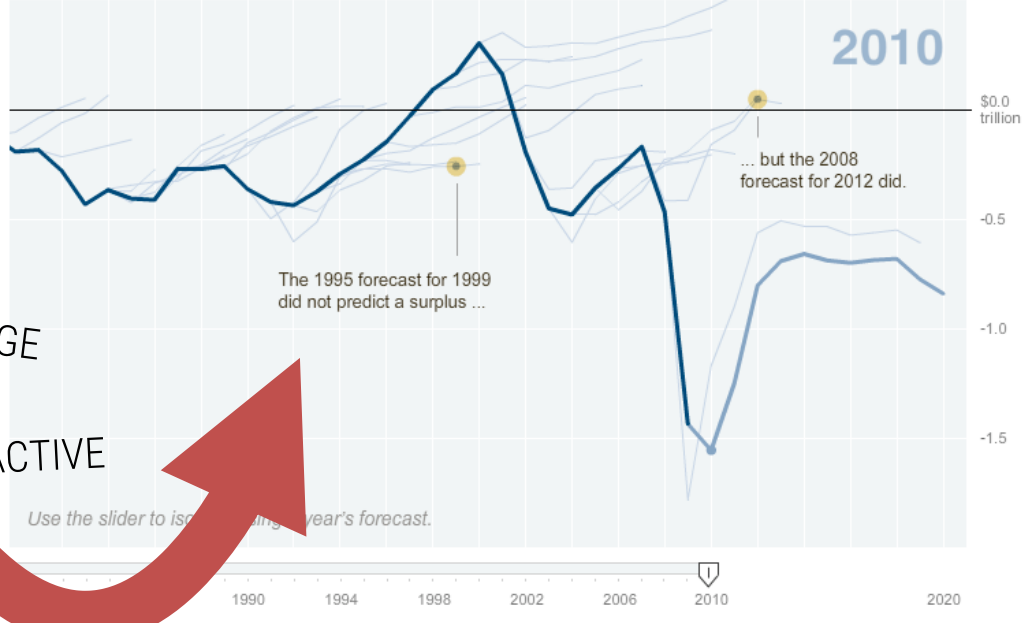
Budget Forecasts, Compared With Reality

Just two years ago, surpluses were predicted by 2012. How accurate have past White House budget forecasts been?

1 2 3 4 5 6 NEXT ▸

Latest forecast

Today, with a better understanding of the severity of the economic downturn, the deficit situation is much more dire.

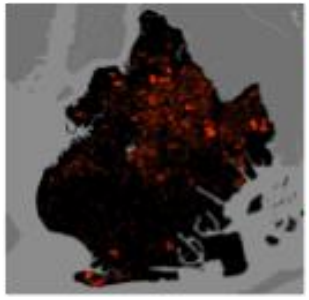


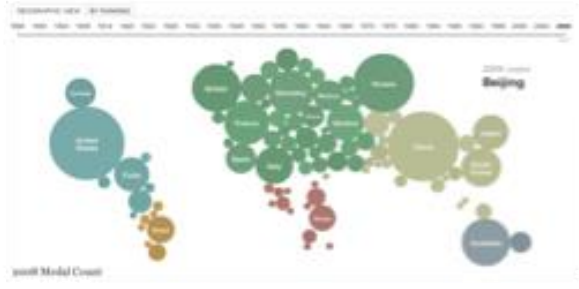
CENTER STAGE

STANDALONE

INTERACTIVE

GUIDED



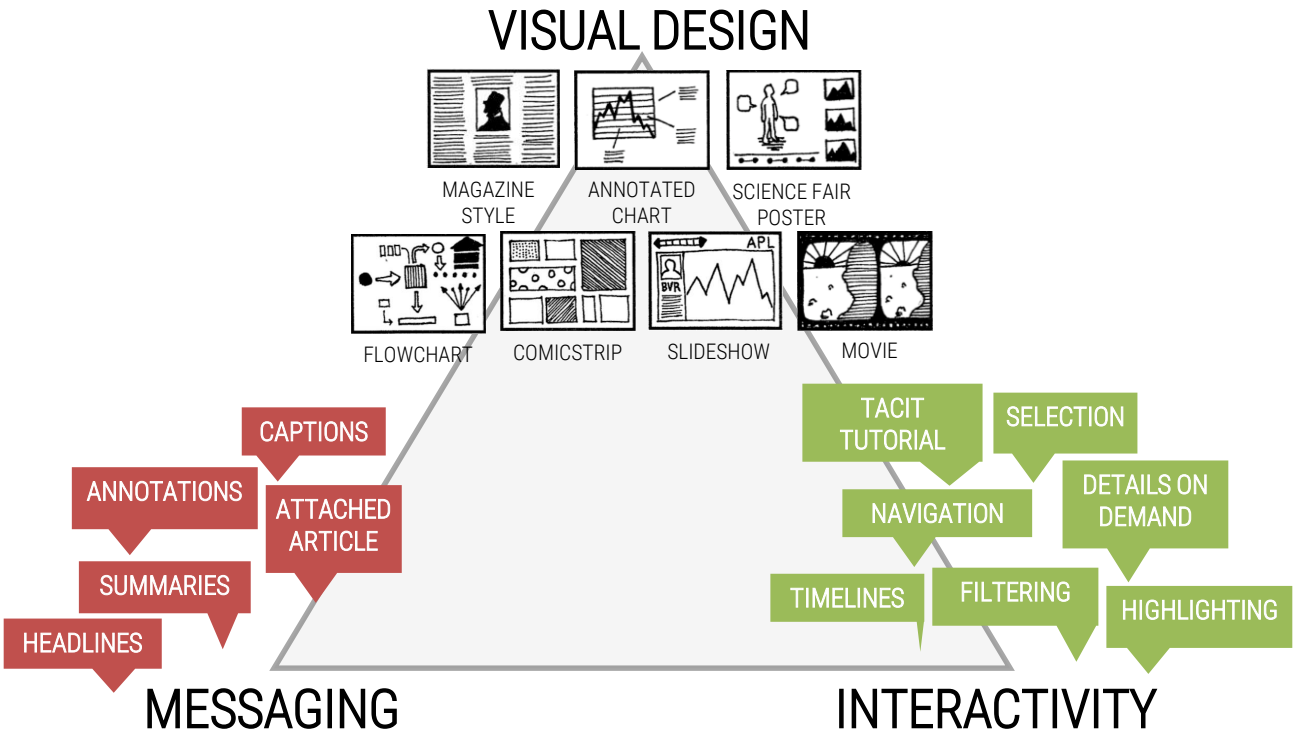


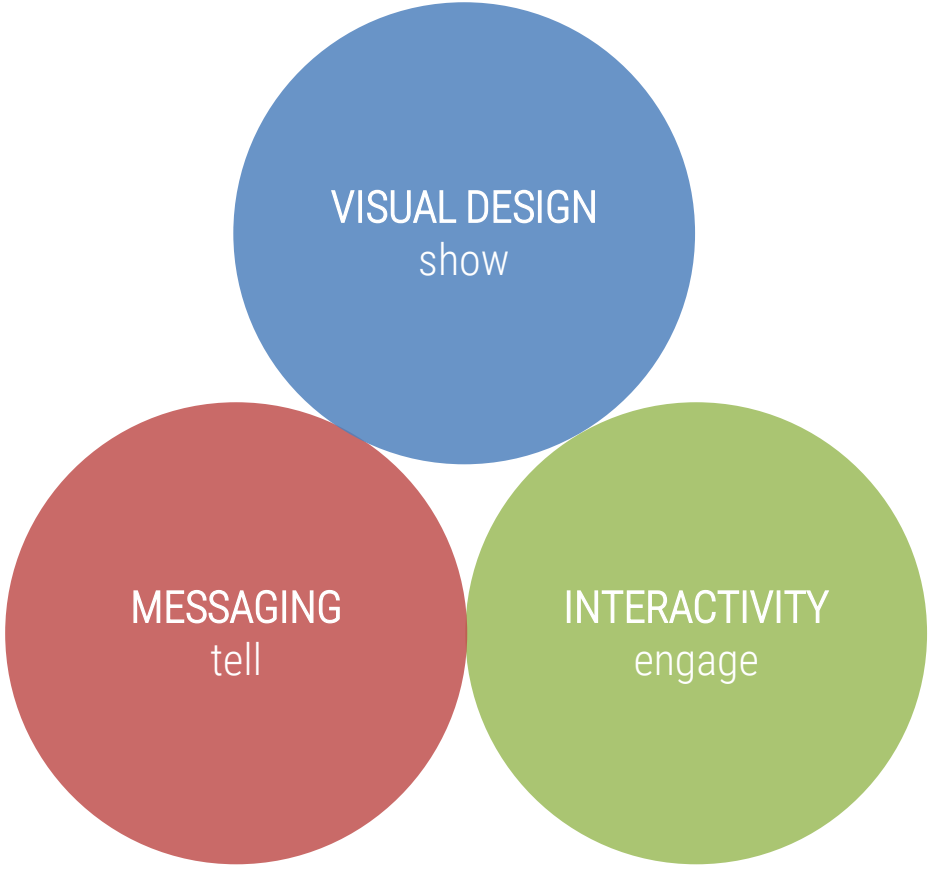
58

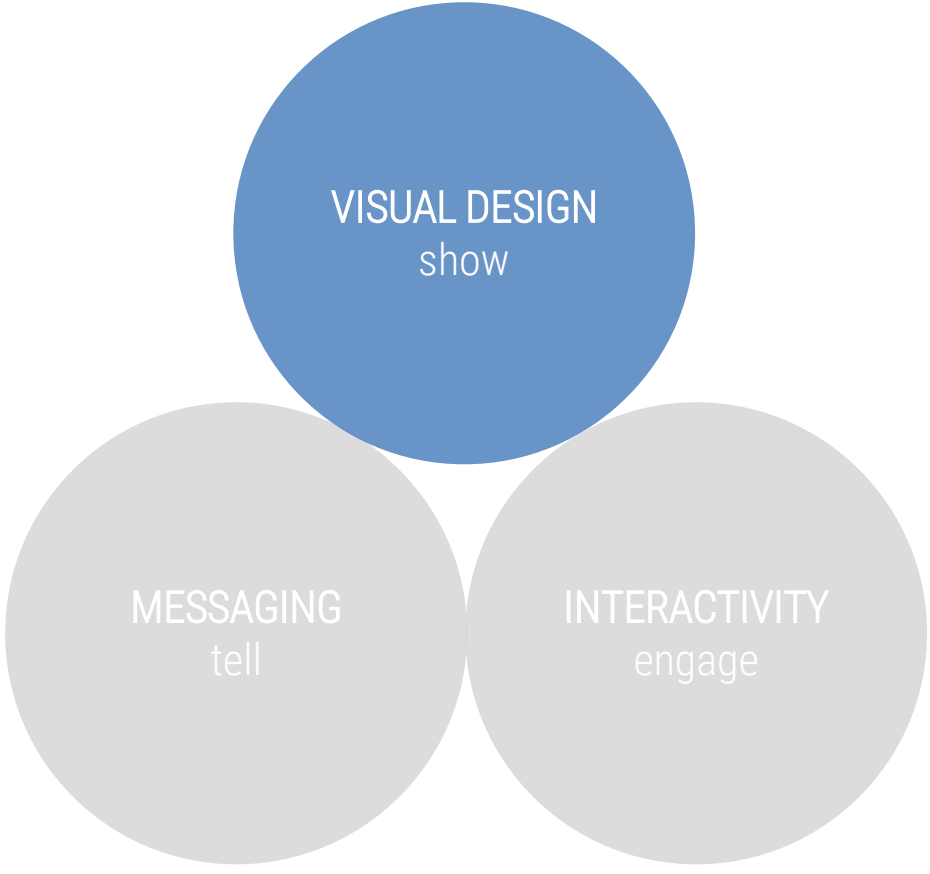
CASE STUDIES

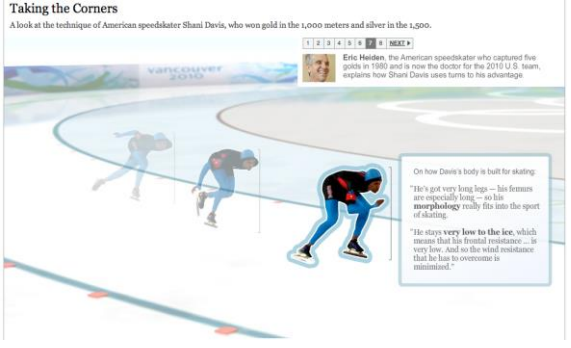
70% JOURNALISM
20% BUSINESS
10% RESEARCH

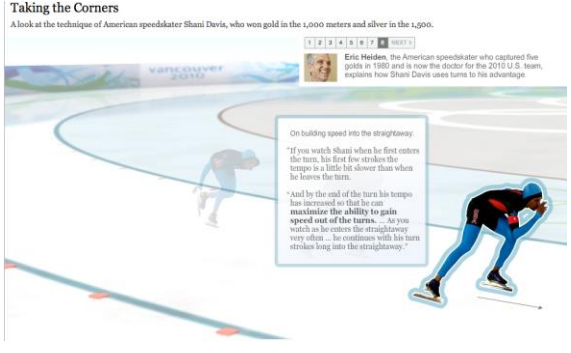
EDWARD SEGEL &
JEFFREY HEER **2010**


VISUAL DESIGN
MAGAZINE STYLE
ANNOTATED CHART
SCIENCE FAIR POSTER
FLOWCHART
COMICSTRIP
SLIDESHOW
APL
BVR
MOVIE
CAPTIONS
ANNOTATIONS
ATTACHED ARTICLE
SUMMARIES
HEADLINES
TACIT TUTORIAL
SELECTION
NAVIGATION
DETAILS ON DEMAND
TIMELINES
FILTERING
HIGHLIGHTING
MESSAGING
INTERACTIVITY


VISUAL DESIGN
show
MESSAGING
tell
INTERACTIVITY
engage

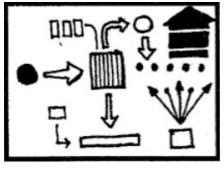

VISUAL DESIGN
show
MESSAGING
tell
INTERACTIVITY
engage



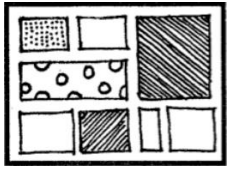


THE MORE LINEAR, THE MORE LIKE A TRADITIONAL STORY.

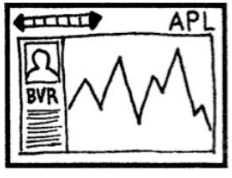
WITH A BEGINNING, MIDDLE, AND END.



FLOWCHART

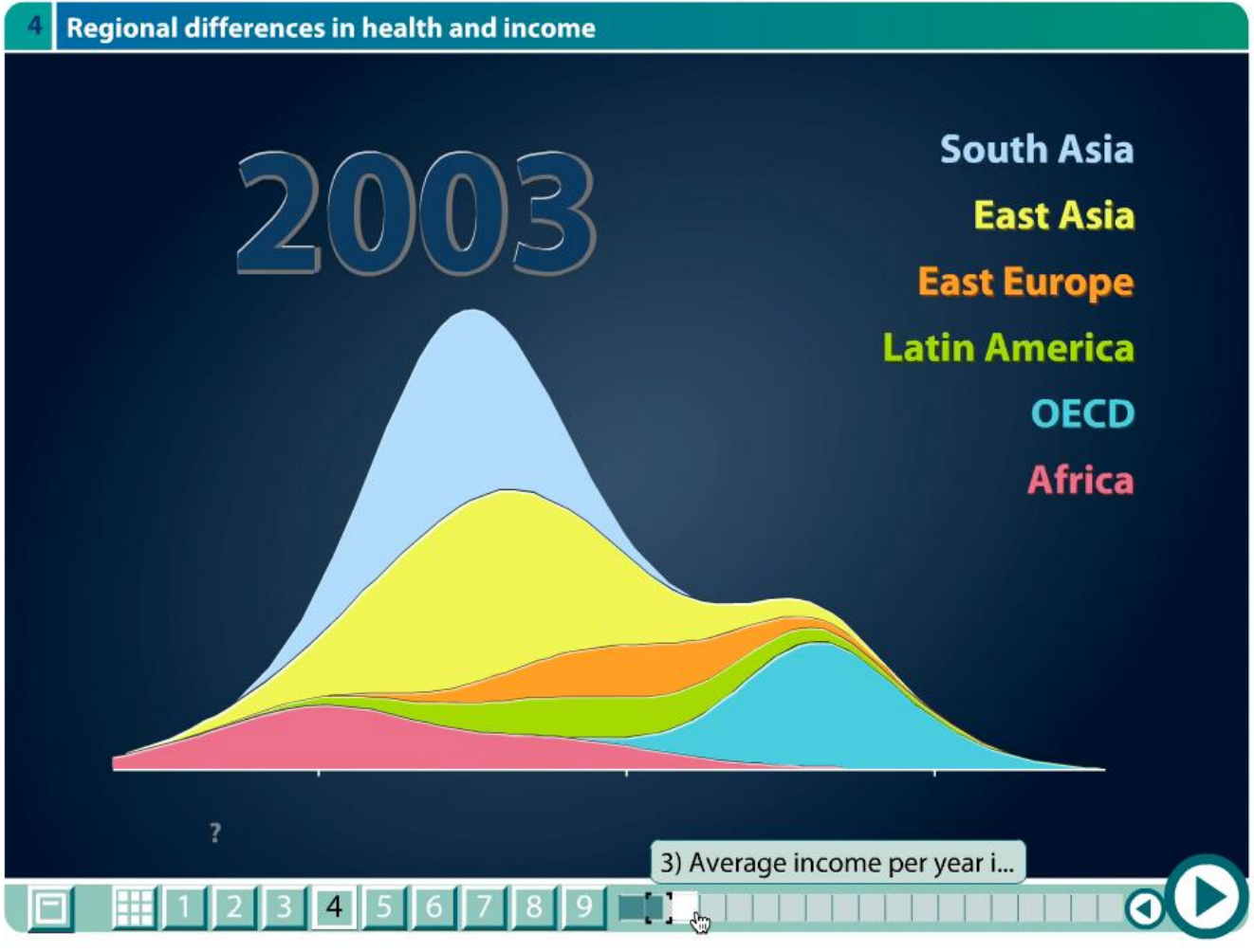


COMICSTRIP



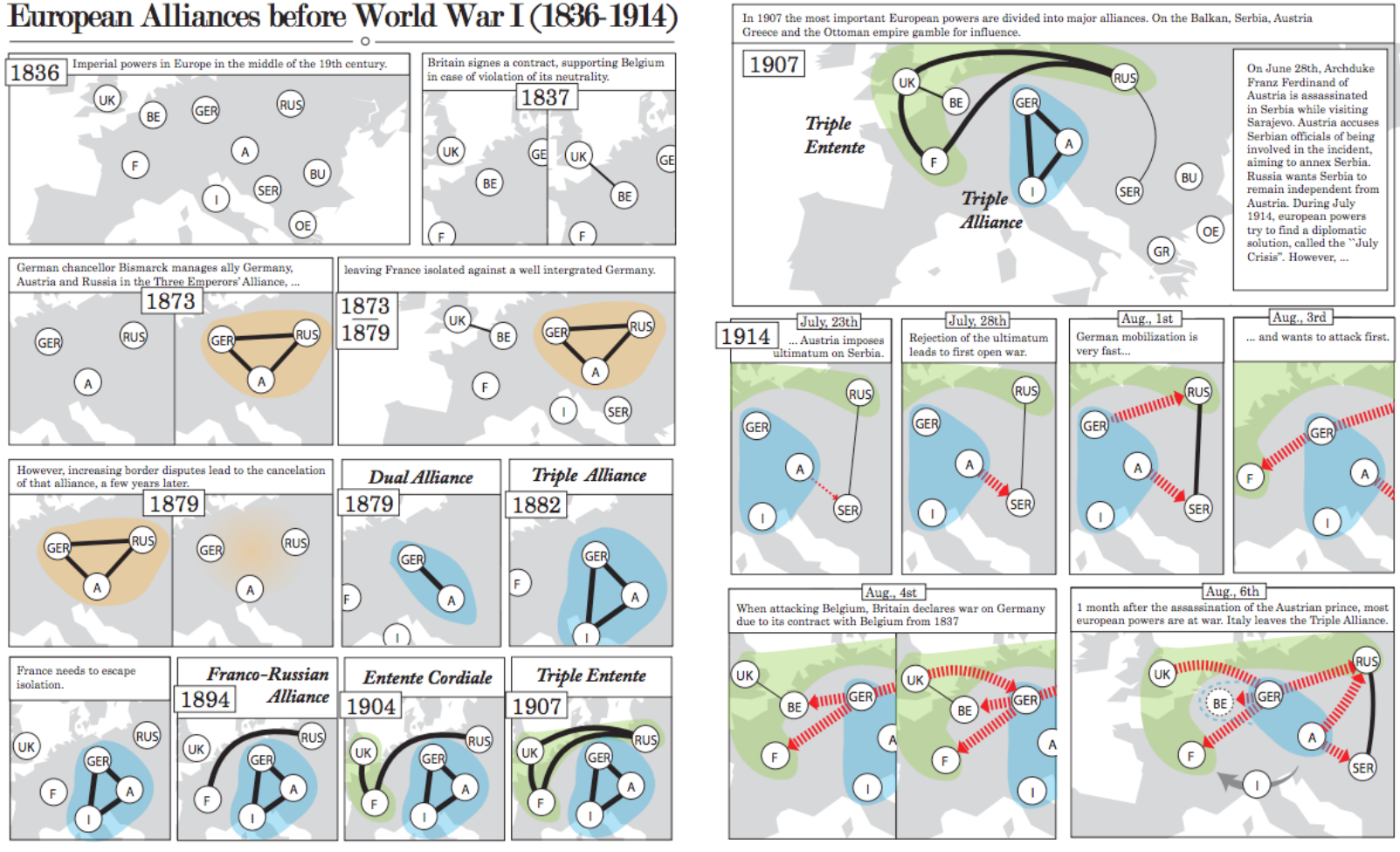
SLIDESHOW

USE STAGING AND ANIMATION FOR COMPLICATED TRANSITIONS TO AVOID CONFUSING READERS



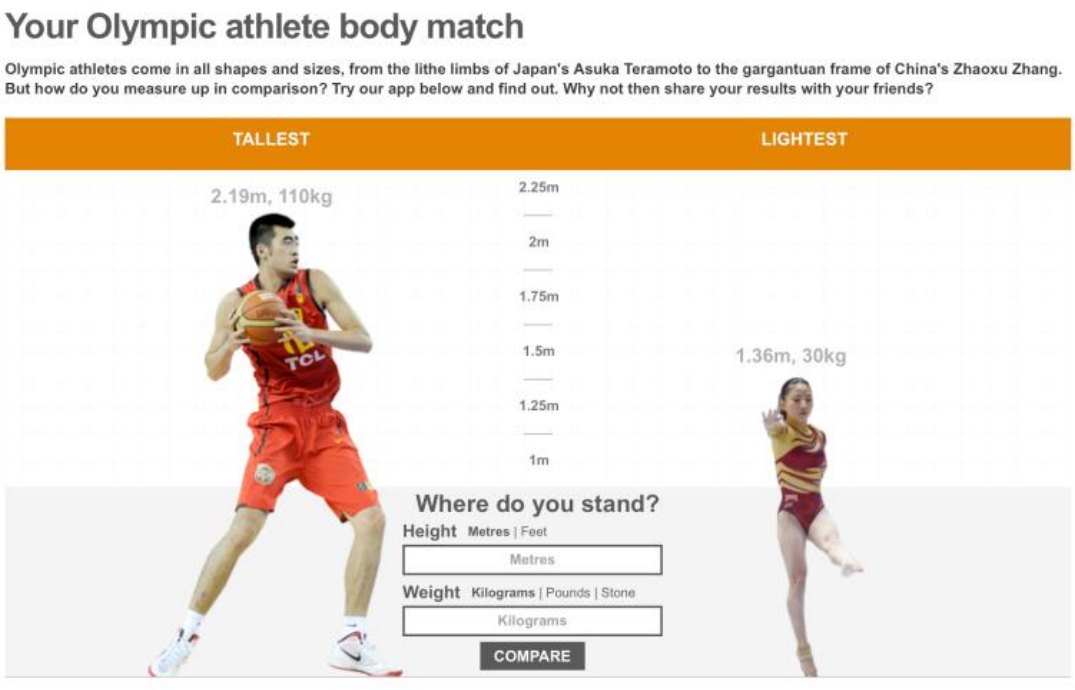
USE ESTABLISHING SHOTS

SITUATE THE VIEWER BEFORE DIVING IN.



BACH ET AL 2016

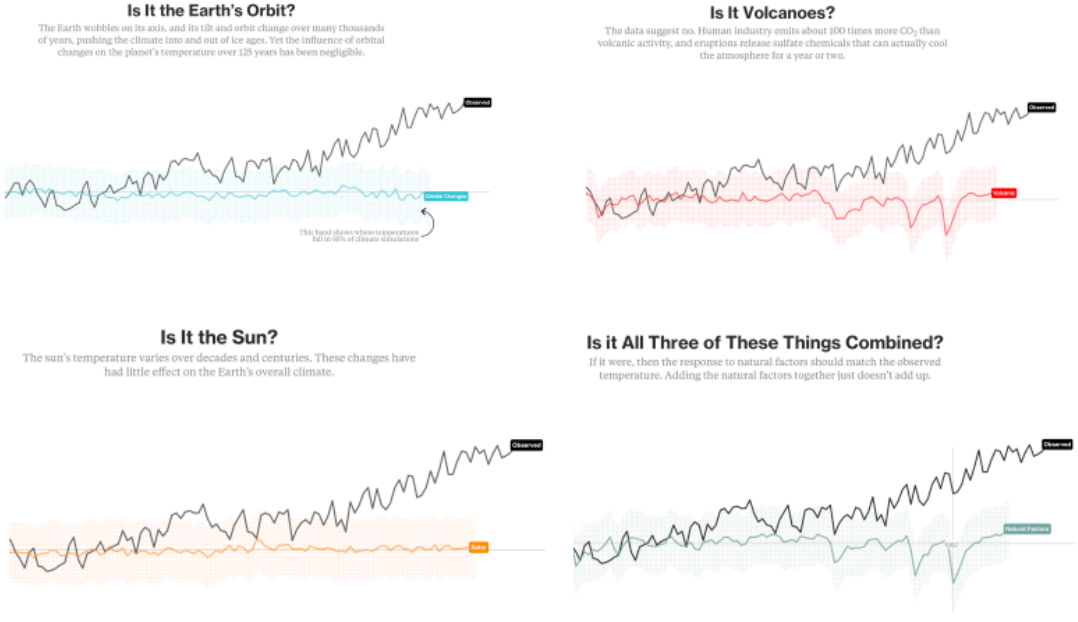
Users find themselves



HELPS ANCHOR VIEWER IN THE PIECE.
MAKES DATA MORE PERSONALLY RELEVANT.

2016 LYN BARTRAM, BENJAMIN BACH, JEREMY BOY, PAULO CIUCCARELLI, STEVEN DRUCKER, YURI ENGELHARDT, ULRIKE KOEPPEN, MORITZ STEFANER, BARBARA TVERSKY, & JO WOOD.

Again, and again…



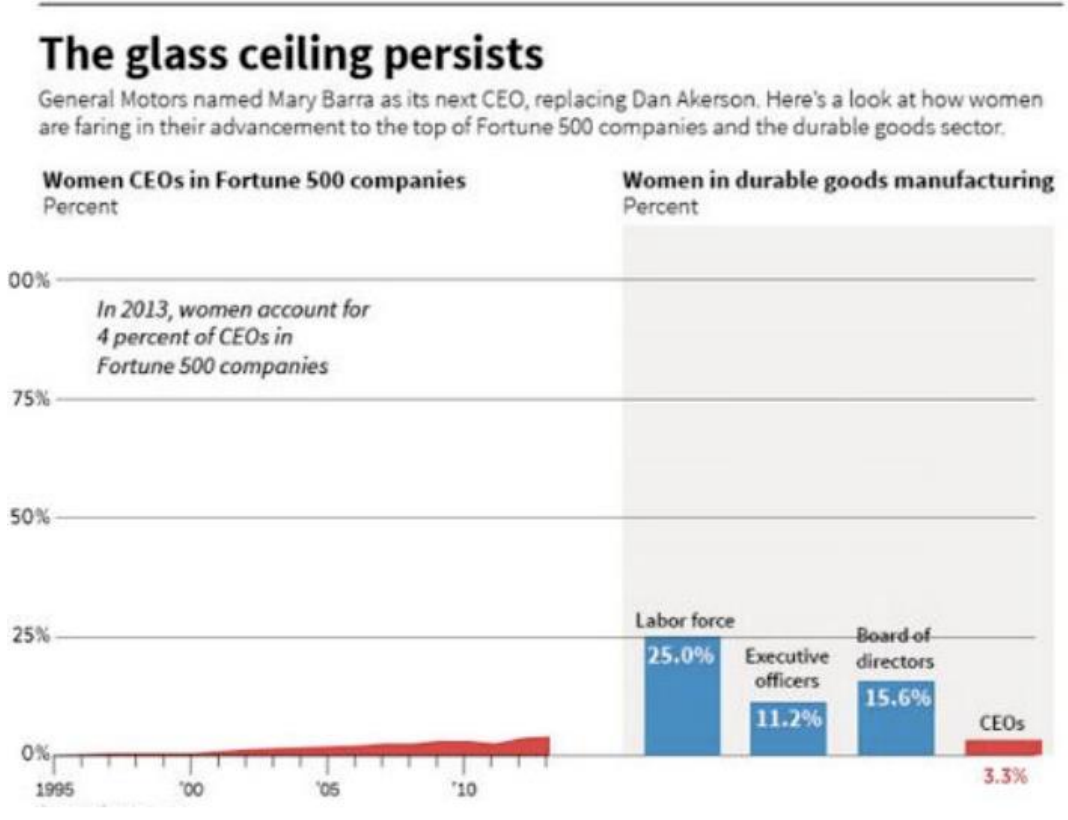
SHOW SAME PHENOMENON OVER AND OVER, CHANGING ONLY ONE VARIABLE.

RHYTHM STRENGTHENS THE NARRATIVE.

REPEATED DISAPPOINTMENT SETS UP THE FINAL REVEAL.

2016 LYN BARTRAM, BENJAMIN BACH, JEREMY BOY, PAULO CIUCCARELLI, STEVEN DRUCKER, YURI ENGELHARDT, ULRIKE KOEPPEN, MORITZ STEFANER, BARBARA TVERSKY, & JO WOOD.

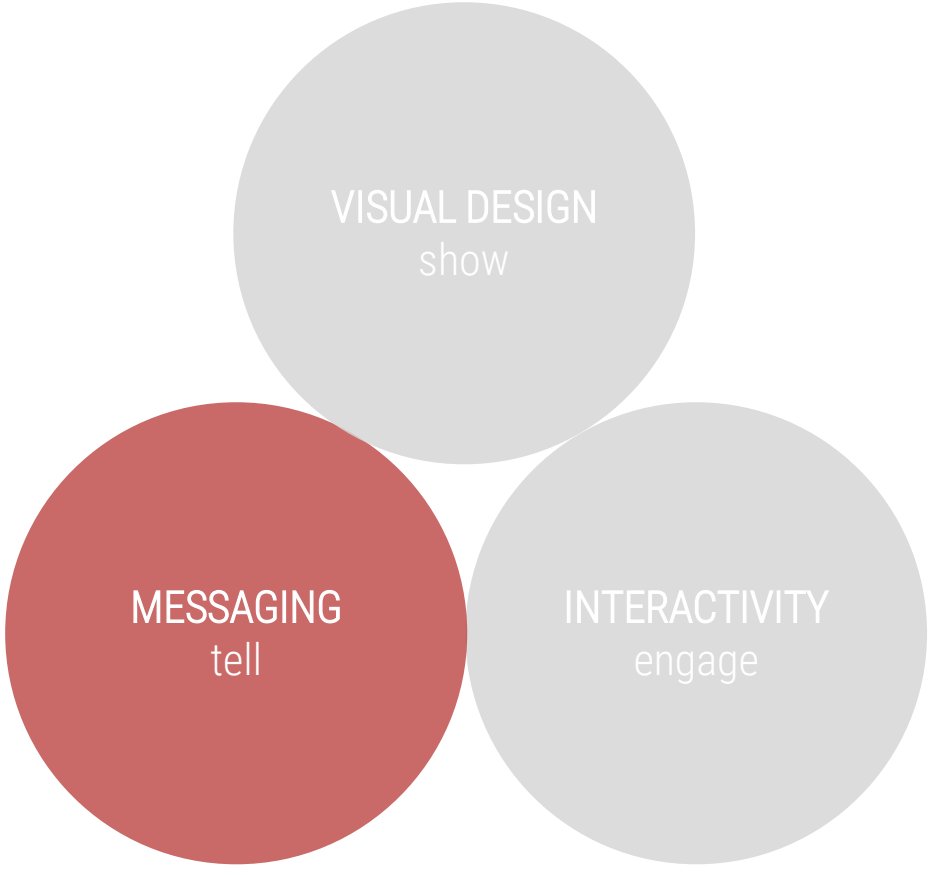
Break conventions



PURPOSEFULLY BREAK CONVENTIONS OF CHART DESIGN.

BREAKING EXPECTATIONS CAN BE USED TO UNDERLINE PARTICULAR INTERPRETATIONS.

2016 LYN BARTRAM, BENJAMIN BACH, JEREMY BOY, PAULO CIUCCARELLI, STEVEN DRUCKER, YURI ENGELHARDT, ULRIKE KOEPPEN, MORITZ STEFANER, BARBARA TVERSKY, & JO WOOD.

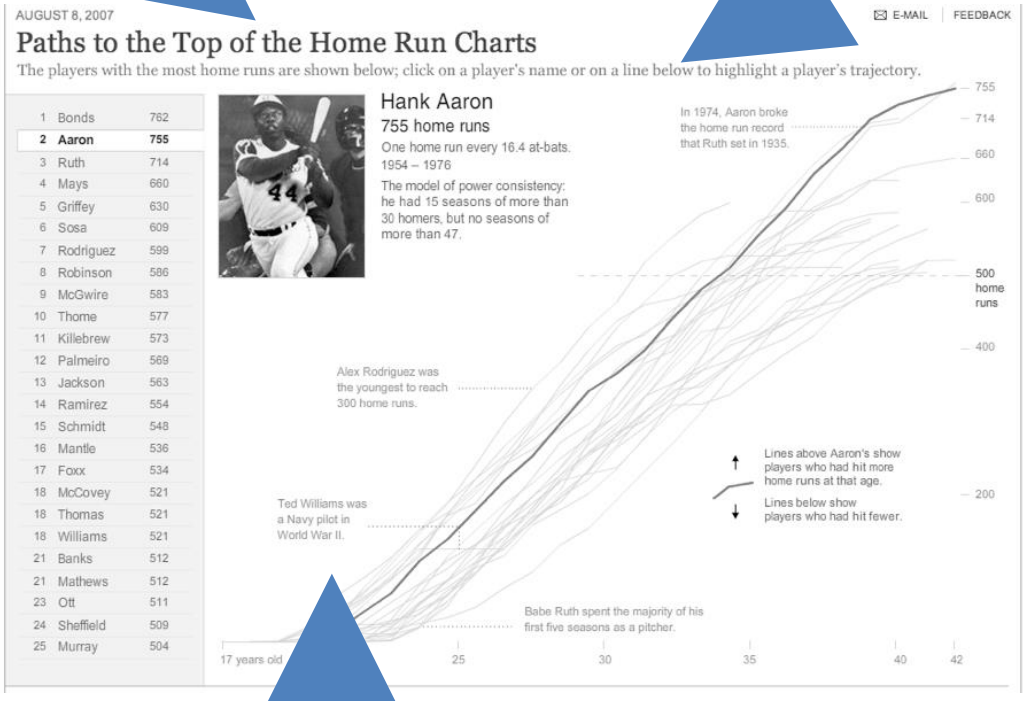

VISUAL DESIGN
show
MESSAGING
tell
INTERACTIVITY
engage

HEADLINE

CAPTION

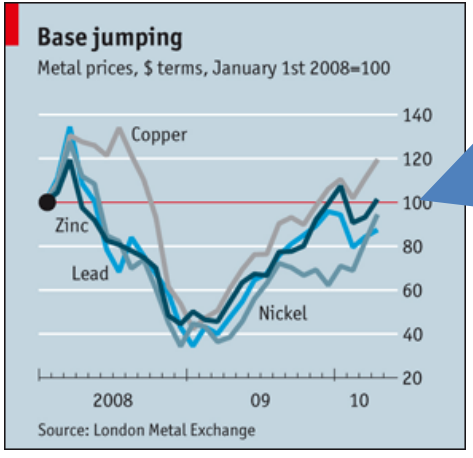
USE HEADLINES, CAPTIONS, & ANNOTATIONS

QUICKLY DRAW ATTENTION TO WHAT'S IMPORTANT.



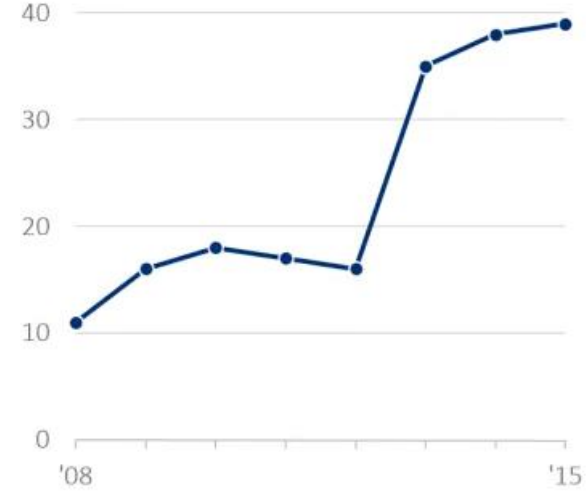
ANNOTATION

MARK FOR EMPHASIS



DESCRIPTIVE TITLES AND ANNOTATIONS CAN BE THE DIFFERENCE BETWEEN A CHART AND A STORY

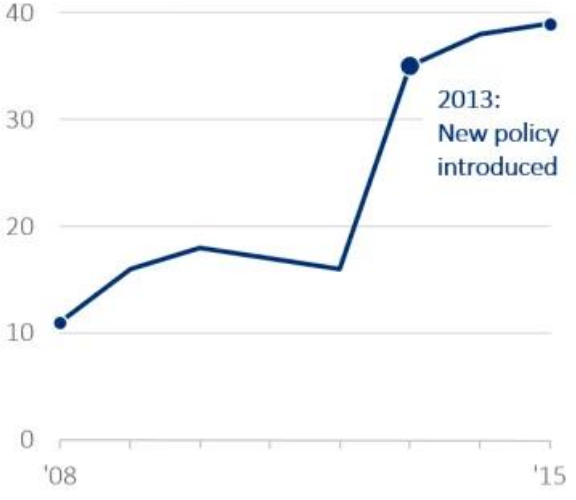
Number of studies funded each year



or

We're funding more studies each year

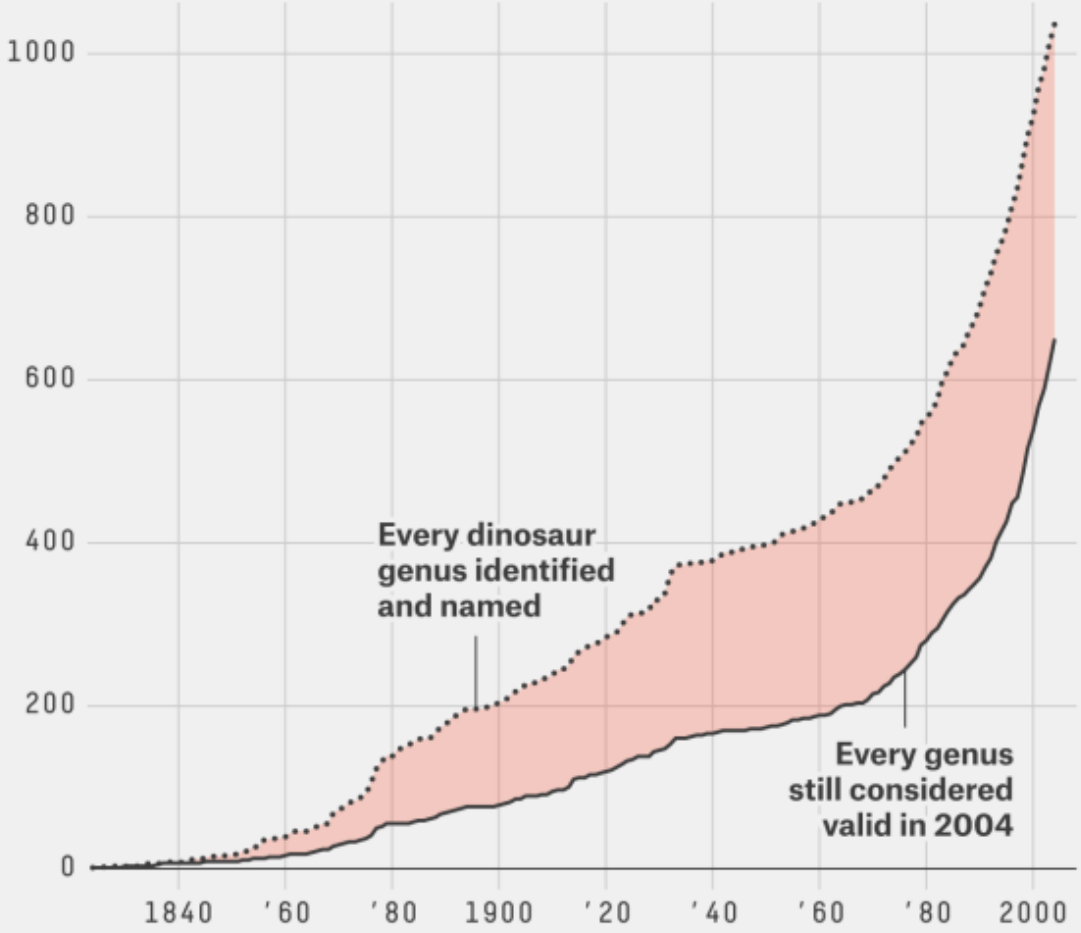
Beginning in 2013, we set aside new funding to measure the effectiveness of our initiatives – and we evaluated 39 of our programs in 2015 alone.



s

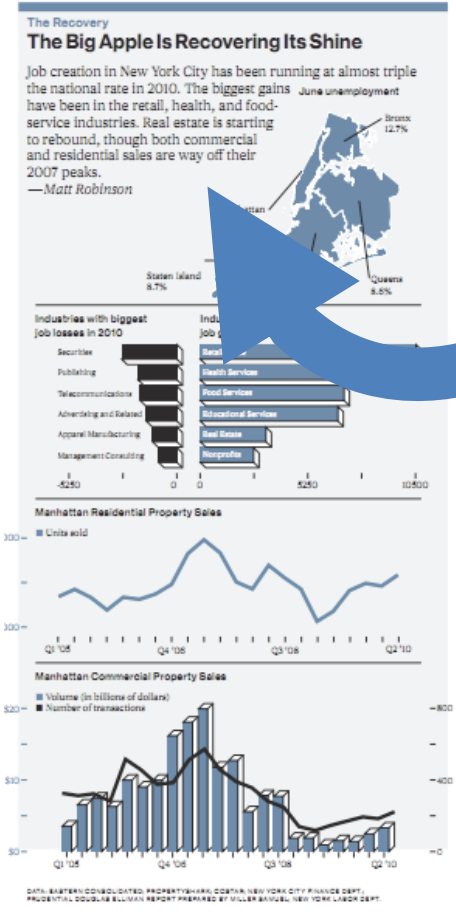
Dinosaurs named, then unnamed

By 2004, about 37 percent of every dinosaur genus ever identified and named had had its genus status revoked



FIVETHIRTYEIGHT

SOURCE: PALEOBIOLOGY



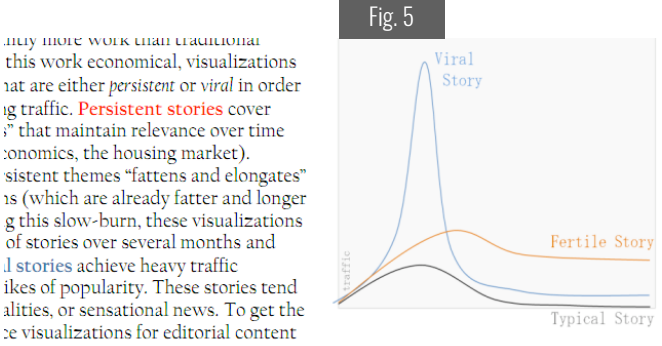
ISOLATED

WEAVE TEXT INTO THE GRAPHIC, NOT JUST AT THE BEGINNING.

TEXT AND GRAPHICS WORK BETTER TOGETHER THAN APART.

CONNECT THE TEXT TO RELEVANT GRAPHICS

"SEE FIG. 5"



The Endorsement Primary

In presidential primaries, endorsements have been among the best predictors of which candidates will succeed and which will fail. So we're keeping track.

By AARON BYCOFFE

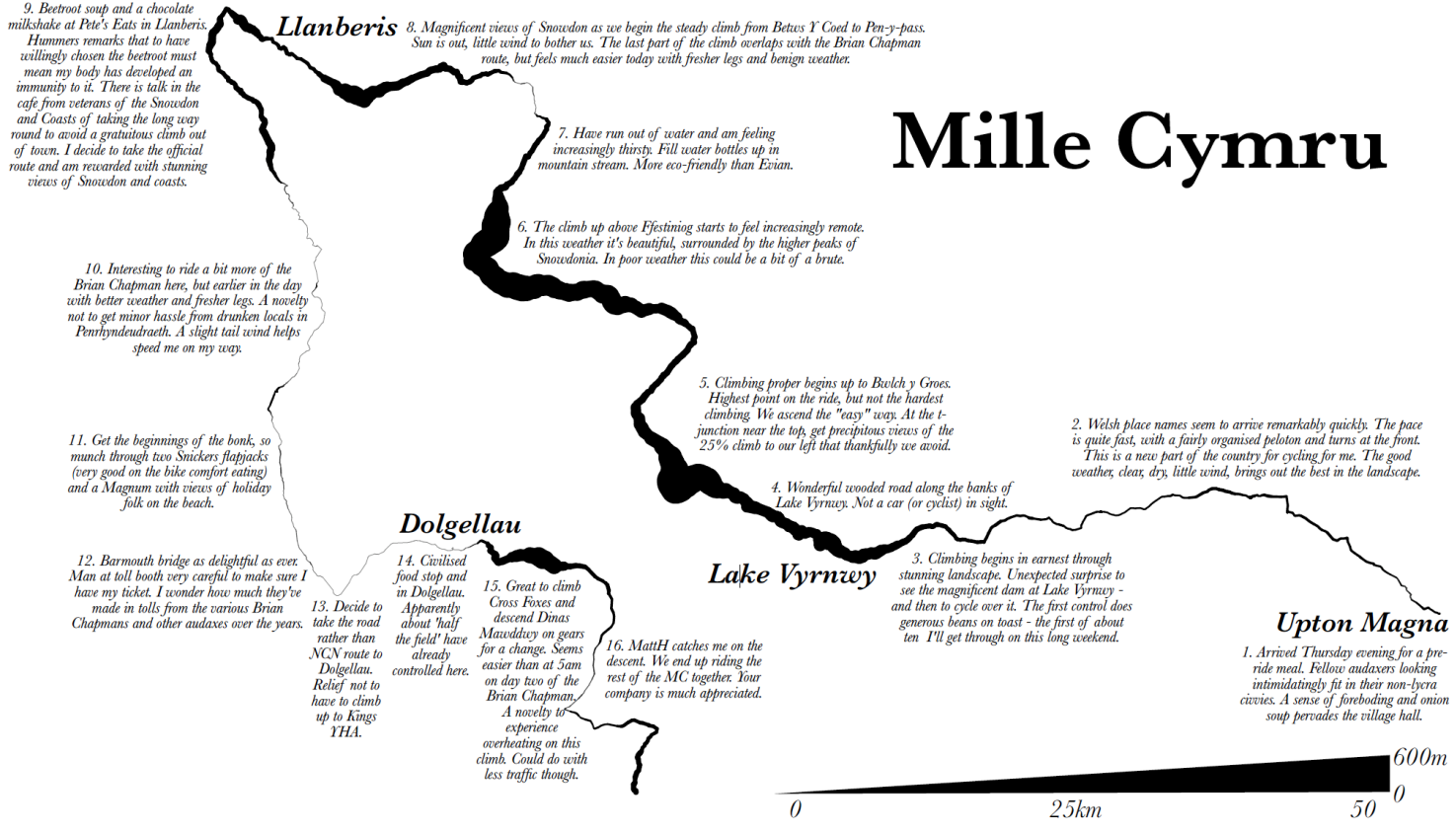
UPDATED 11:27 A.M. EST | MAR 3

CANDIDATE	REPRESENTATIVES 1 POINT EACH	SENATORS 5 POINTS EACH	GOVERNORS 10 POINTS EACH	TOTAL POINTS
Marco Rubio				168
Ted Cruz				34
John Kasich				31
Donald Trump				29

CANDIDATE	REPRESENTATIVES 1 POINT EACH	SENATORS 5 POINTS EACH	GOVERNORS 10 POINTS EACH	TOTAL POINTS
Hillary Clinton				478
Bernie Sanders				5

Before any votes are cast, presidential candidates compete for the support of influential members of their party, especially elected officials like U.S. representatives, senators and governors. During the period

REMOVE DETAIL TO CREATE SPACE FOR THE STORY.



JO WOOD 2016

Published: January 8, 2010

A Peek Into Netflix Queues

Examine Netflix rental patterns, neighborhood by neighborhood, in a dozen cities. Some titles with distinct patterns are Mad Men, Obsessed and Last Chance Harvey. Comments (135)

100 titles that were frequently rented from Netflix in 2009

◄ Previous | Next ► | Most rented — Least rented

Change how movies are sorted: **Most rented** | Alphabetical | By metascore

Mad Men: Season 1: Disc 1

77

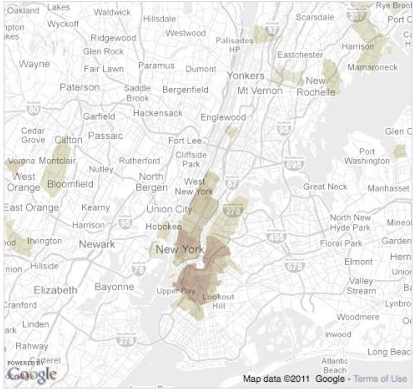
Metacritic score

100=loved by critics, 0=hated

There were seven deadly sins practiced at the dawn of the 1960s: smoking, drinking, adultery, sexism, homophobia, anti-Semitism and racism. The magic of "Mad Men" is that it softly spoofs those cruel, antiquated mores without draining away the romance of that era: the amber-lit bars and indigo nightclubs, soaring skyscrapers, and the brash confidence that comes with winning a war and owning the world.

Read Rest of NYT Review »

The ZIP codes are shaded according to each movie's rank. Ranked No. 1 — No. 50



Sources: Netflix provided data on the top 50 rentals in 2009 in each ZIP code. Titles are listed in the approximate order of popularity across selected metropolitan areas. Metascores are from metacritic.com.

START WITH AN INTERESTING VIEW.

CURATE THE EXPERIENCE FROM THE BEGINNING.

MAKE DATA RELATABLE & PUT NUMBERS AND FACTS IN CONTEXT.

260 THOUSAND SQUARE MILES? "IT'S THE SIZE OF FRANCE!"

Wetlands Destruction

Coastal marshes absorb fertilizer runoff from farms and buffer civilization from Gulf storms.

Losses in coastal watersheds, 1998 to 2004

Great Lakes	**20,000**	acres
Atlantic	**110,000**	acres

Aug 16, 2010

MIND YOUR PRECISION.

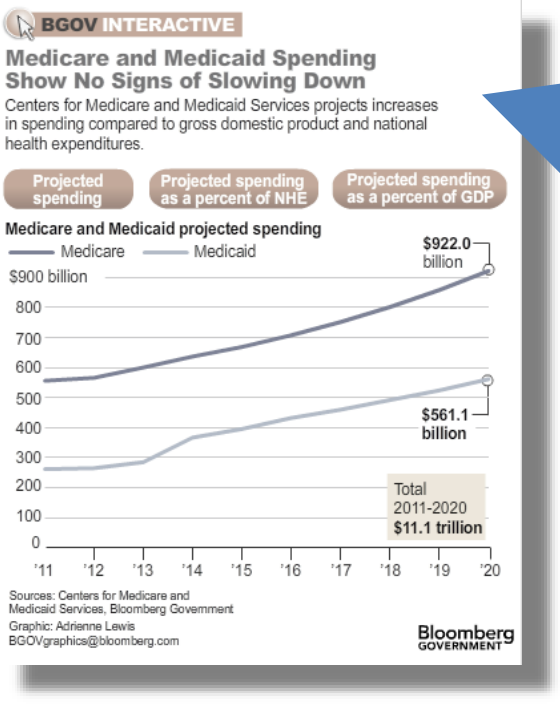
SIGNIFICANT DIGITS, TICK MARKS, AND LABELS SUGGEST WHAT DESERVES ATTENTION.

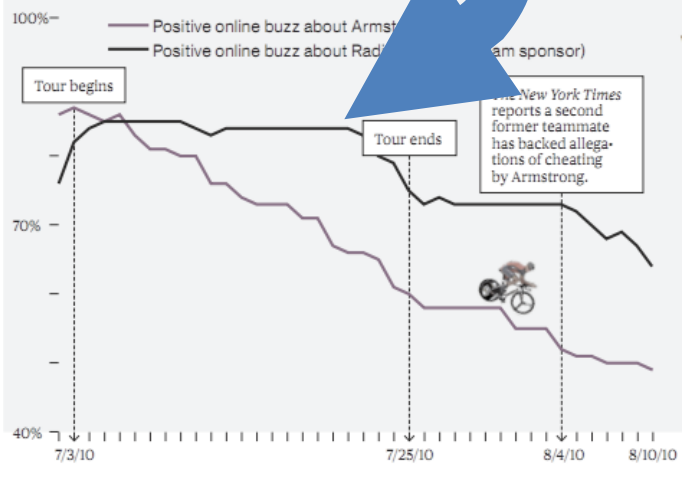
Representative	District	Fiscal 2010 contract spending
Mike Coffman	Colo. 6	$3.26 billion
Doug Lamborn	Colo. 5	2.98 billion
Rob Bishop	Utah 1	2.76 billion
Kenny Marchant	Texas 24	2.58 billion
Jeff Duncan	S.C. 3	2.40 billion
Sandy Adams	Fla. 24	2.36 billion
Lamar Smith	Texas 21	1.65 billion
Steve Scalise	La. 1	1.49 billion
Jeff Landry	La. 3	1.47 billion
Roscoe Bartlett	Md. 6	billion
John Carter	Texas 31	illion

TOO PRECISE

THOUGHTFUL

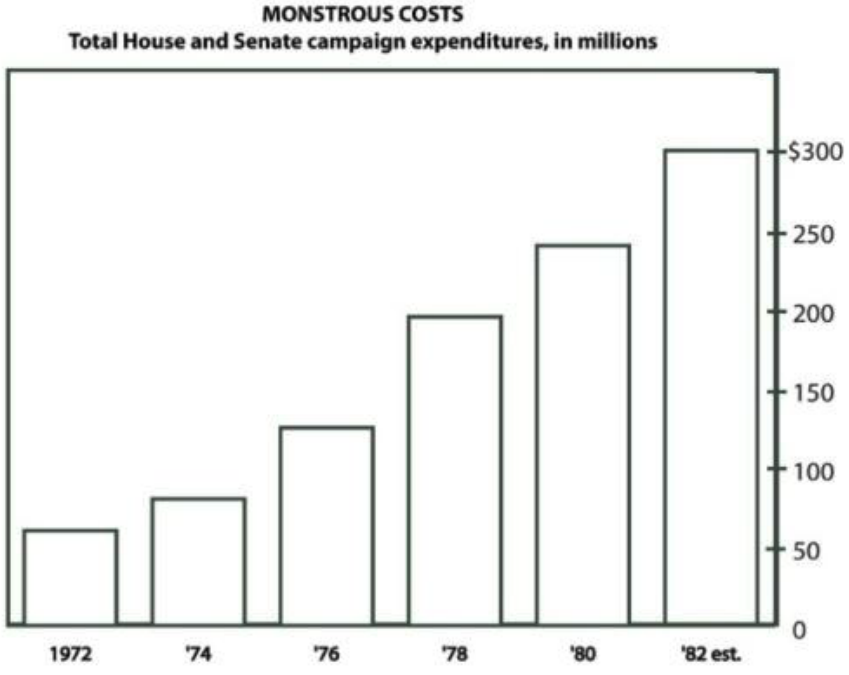
FINE





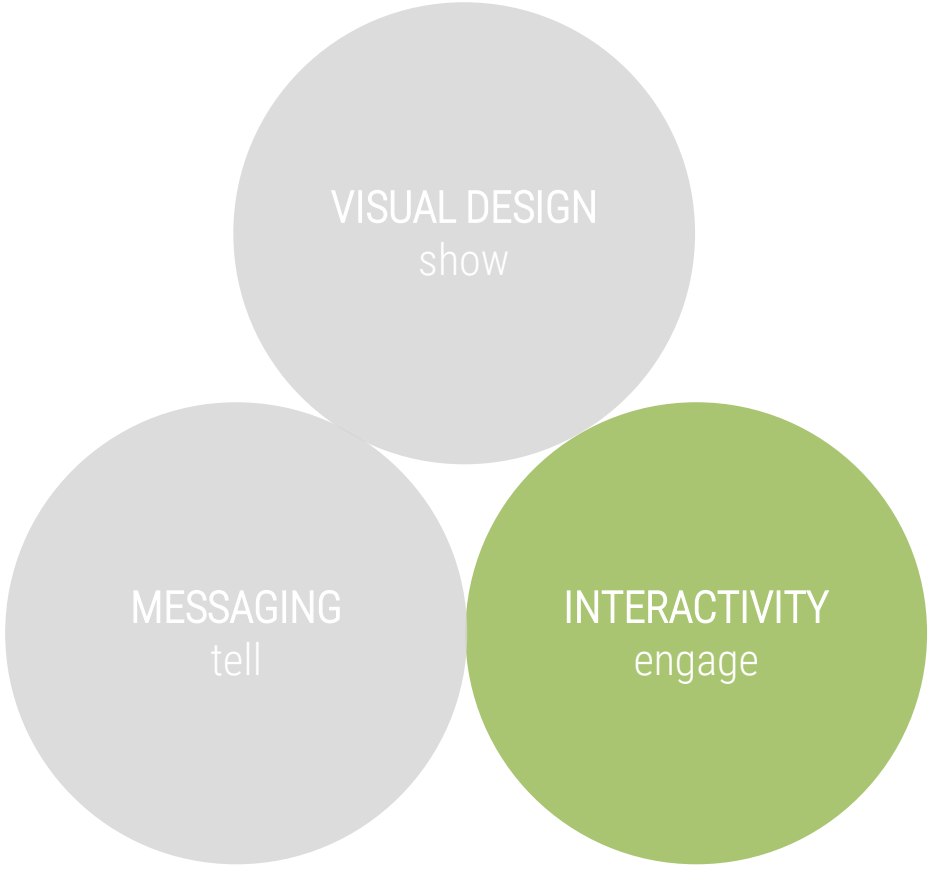
USE EMBELLISHMENTS SPARINGLY & CAREFULLY.

STYLISED VISUALS CAN BE ENGAGING BUT ARE HARD TO GET RIGHT.



NIGEL HOLMES

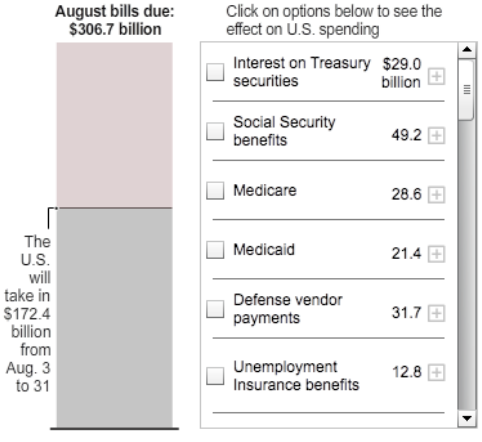
IT’S IMPORTANT TO REALLY UNDERSTAND THE RULES OF GOOD VISUAL COMMUNICATION BEFORE YOU TRY TO BREAK THEM.


VISUAL DESIGN
show
MESSAGING
tell
INTERACTIVITY
engage

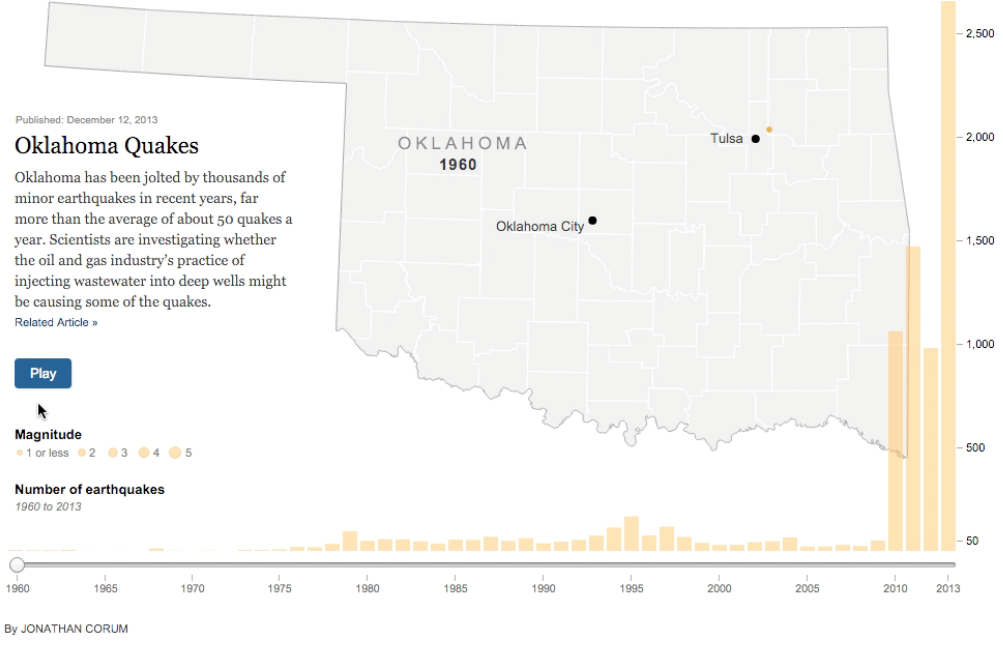
INTERACTIVE FEATURES SHOULD SUGGEST INTERACTIVITY.

AVOID A CLICK-AND-SEEK EXPERIENCE.

FAMILIAR WIDGETS

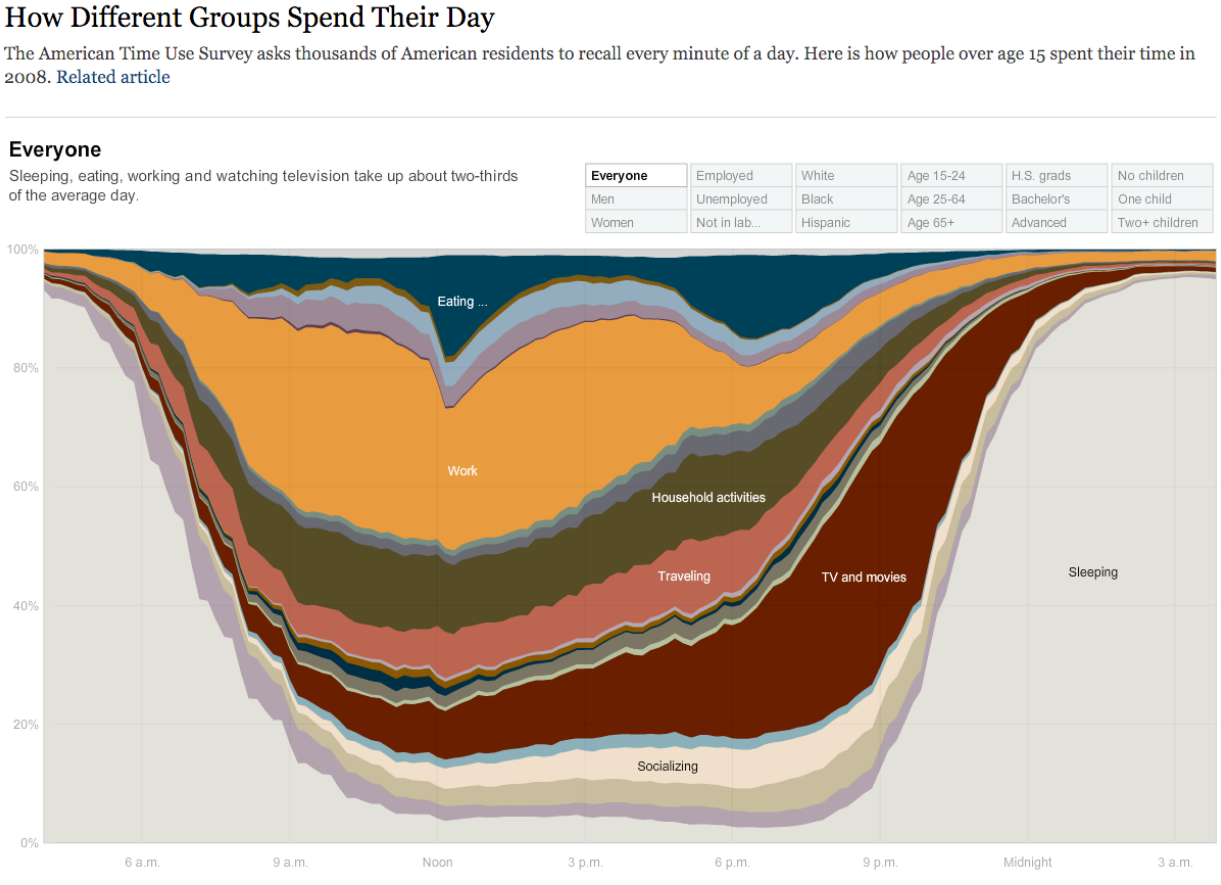


VISUAL FEEDBACK ON PAGE LOAD OR PLAY

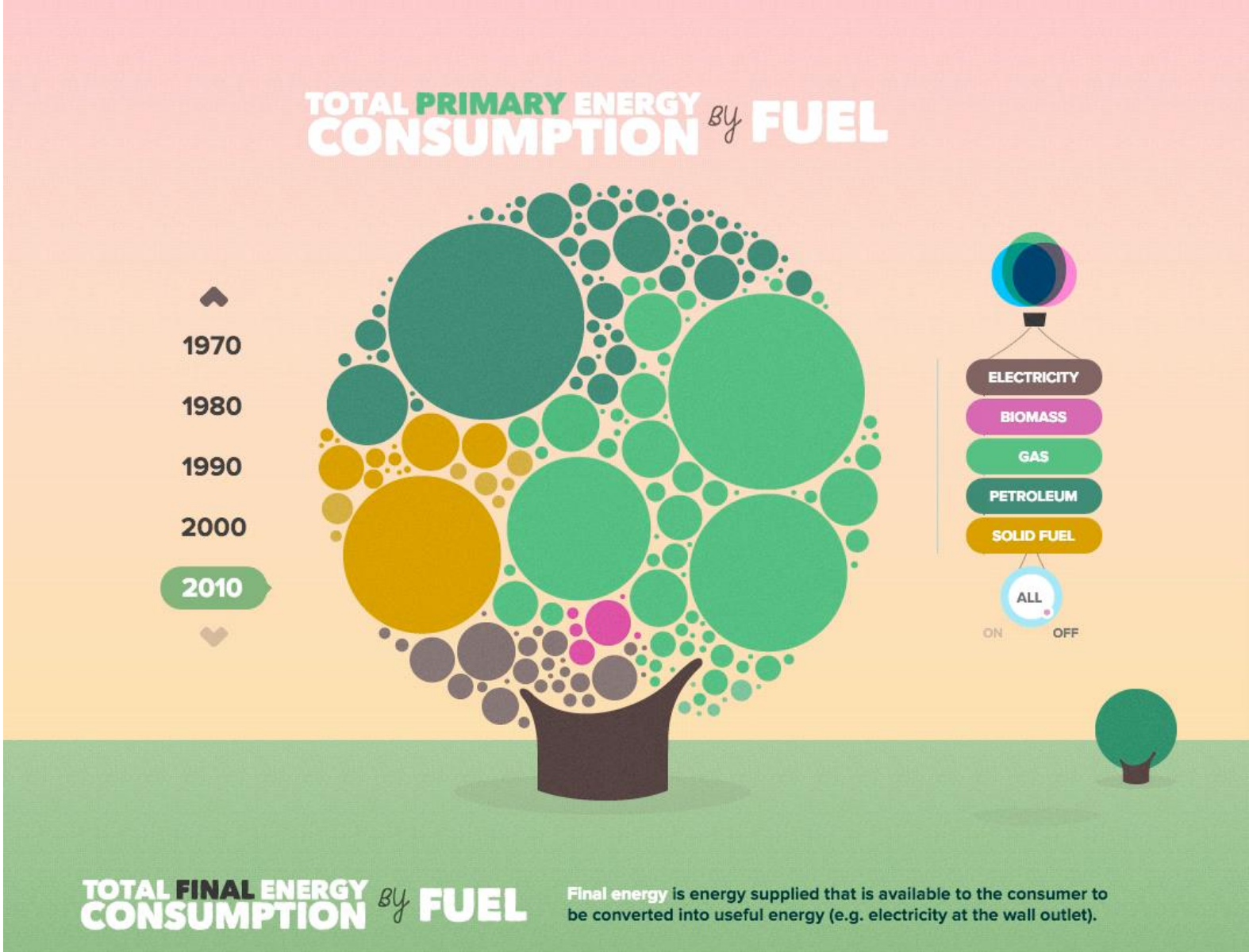


INCLUDE EASY WAYS TO GO BACK / RESET LINEAR NAVIGATION CAN SIMPLIFY THIS.

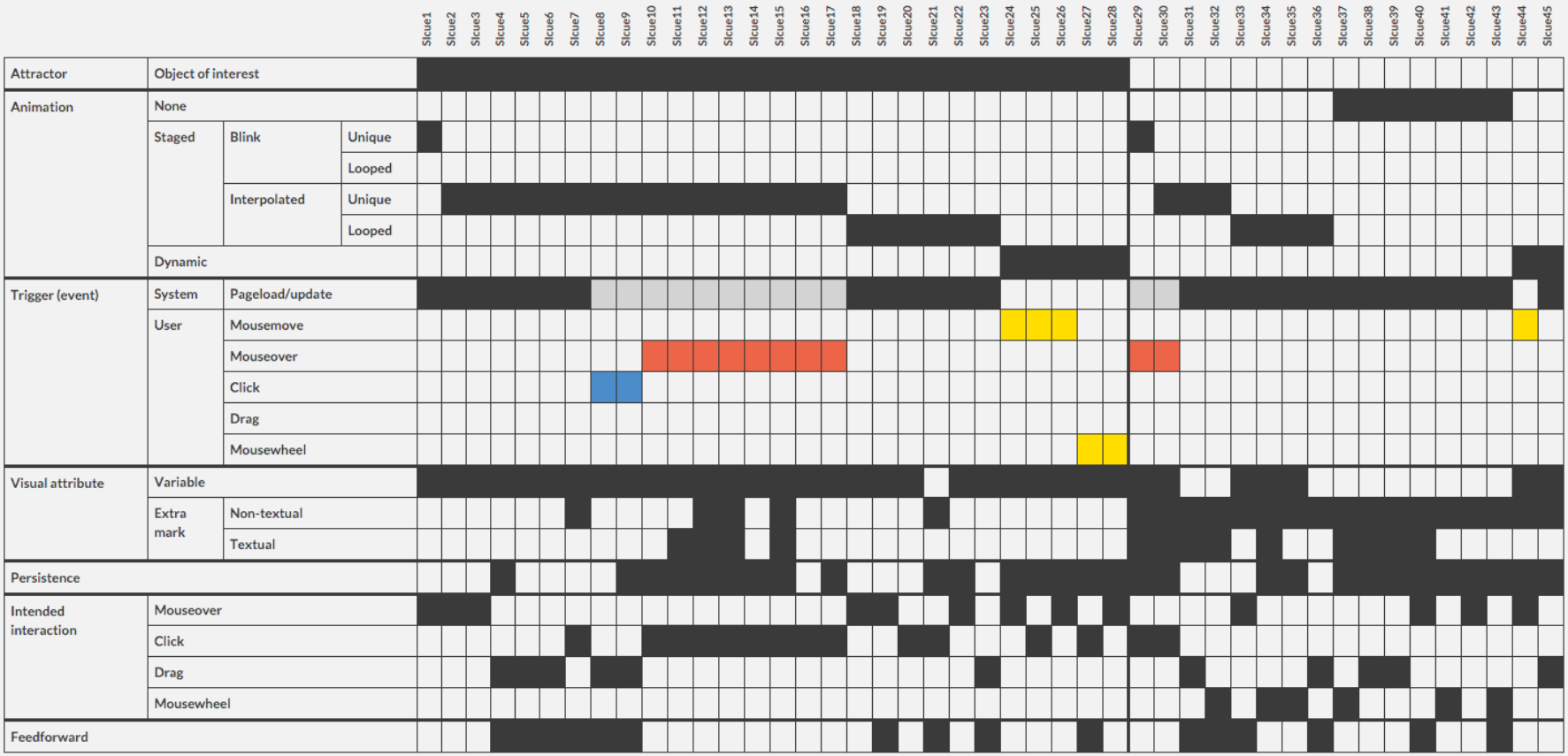
RESTRICT INTERACTION TO KEY DIMENSIONS. THE MORE INTERACTIVITY, THE LESS STORY.



USE MOTION & OTHER CUES TO SUGGEST INTERACTION



Suggested Interactivity



JEREMY BOY ET AL. 2015

LOTS OF INTERACTIVE EXAMPLES AT http://peopleviz.gforge.inria.fr/trunk/SI_cues/

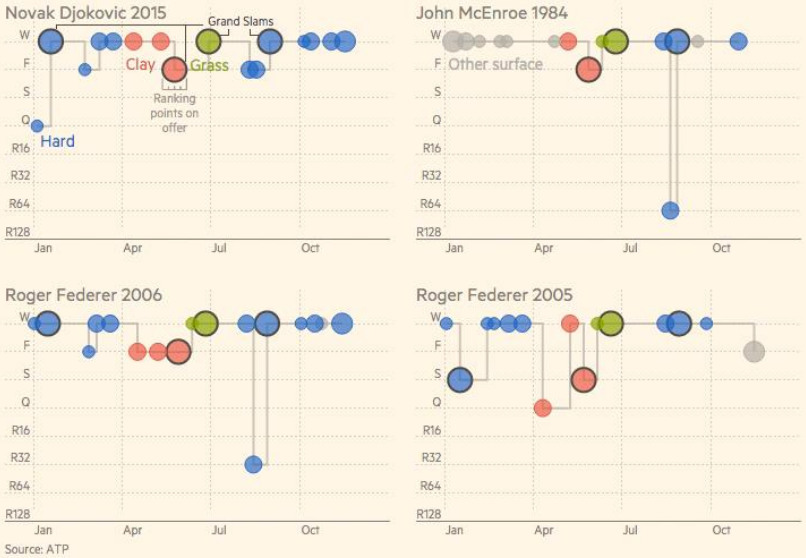
“SCROLLJACKING”

HIJACKING IN-BROWSER SCROLLING TO ADVANCE A LINEAR NARRATIVE.

SMOOTH AND LINEAR
EASY FORWARD/BACK
MORE BROWSABLE THAN VIDEO
CROSS-PLATFORM
CAN BREAK THE SCROLLBAR

FINANCIAL TIMES

Djokovic’s 2015 was the greatest ever men's tennis season



John Burn-Murdoch • January 27, 2016

If Novak Djokovic wins the Australian Open title this weekend, he will in doing so extend the most impressive streak ever in men's tennis.

When the current world number one won the Qatar Open earlier this month, it marked the 16th consecutive tournament he had entered in which he reached the final -- a run stretching back exactly one year to a quarter-final defeat at the same event.

CLICKING IS A DECISION

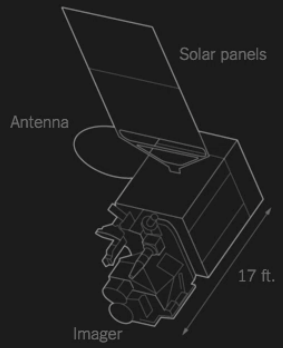
SCROLLING IS A CONTINUATION

JOSHUA PORTER

Japan's New Satellite Captures an Image of Earth Every 10 Minutes

By DEREK WATKINS JULY 10, 2015

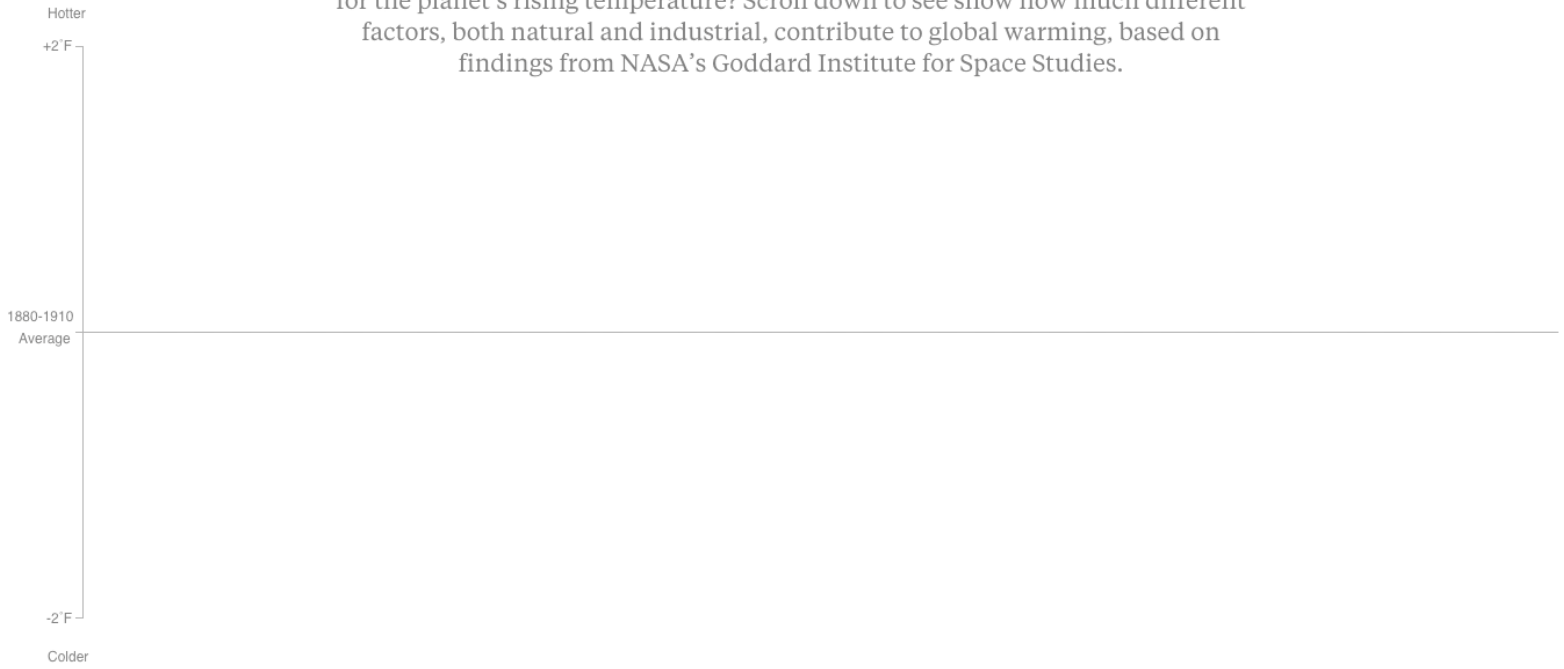
A sense of perspective is unavoidable from 22,000 miles out. Looking down at Earth from that distance — almost three times farther than the diameter of the planet itself — allows a view of the globe as a massive organic system, pulsing with continuous movement. Below, images from the Himawari-8 weather satellite's first official day paint a living portrait of the western Pacific, with Typhoons Chan-hom and Nangka spinning slowly westward.



What's Really Warming the World?

By Eric Roston and Blacki Migliozzi | June 24, 2015

Skeptics of manmade climate change offer various natural causes to explain why the Earth has warmed 1.4 degrees Fahrenheit since 1880. But can these account for the planet's rising temperature? Scroll down to see show how much different factors, both natural and industrial, contribute to global warming, based on findings from NASA's Goddard Institute for Space Studies.



Scroll Events

Detecting The Scroll

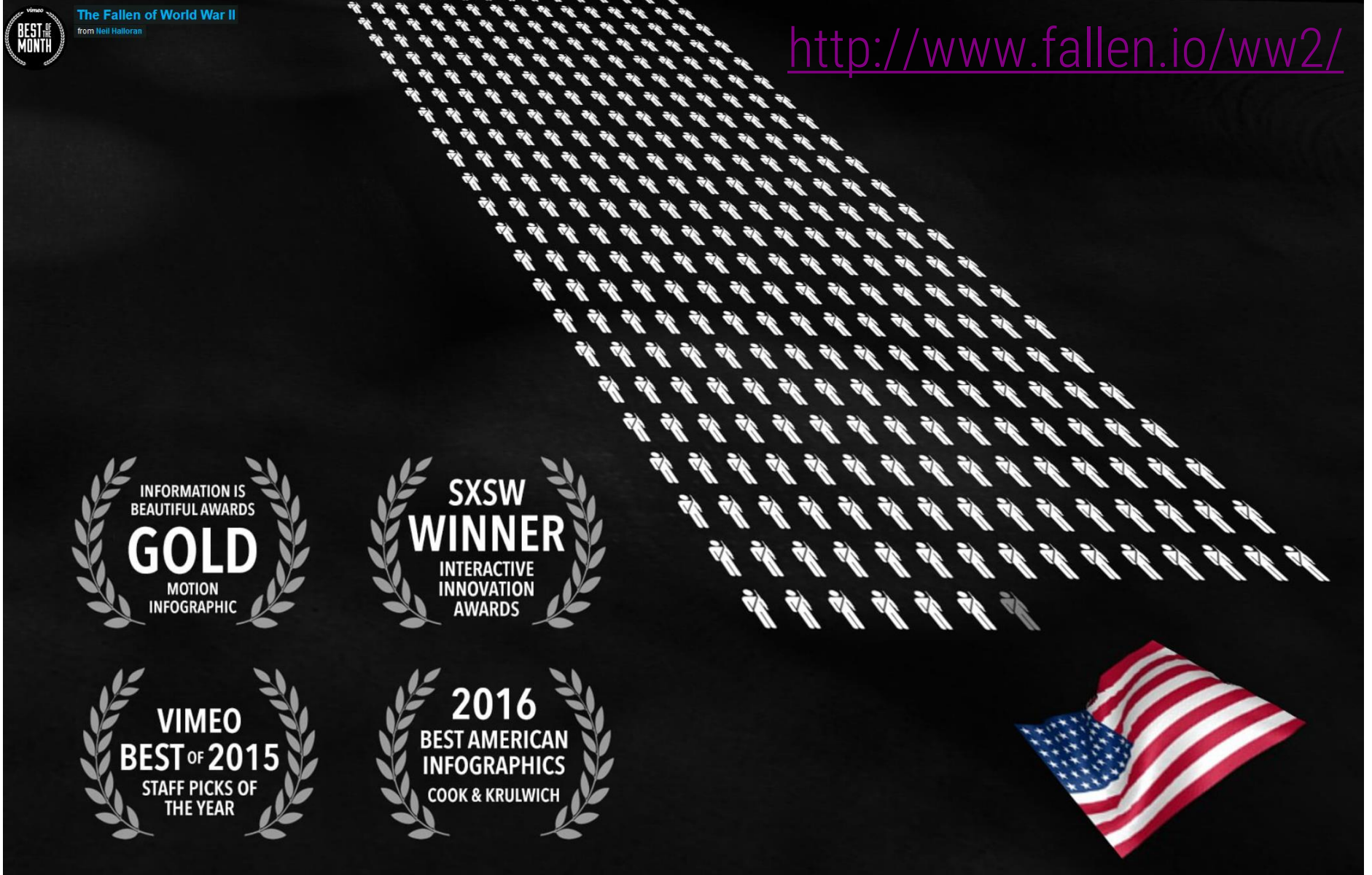
JIM VALLANDINGHAM http://vallandingham.me/scroll_talk/

“Data journalism is not graphics and visualizations. It's about telling the story in the best way possible. Sometimes that will be a visualization ...But sometimes it's a news story. Sometimes, just publishing the number is enough.”

SIMON ROGERS, THE GUARDIAN // 2011

"I think people have begun to forget how powerful human stories are, exchanging their sense of empathy for a fetishistic fascination with data... The human stuff is the main stuff, and the data should enrich it."

JONATHAN HARRIS // 2008

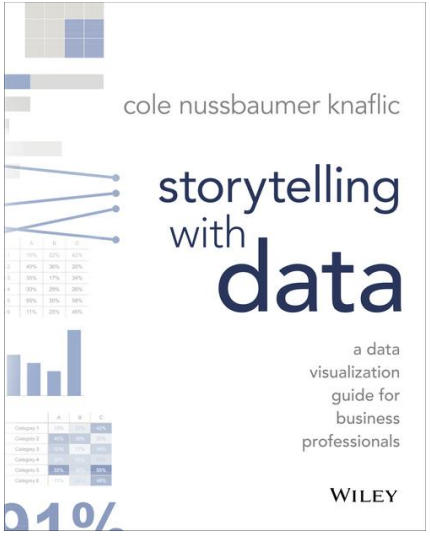

vimeo
BEST OF THE MONTH
The Fallen of World War II
from Neil Halloran
http://www.fallen.io/ww2/
INFORMATION IS BEAUTIFUL AWARDS
GOLD
MOTION INFOGRAPHIC
SXSW
WINNER
INTERACTIVE INNOVATION AWARDS
VIMEO
BEST OF 2015
STAFF PICKS OF THE YEAR
2016
BEST AMERICAN INFOGRAPHICS
COOK & KRULWICH

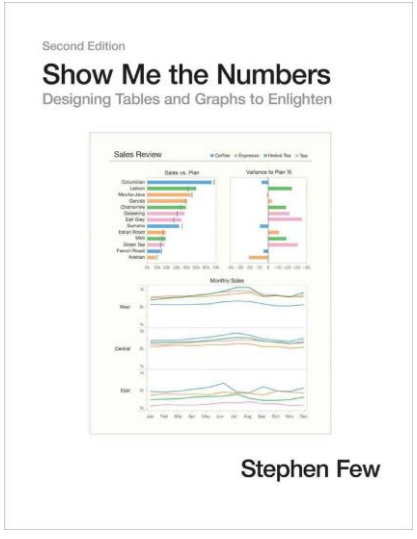
QUESTIONS?

ACKNOWLEDGEMENTS

Slides in were inspired and adapted from

- slides by Wesley Willett (University of Calgary)
- content of the books on the right

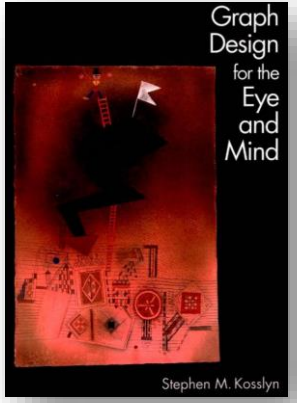
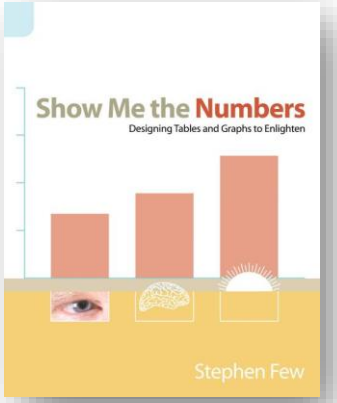
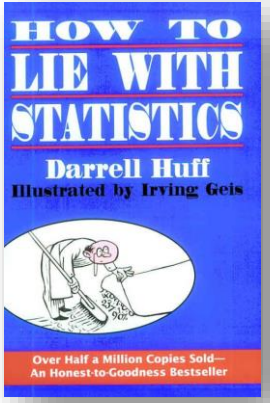
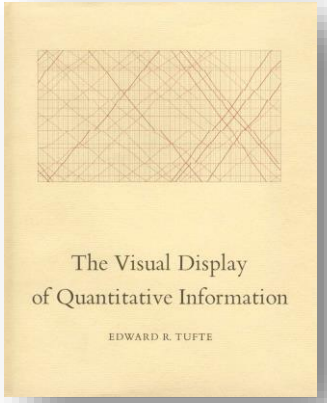
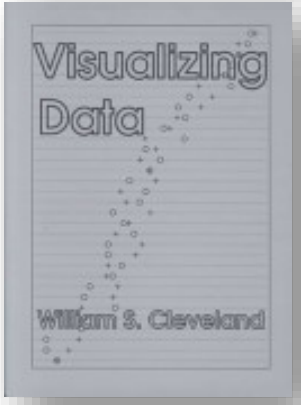
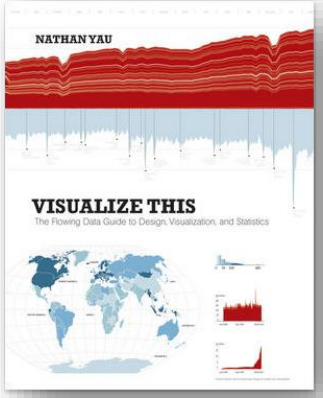




RECAP

- MAXIMIZE THE DATA-INK RATIO
- AVOID CHART JUNK (*SOMETIMES*)
- LAYER INFORMATION
- MAXIMIZE THE DATA DENSITY
  - *SHRINK THE GRAPHICS*
  - *MAXIMIZE THE AMOUNT OF DATA SHOWN* (*SOMETIMES*)

EDWARD TUFTE

DESIGN PRINCIPLES

MANY MORE EXIST…