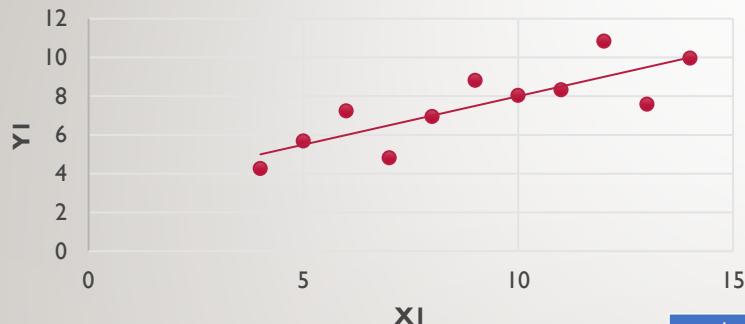


DATA VISUALISATION

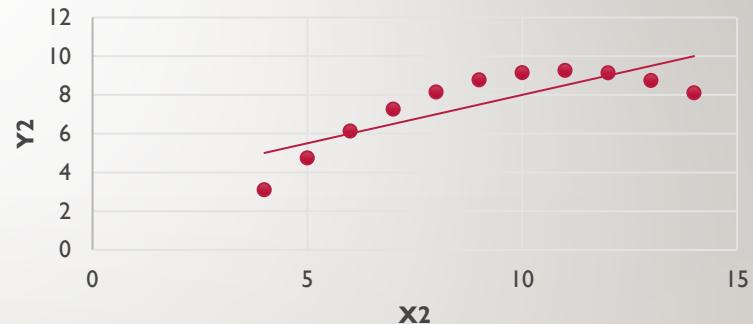
BIG DATA ANALYTICS
AND VISUALISATION

VISUALISING DATA

General Tendency

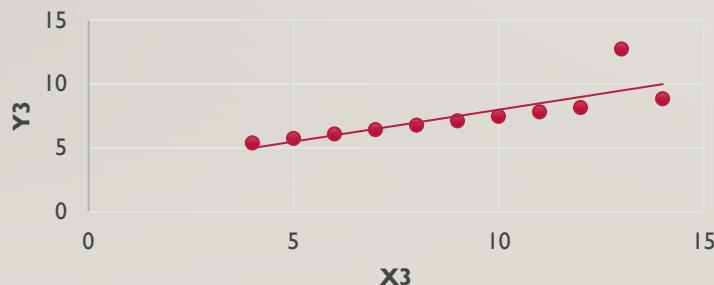


Curvature Pattern

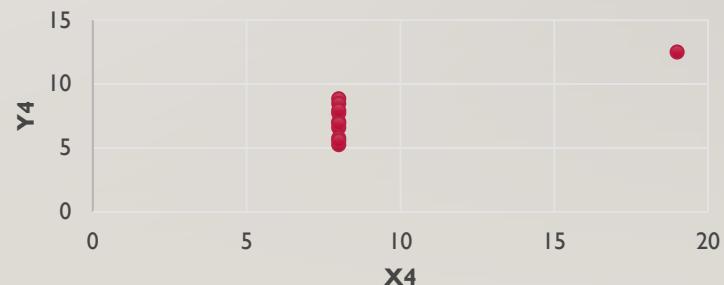


	I	II	III	IV	
X	Y	X	Y	X	Y
10.0	8.04	10.0	9.14	10.0	7.46
8.0	6.95	8.0	8.14	8.0	6.77
13.0	7.58	13.0	8.74	13.0	12.74
9.0	8.81	9.0	8.77	9.0	7.11
11.0	8.33	11.0	9.26	11.0	7.81
14.0	9.96	14.0	8.10	14.0	8.84
6.0	7.24	6.0	6.13	6.0	6.08
4.0	4.26	4.0	3.10	4.0	5.39
12.0	10.84	12.0	9.13	12.0	8.15
7.0	4.82	7.0	7.26	7.0	6.42
5.0	5.68	5.0	4.74	5.0	5.73
					8.0
					6.89

Strong Linear Pattern



Strong Linear Pattern



**“THE GREATEST VALUE OF A
PICTURE IS WHEN IT FORCES
US TO NOTICE WHAT WE
NEVER EXPECTED TO SEE.”**

John W Tukey (*Exploratory Data Analysis*)

VISUALISATION AS A DISCOVERY TOOL

- Through visualisation, we seek to **portray data** in ways that allow us to see it in a new light, to visually **observe patterns, exceptions, and the possible stories** that sit behind its raw state.

**“NICELY DESIGNED POSTERS
WITH A FEW NUMBERS ON
THEM AREN’T REALLY DATA
VISUALISATION.”**

Amanda Cox
Editor of Upshot, New York Times

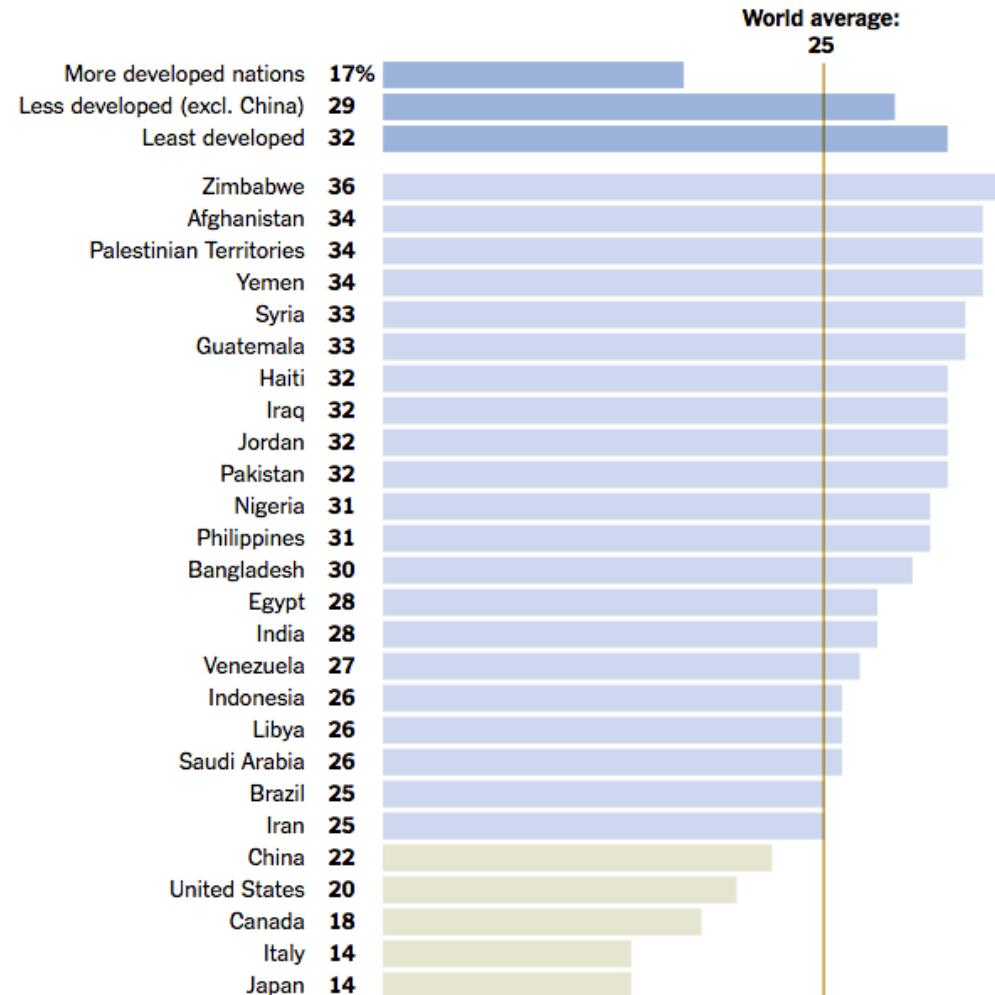
**“[I EMPHASIZE] VISUALIZATIONS THAT
DO SOME WORK; THEY PERSUADE, THEY
EXPLAIN, THEY EXPLORE.**

**BEAUTY IS DESIRABLE, BUT I’M NOT
EXCITED BY PRETTY CHARTS THAT ARE
ALSO PRETTY USELESS.”**

Graham Wills
Data Science and Visualization Expert at IBM

The Youth Bulge

Percent of total population ages 10–24 in 2013.

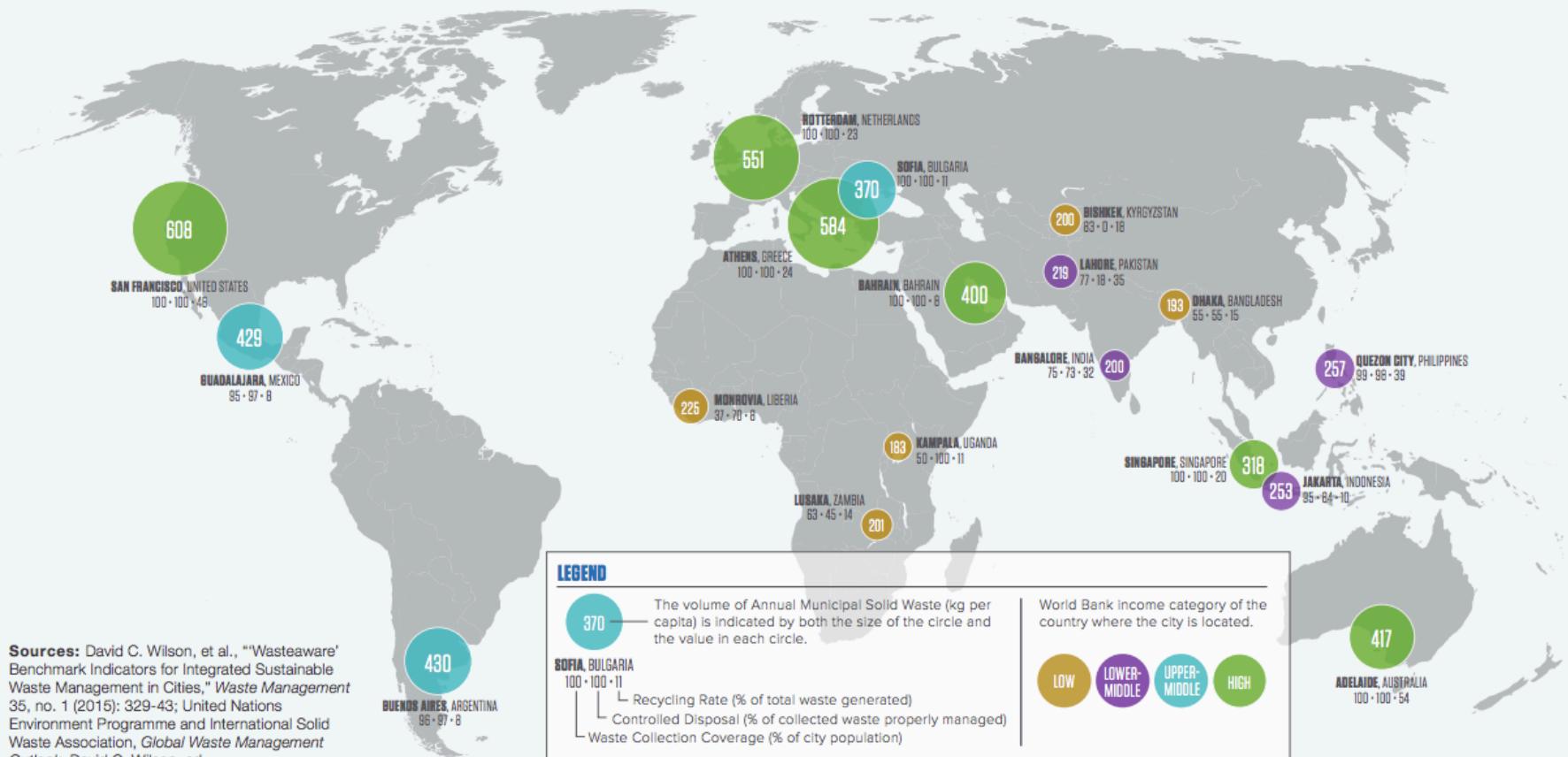


Source: Population Reference Bureau

By The New York Times

Municipal Waste Volumes per Capita Rise With Income

Proper municipal waste disposal is a public health and environmental priority as urban populations grow. City residents without regular refuse collection services risk exposure to contaminants that spread into soil, streets, and water. Uncontrolled dumpsites taint water tables and release airborne toxins as unsorted refuse is burned. Global municipal waste data show that per capita volumes tend to rise with average income levels but negative impacts lessen as wealthier cities improve waste processing systems. While some cities in lower-income countries have expanded collection coverage, many still lag in proper waste processing—or controlled disposal. Collection in Lahore, Pakistan covers 77 percent of the population but only 18 percent of collections go to a controlled disposal facility. Lusaka, Zambia has 63 percent coverage and a 45 percent rate of controlled disposal. Recycling rates reach relatively high levels in some lower-income countries, often due to informal recycling networks.



Sources: David C. Wilson, et al., "'Wasteaware' Benchmark Indicators for Integrated Sustainable Waste Management in Cities," *Waste Management* 35, no. 1 (2015): 329-43; United Nations Environment Programme and International Solid Waste Association, *Global Waste Management Outlook*, David C. Wilson, ed.

THE ART AND SCIENCE OF DATA VISUALISATION

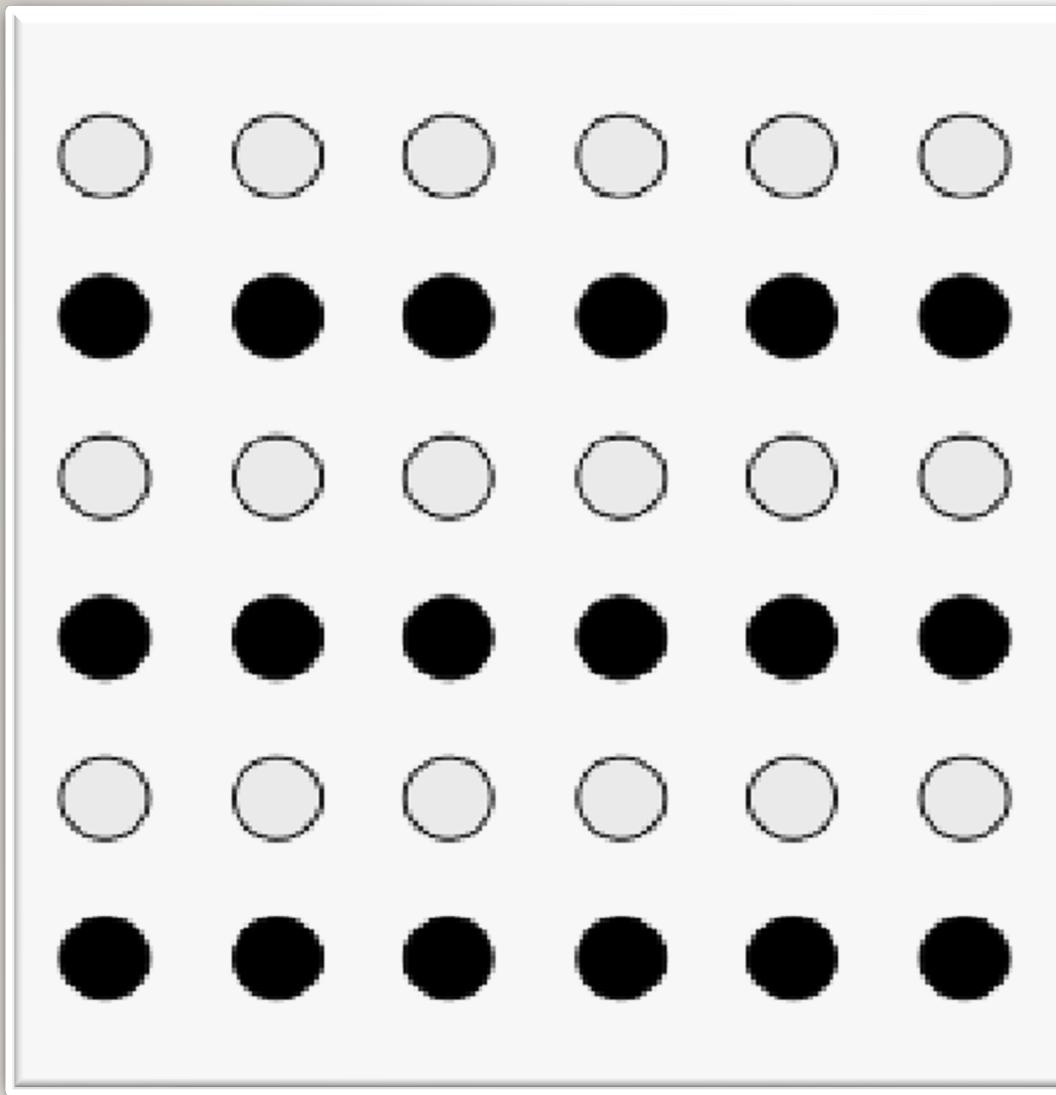
THE ART OF VISUALISATION

- The **art** side of the field refers to the scope for unleashing **design flair and encouraging innovation**, where you strive to design communications that appeal on an **aesthetic** level and then survive in the mind on an **emotional** one.

THE SCIENCE OF VISUALISATION

- The **science** behind visualisation comes in many shapes: the presence of **computer science, mathematics, and statistics**, but one of the key foundations of the subject comes through an understanding of **cognitive science** and in particular, **the study of visual perception** – this concerns how the functions of the eye and the brain work together to process information as visual signals.

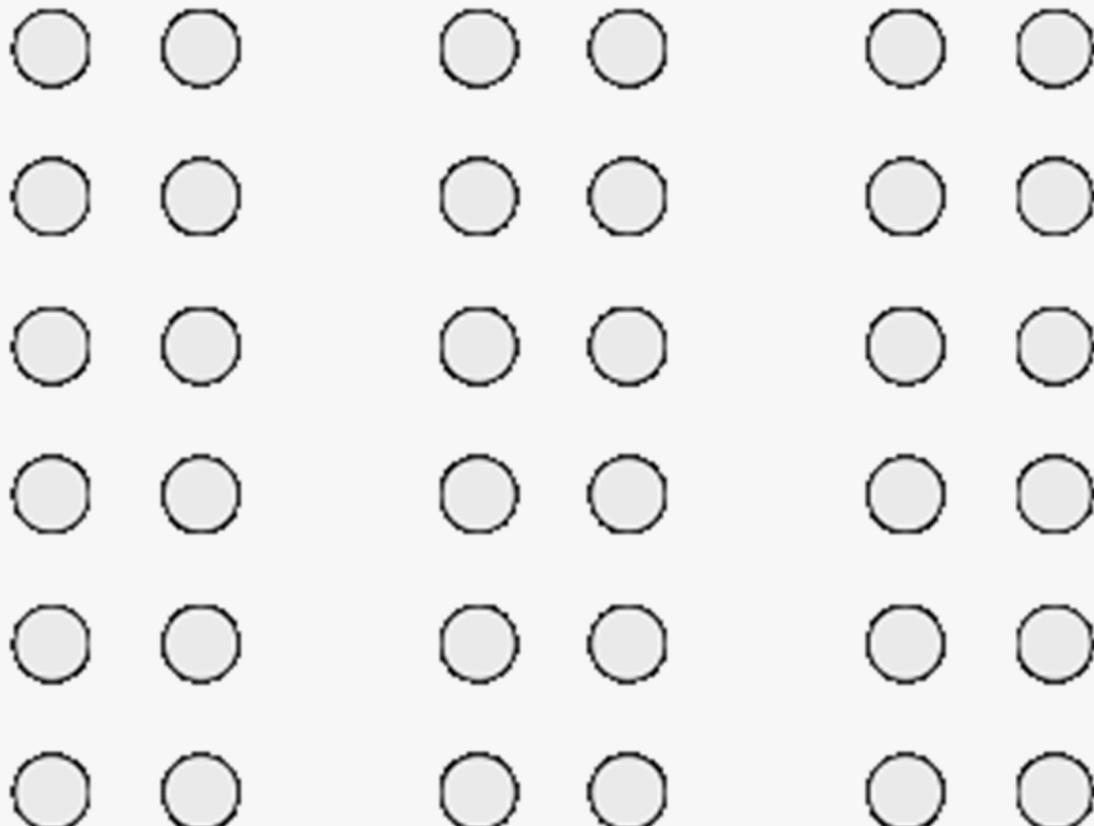
WHAT CAN WE SAY OF THIS?



Preattentive
Reaction

Gestalt
Laws of
Similarity

AND THIS?



Three
clusters or
sets

Gestalt
Laws of
Proximity

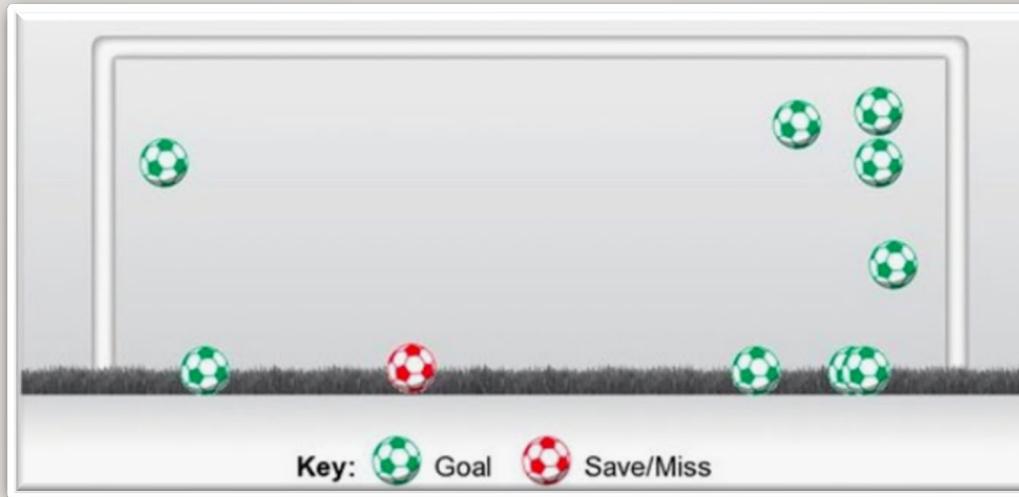
VISUAL PERCEPTION

- At the root of visual perception knowledge is the understanding that our **visual functions are extremely fast and efficient processes** whereas our **cognitive processes**, the act of thinking, is much slower and less efficient.
- How we exploit these attributes in visualisation has a significant impact on how effectively the design will aid interpretation.

VISUAL FUNCTION

- When we design a visualisation, we need to take advantage of the strengths of the visual function and avoid the disadvantages of the cognitive functions.
- We need to minimize the amount of thinking or “working out” that goes into reading and interpreting data and simply let the eyes do their efficient and effective job.

PREATTENTIVE VISUAL PERCEPTION



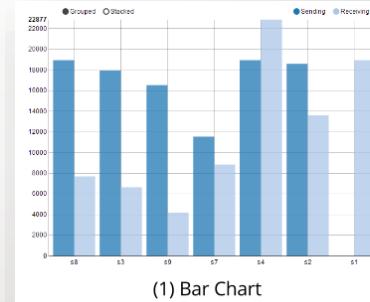
LET US DEFINE DATA VISUALISATION

DATA VISUALISATION IS

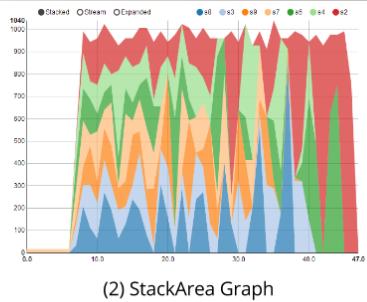
the **representation** and **presentation**
of data that exploits our **visual**
perception abilities in order to **amplify**
cognition.

REPRESENTATION OF DATA IS

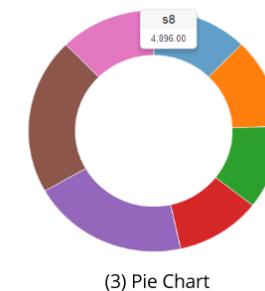
- the way you decide to depict data through a choice of physical form.
- Whether it is via a line, a bar, a circle, or any other visual variable, you are taking data as the raw material and creating a representation to best portray its attributes.



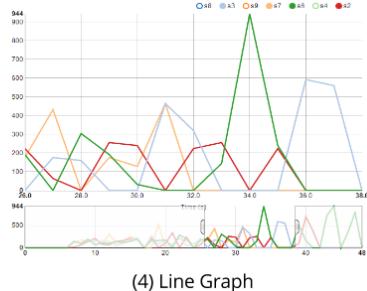
(1) Bar Chart



(2) StackArea Graph



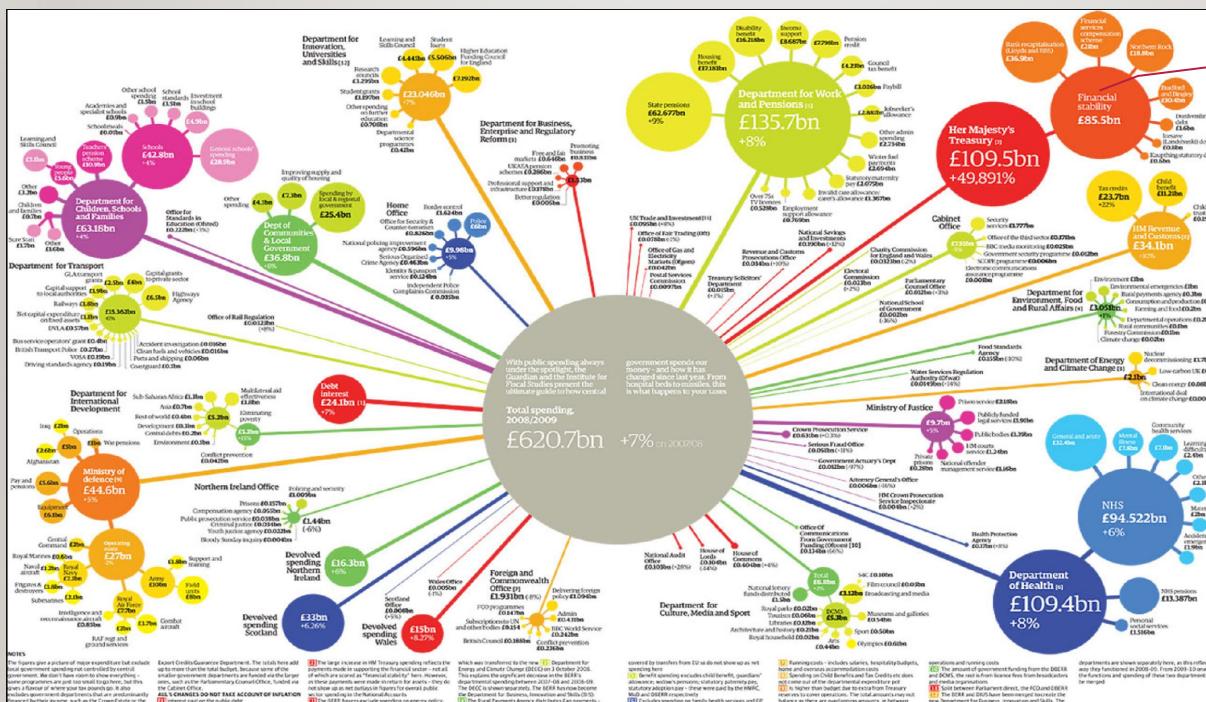
(3) Pie Chart



(4) Line Graph

PRESENTATION OF DATA

- goes beyond the representation of data.
- It concerns **how you integrate your data representation into the overall communicated work**, including the choice of **colors**, **annotations**, and **interactive features**.



The use of circles to represent the constituent departments, sized according to their quantitative value and coloured to visually distinguish the different departments.

VISUAL PERCEPTION ABILITIES

- relates to the scientific understanding of how our eyes and brains process information most effectively.
- This is about harnessing our abilities with spatial reasoning, pattern recognition, and big-picture thinking.

AMPLIFY COGNITION

- is about maximizing how efficiently and effectively we can process the information into thoughts, insights, and knowledge.

ULTIMATELY,

- the objective of data visualisation should be to make a reader or users feel like they have become better informed about a subject.

WHY USE DATA VISUALISATION?

I. SPEED

“ATTENTION SPAN HAS
FALLEN FROM 12 SECONDS IN
2000 TO 8 SECONDS IN 2015.”



Attention Spans study, Microsoft Corp. 2015

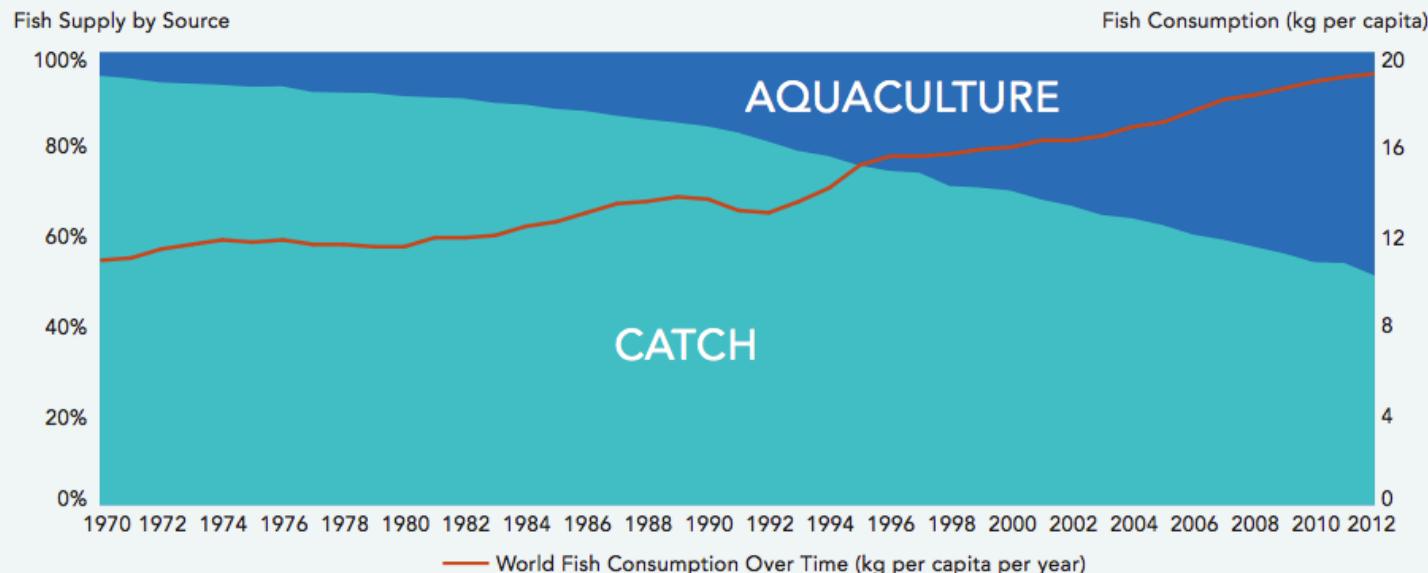
**Data visualizations allow quicker
understanding of a data set.**

2. COMPREHENSION

Aquaculture Meets Fish Demand as Ocean Catches Decline

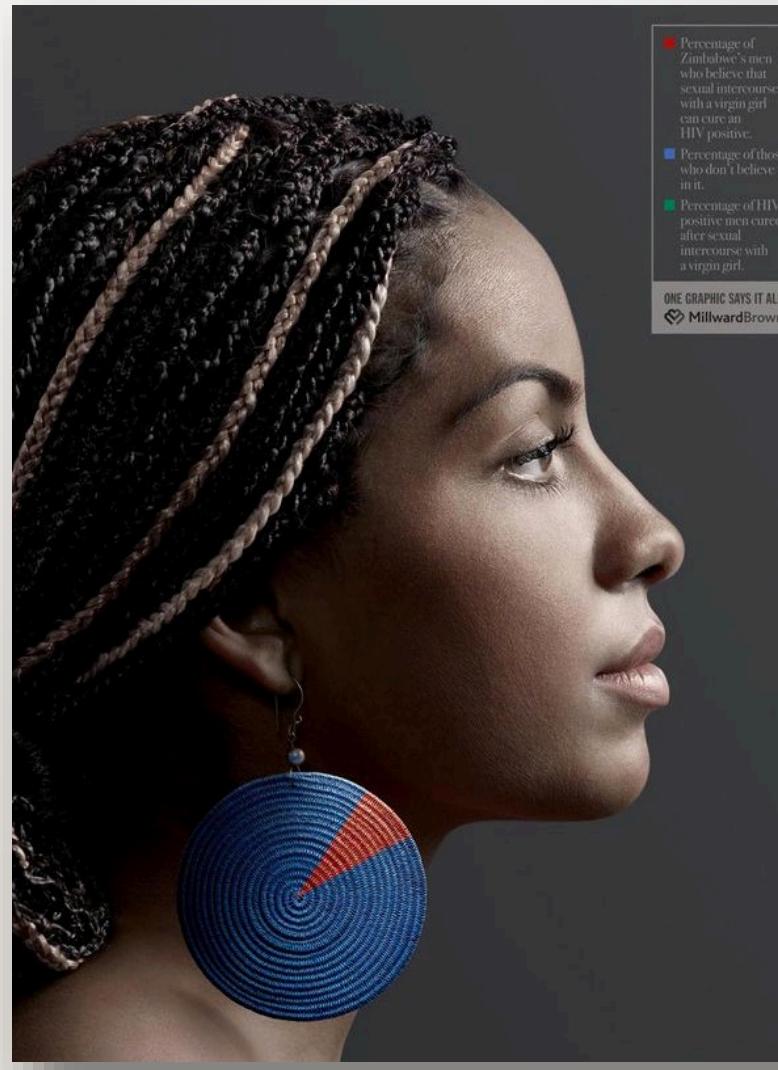
Seafood is an important protein source for about 3 billion people worldwide. Population growth, new ocean fishing technologies, and changes in ocean ecosystems have placed strains on wild fish stocks. Total ocean catches peaked in the late 1990s and the World Wildlife Fund estimates that the oceans contain half the number of fish they did in 1970. Declining catches also reflect national and global efforts to enforce sustainable catch limits. Strong growth in aquaculture has allowed per capita fish consumption to rise steadily, to a global average of 19 kilograms per person in 2012 from about 10 kilograms in the 1960s. In 2012, aquaculture was the source for about half (49 percent) of fish consumed by humans, up from 5 percent in 1962.

Trend in Annual World Fish Supply by Source and Fish Consumption per Capita, 1970-2012



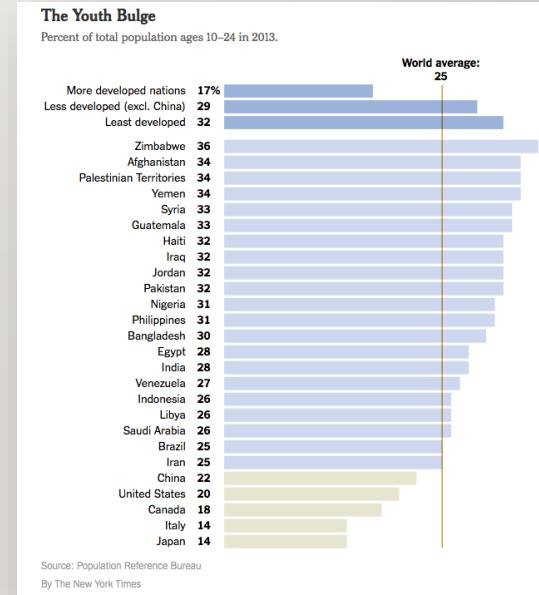
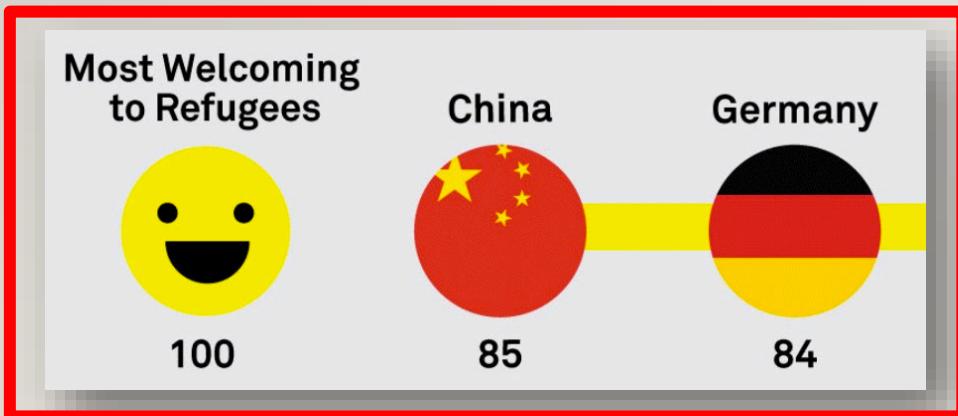
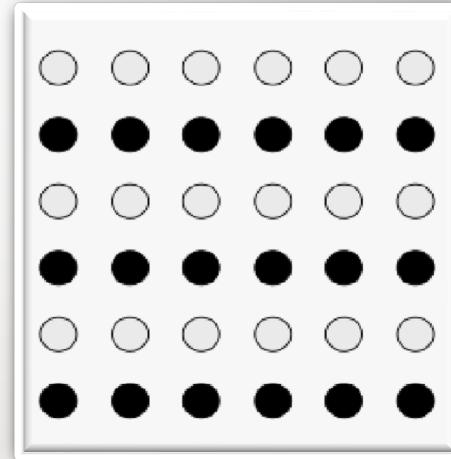
Sources: Food and Agriculture Organization, Fisheries and Aquaculture Department.

3. APPEAL



4. RETENTION

Which one have we not
seen before?

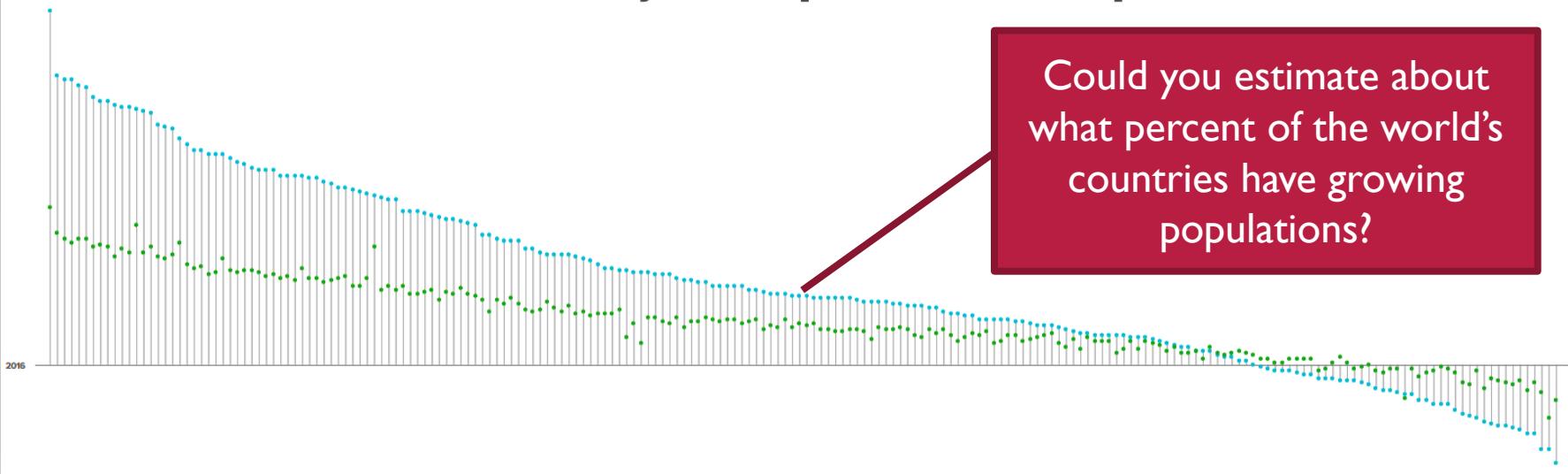


WORLD POPULATION DATA (BEFORE)

	Population, Health, and Environment Data and Estimates for the Countries and Regions of the World												
	Population mid-2016 (millions)	Births per 1,000 Population	Deaths per 1,000 Population	Net Migration Rate per 1,000	Population		Infant Mortality Rate ^a	Total Fertility Rate ^b	Percent of Population		GNI per Capita (\$US)	Percent of Married Women 15-49 Using Contraception ^c	
					mid-2030 (millions)	mid-2050 (millions)			Ages <15	Ages 65+		All Methods	Modern Methods
WORLD	7,418	20	8	—	8,539	9,869	36	2.5	26	8	15,415	54	62
MORE DEVELOPED	1,254	11	10	3	1,298	1,322	5	1.7	16	18	39,963	78	70
LESS DEVELOPED	6,164	22	7	-0	7,241	8,548	39	2.6	28	7	10,214	49	61
LESS DEVELOPED (Excl. China)	4,778	24	7	-0	5,821	7,195	43	2.9	31	5	8,936	47	54
LEAST DEVELOPED	962	33	9	-1	1,318	1,923	59	4.3	41	4	2,424	32	36
AFRICA	1,203	36	10	-1	1,681	2,527	57	4.7	41	4	4,802	41	35
SUB-SAHARAN AFRICA	974	37	11	-0	1,388	2,128	62	5.0	43	3	3,606	39	31
NORTHERN AFRICA	229	29	6	-1	293	400	29	3.4	32	5	9,798	51	52
Algeria	40.8	26	5	0	50.6	63.2	21	3.1	29	6	14,280	71	57
Egypt	93.5	31	6	-1	121.6	168.8	22	3.5	31	4	10,690	43	58
Libya	6.3	20	5	-10	7.4	8.4	23	2.4	30	5	15,140	79	42
Morocco	34.7	20	6	-2	38.1	38.8	24	2.4	25	6	7,680	60	67
Sudan	42.1	37	8	-3	61.7	105.0	51	5.2	43	3	4,080	34	12
Tunisia	11.3	20	7	-1	13.1	14.9	17	2.4	24	8	11,060	68	62
Western Sahara ^e	0.6	18	6	8	0.7	0.9	35	2.1	26	3	—	81	—
WESTERN AFRICA	359	39	11	-1	515	800	64	5.4	44	3	4,135	45	18
Benin	10.8	36	9	-0	16.6	24.0	66	4.7	45	3	2,100	44	18
Burkina Faso	19.0	41	10	-1	28.2	47.0	65	5.7	49	3	1,640	30	21
Cape Verde	0.5	21	5	-4	0.6	0.7	19	2.3	28	6	6,390	66	57
Côte d'Ivoire	23.9	37	13	0	33.0	50.1	69	4.9	42	3	3,240	54	18
Gambia	2.1	41	9	-1	3.2	5.1	45	5.6	46	2	1,580	60	9
Ghana	28.2	33	8	-1	37.1	50.4	41	4.2	39	5	4,070	54	35
Guinea	11.2	37	10	-0	18.3	27.5	67	5.1	43	3	1,120	37	6
Guinea-Bissau	1.9	37	12	-1	2.5	3.6	88	4.9	43	3	1,450	49	16
Liberia	4.6	35	9	-1	6.4	9.4	54	4.7	42	3	720	50	20
Mali	17.3	44	13	-3	26.1	43.6	56	6.0	47	3	2,360	40	16
Mauritania	4.2	31	8	-1	5.7	8.0	72	4.2	40	3	3,710	60	11
Niger	19.7	49	9	-0	34.3	68.9	56	7.6	50	3	950	22	14
Nigeria	186.5	39	13	-0	261.9	397.5	69	5.5	43	3	5,800	48	15
Senegal	14.8	38	6	-1	21.6	34.4	39	5.0	44	4	2,390	45	23
Sierra Leone	6.6	37	14	-1	8.9	12.6	89	4.9	42	3	1,560	40	17
Togo	7.5	36	9	-0	10.9	17.4	47	4.7	42	3	1,320	38	20
EASTERN AFRICA	394	36	9	-1	561	844	51	4.8	43	3	2,019	26	40
Burundi	11.1	42	10	0	17.2	30.4	63	6.1	46	2	730	12	32
Comoros	0.8	33	7	-3	1.0	1.4	36	4.3	40	3	1,430	28	19
Djibouti	0.9	25	9	-3	1.1	1.2	53	3.2	33	4	—	77	19
Eritrea	5.4	34	7	-5	7.3	10.4	43	4.2	43	3	—	23	8
Ethiopia	101.7	30	7	-0	132.9	168.6	47	4.2	41	3	1,620	20	37

WORLD POPULATION DATA (AFTER)

2030 and 2050 Projected Population as a Multiple of 2016



Speed, Comprehension of information,
Appeal, and (hopefully) **Retention**

WHAT MAKES A GOOD DATA VISUALISATION?

A GOOD DATA VISUALISATION

- Must be accurate and not misrepresent data
- Must be easy to understand
- Relates to your audience
- Only shows what is necessary

PRINCIPLES OF GOOD DATA VISUALISATION DESIGN

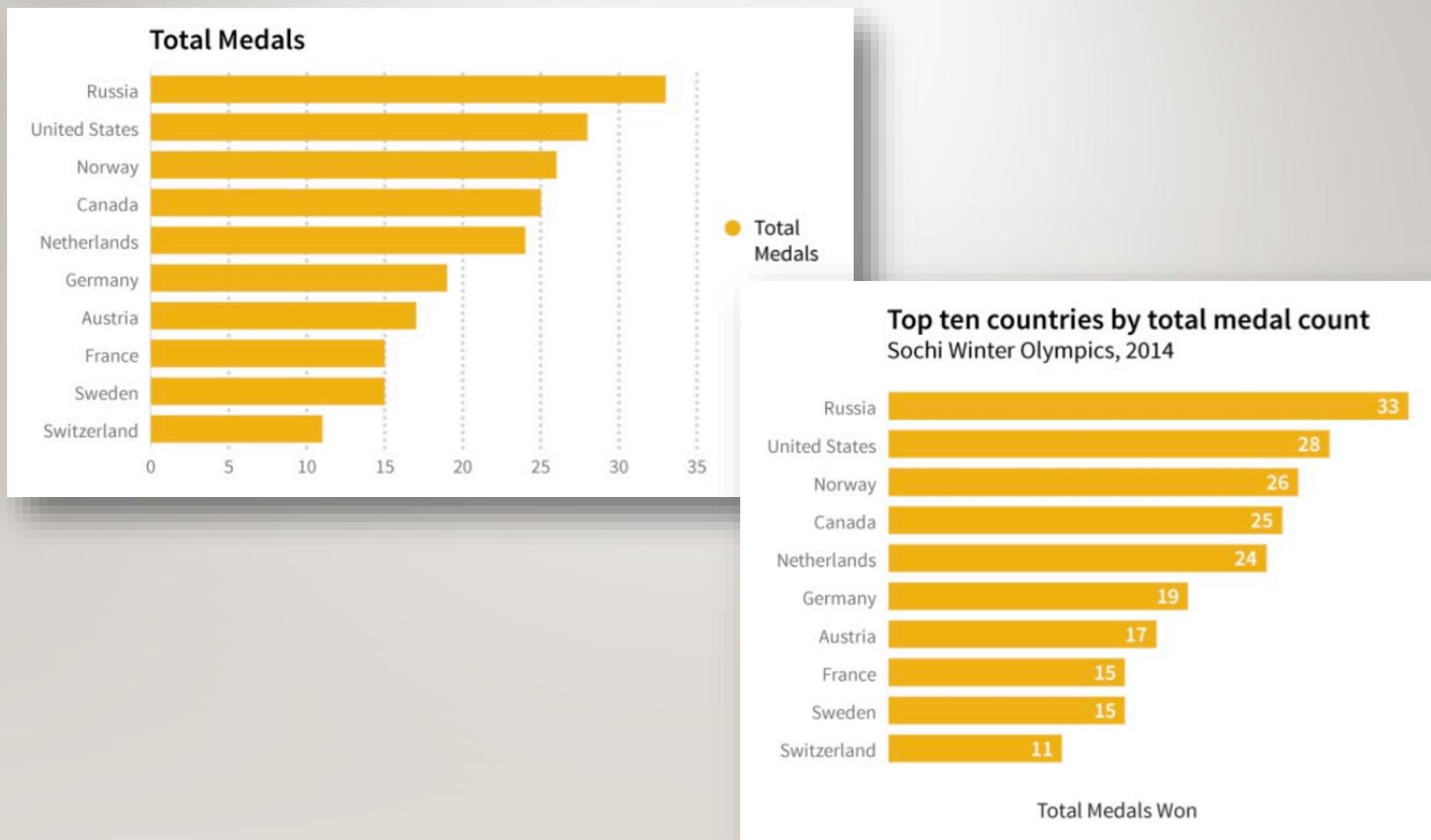
PRINCIPLE I:

USE YOUR “INK” STRATEGICALLY

USE YOUR “INK” STRATEGICALLY ..!

- Every single line, word, and shape should aid in the understanding of the graphic.
- If not, delete.
- Add elements when helpful.

USE YOUR “INK” STRATEGICALLY ..2



USE YOUR “INK” STRATEGICALLY ..3

Figure 13. Girls and Women Ages 15-49 Who Are Cut but Open to Stopping FGM/C

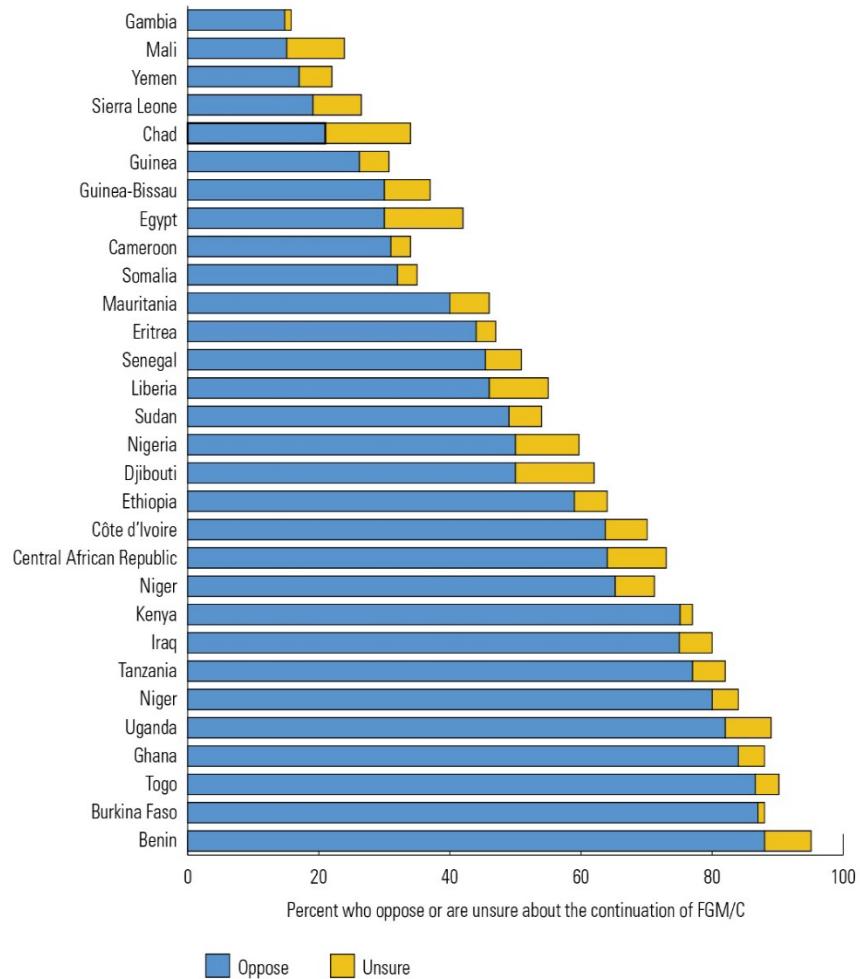
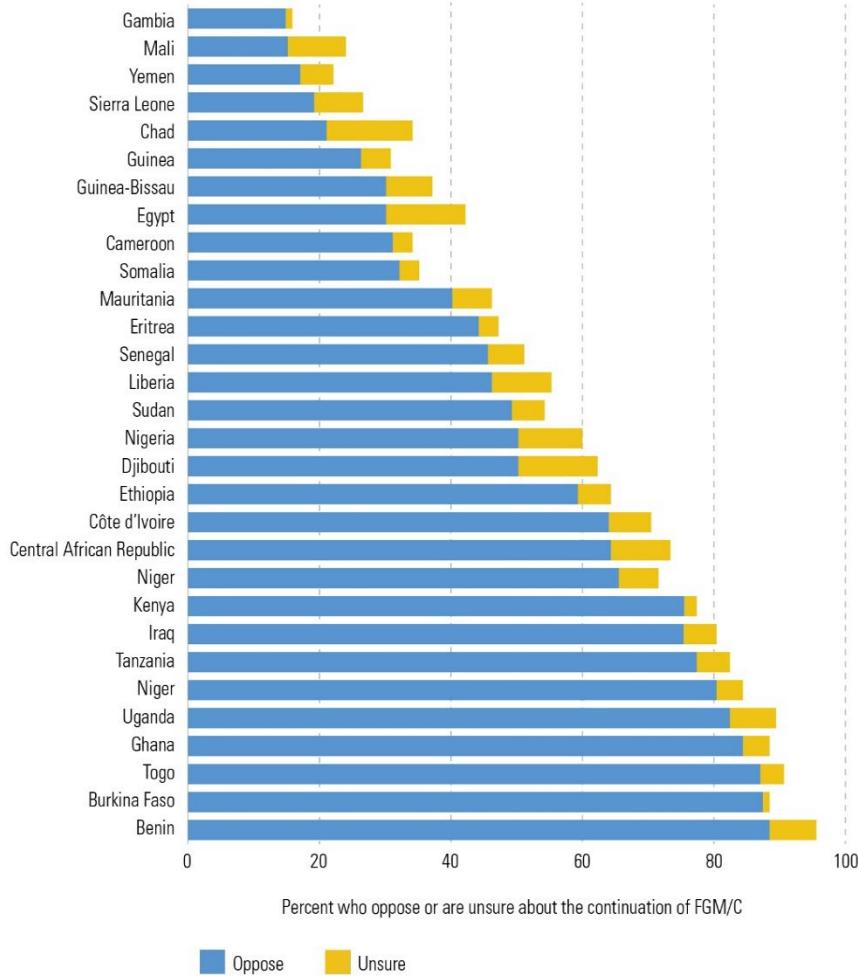


Figure 13. Girls and Women Ages 15-49 Who Are Cut but Open to Stopping FGM/C



PRINCIPLE 2:

USE GOOD TEXT DESIGN

TEXT TIPS

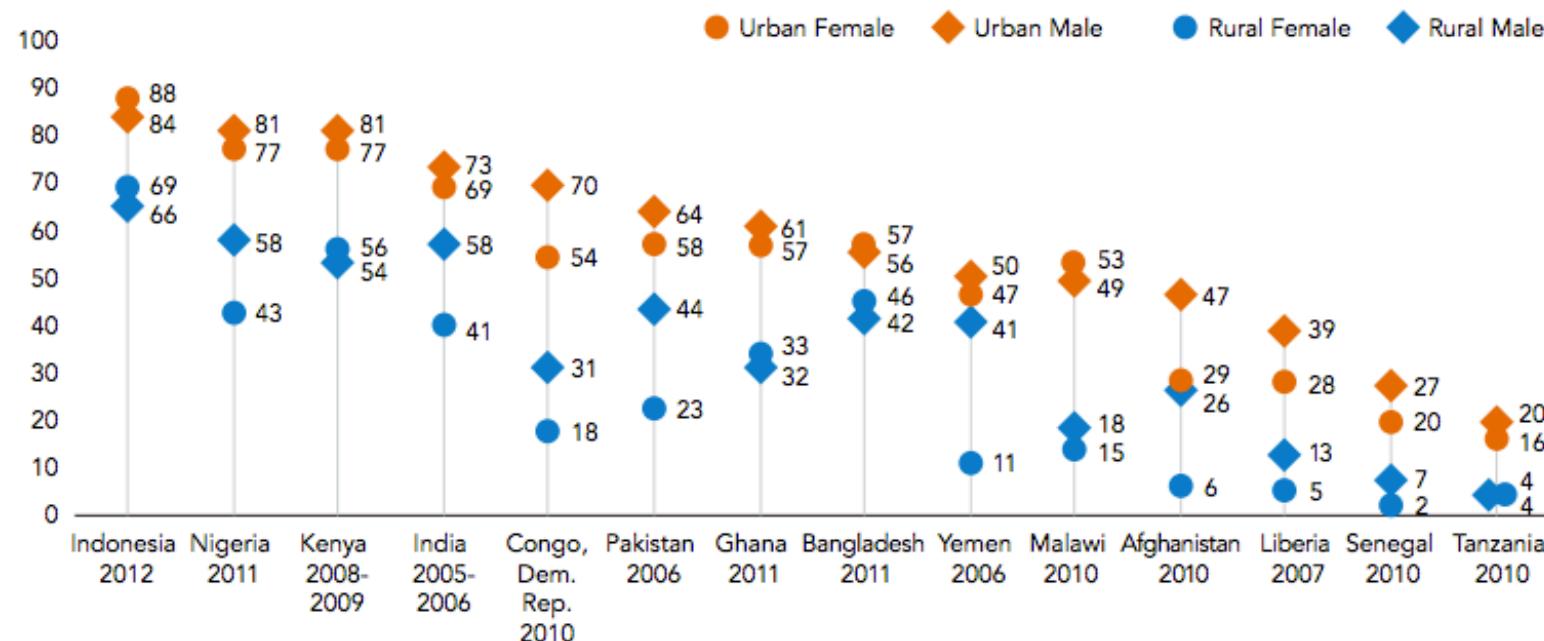
- Use sans serif fonts (**Helvetica, Arial, Gill Sans** are good options).
- Ways to create emphasis:**ALL CAPS, bold, italics, bigger.**
- Keep fonts consistent.
- Can use title text for takeaway message.

PUT THE KEY MESSAGE RIGHT IN THE TITLE

Young People in Urban Areas Are Likely to Stay in School Longer.

Overall, young people in urban areas have a greater chance of completing lower secondary school than their rural counterparts. Young men have more educational advantages and higher completion rates in both urban and rural settings, with a few exceptions. Gender gaps in education can vary widely in both urban and rural areas, as seen in Afghanistan, Kenya, and Yemen. While the gender gap may be closing in some countries, the gap between urban and rural educational attainment remains wide.

Percent of Young People Ages 15-24 Who Have Completed Lower Secondary School



Source: UNESCO, World Inequality Database on Education. Based on original data from ICF International, Demographic and Health Surveys and UNICEF, Multiple Indicator Cluster Surveys.

TEXT INSTEAD OF GRAPH? .. I

Percent of total revenue

2013



2014



Exoalgio



Gosomnia



Alacrala



Rejuvo



Happajoy

TEXT INSTEAD OF GRAPH? ..2

Exoalgio's revenue grew

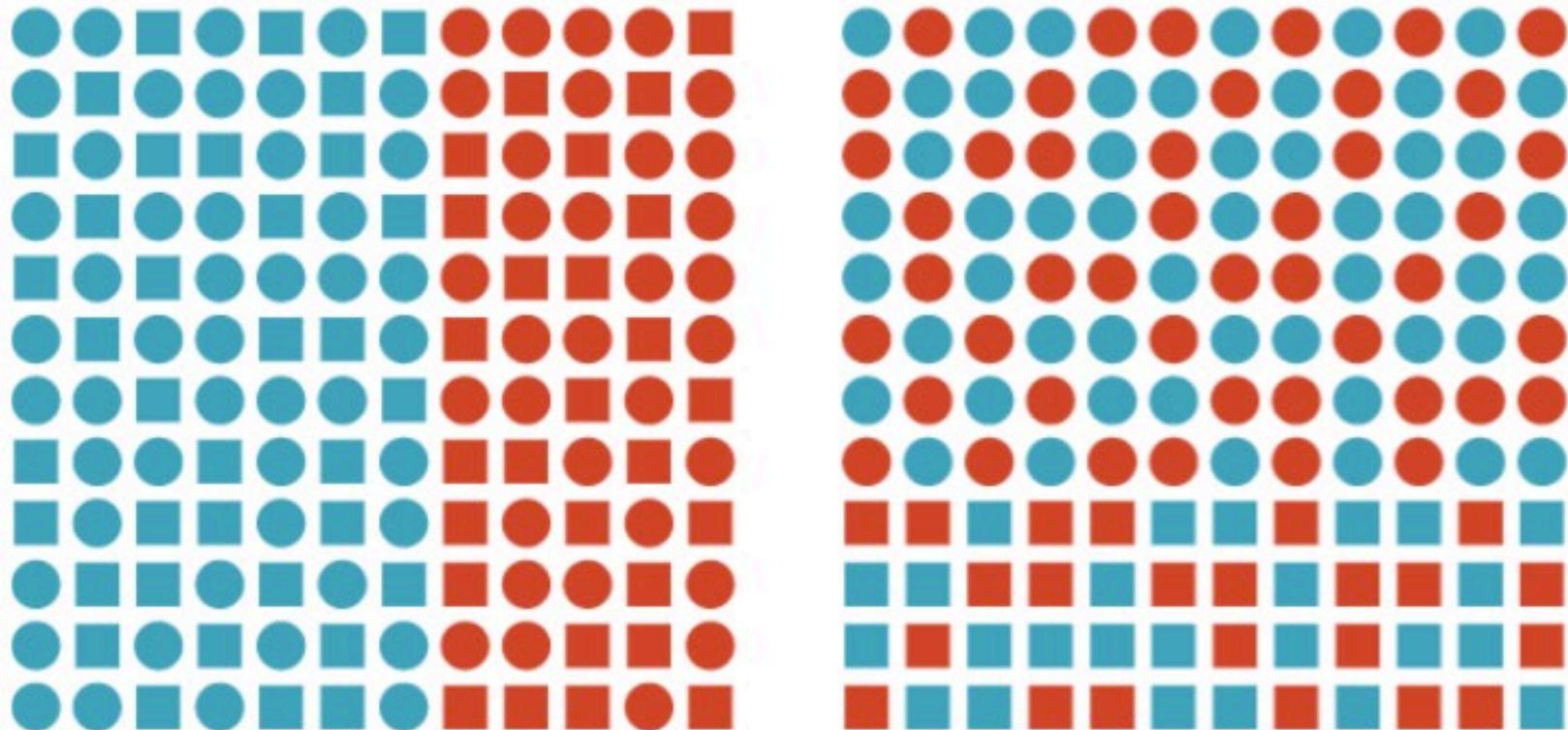
110%

between 2013 and 2014.

PRINCIPLE 3:

USE GOOD COLOUR DESIGN

THE IMPORTANCE OF COLOUR

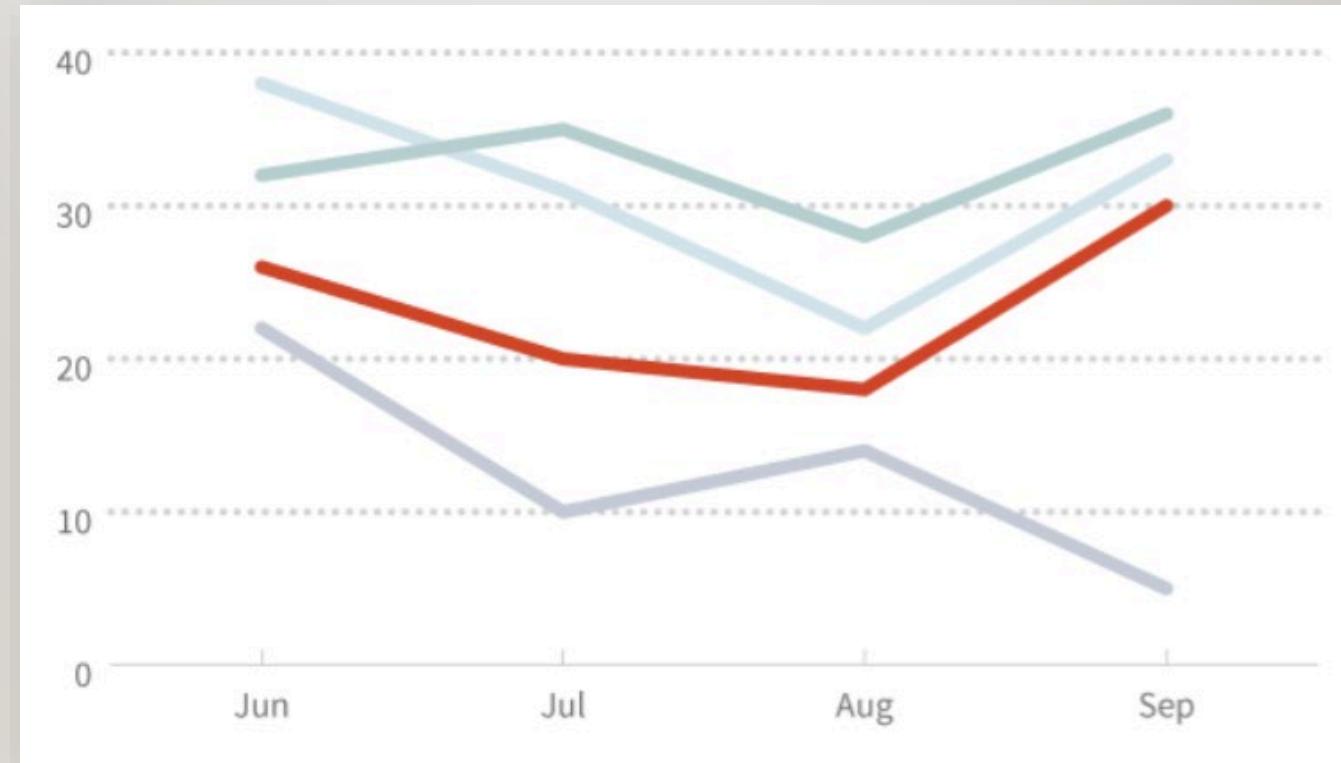


COLOUR TIPS

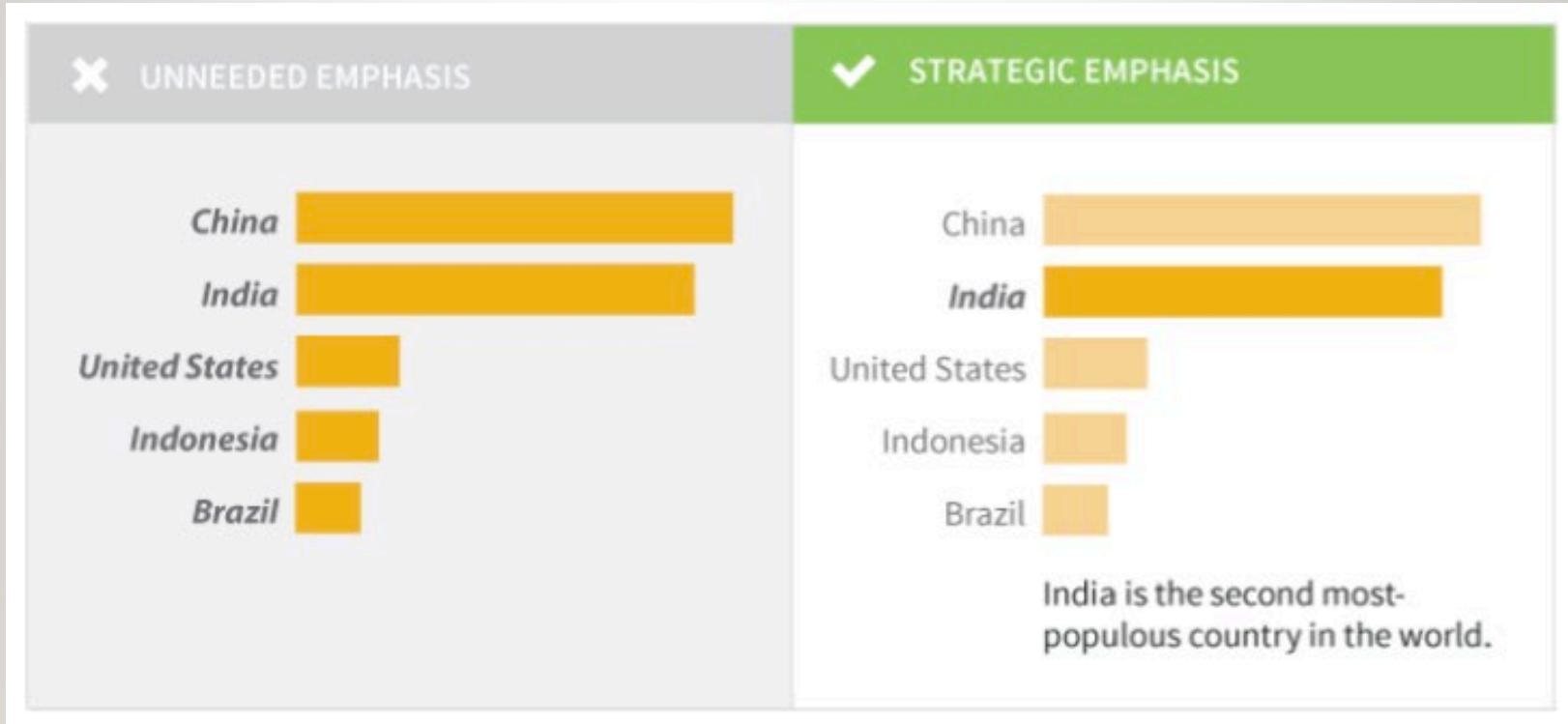
- Darker/brighter colours will read as “more”.
- Use grey to denote neutral or unimportant data.
- Utilize white space.
- Every colour used must have a reason for being there and should be distinct.
- Choose appropriate colour palette and keep them consistent.

COLOUR HAS MEANING

- The higher the contrast between objects, the more differently they are perceived.
- Colours also have symbolic meaning.

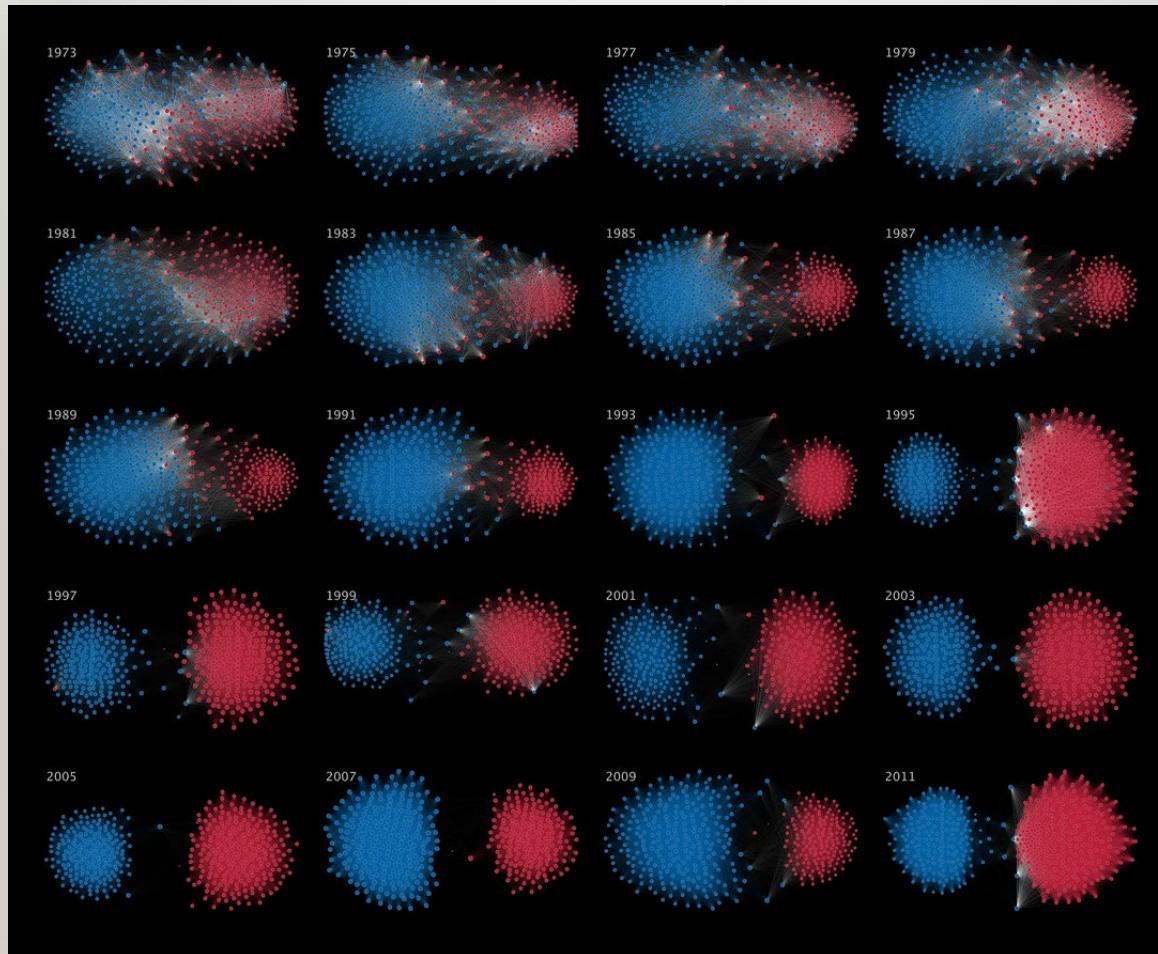


COLOUR IDEAS .. I



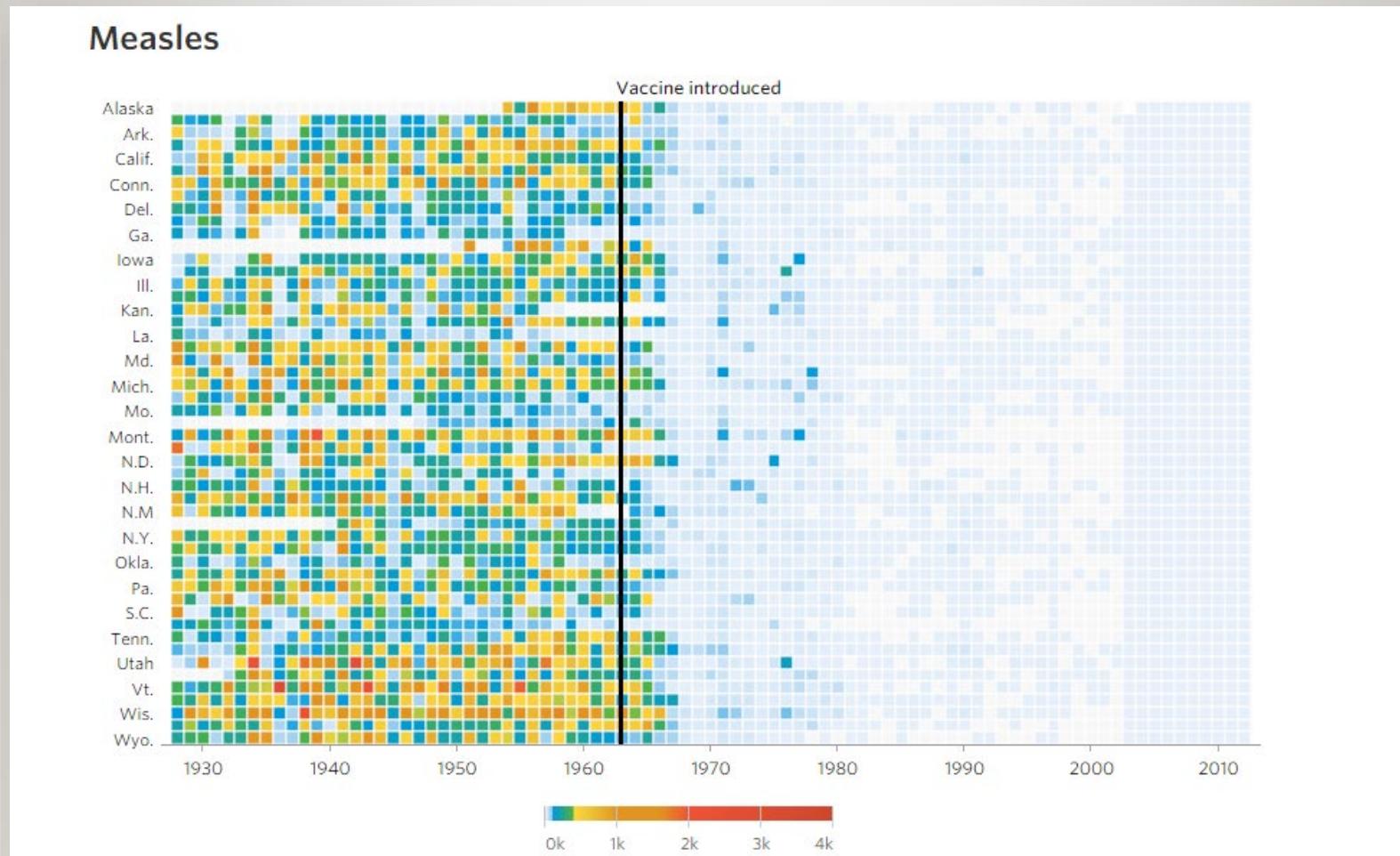
COLOUR IDEAS ..2

- Votes Across Party Lines in the U.S. House of Representatives



COLOUR IDEAS ..3

- Effectiveness of the Measles Vaccine



PRINCIPLE 4:

USE ICONS, PHOTOGRAPHY AND INTERACTIVITY APPROPRIATELY

ICONS .. I

- Effectiveness of the Measles Vaccine



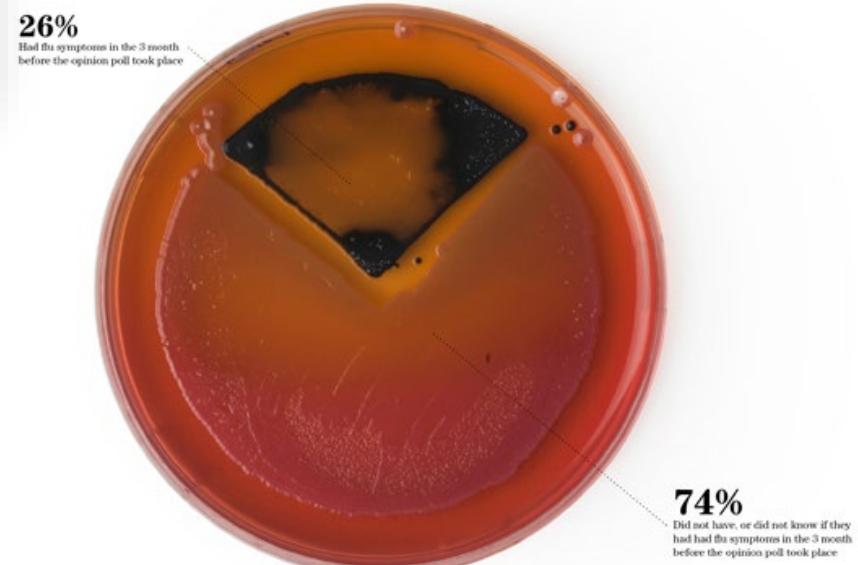
FAMILY PLANNING &
REPRODUCTIVE HEALTH

ICONS ..2

Can you tell which map is showing libraries and hospitals?



PHOTOGRAPHY

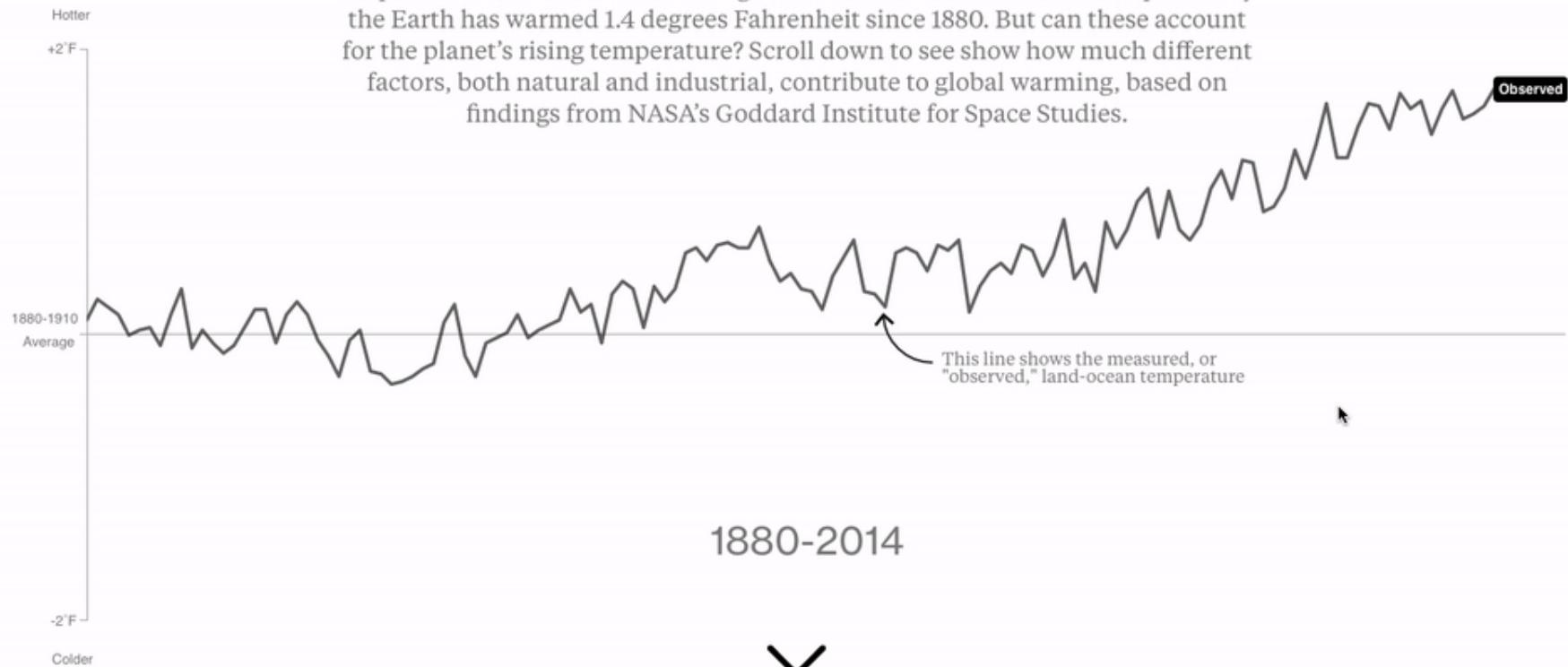


INTERACTIVITY

What's Really Warming the World?

By Eric Roston [Twitter](#) and Blacki Migliozzi [Twitter](#) | 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 how much different factors, both natural and industrial, contribute to global warming, based on findings from NASA's Goddard Institute for Space Studies.



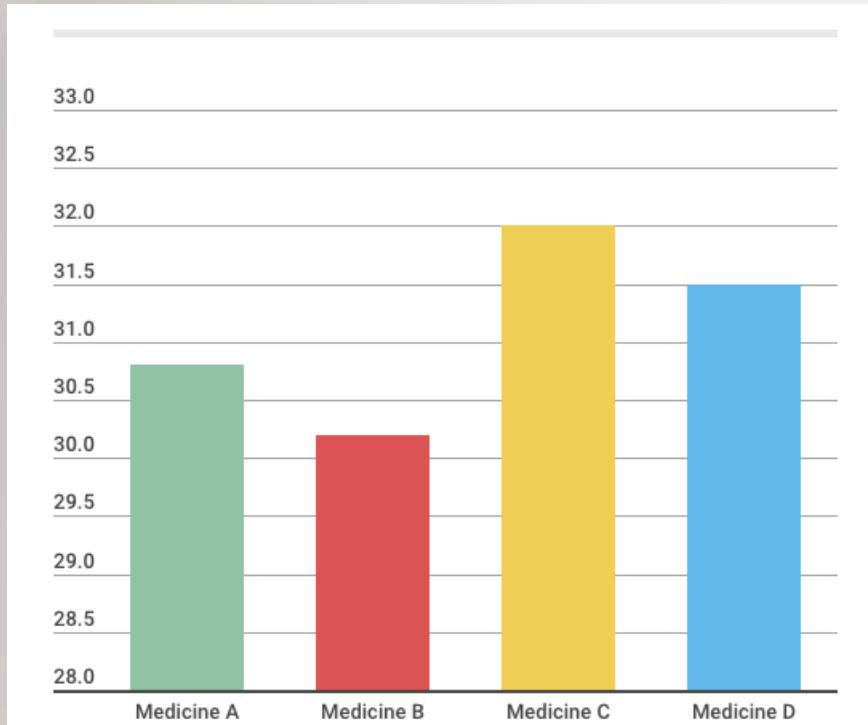
COMMON MISTAKES WITH DATA ACCURACY

COMMON MISTAKES

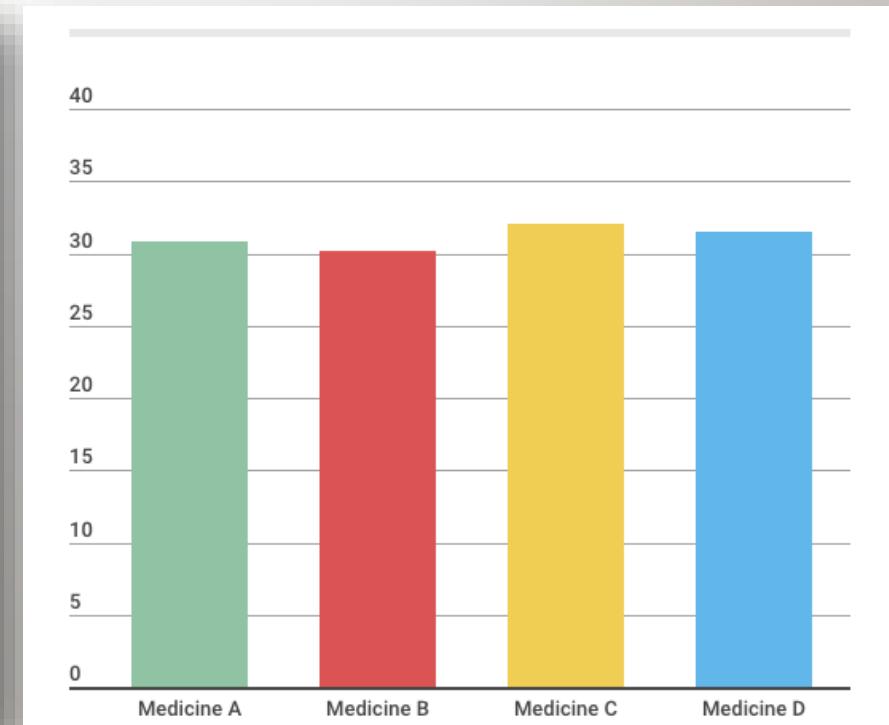
- Mixing up percent change and percentage point change
- Pie chart does not add up to 100 percent
- Proportionally sized bubbles using diameter instead of area for sizing
- Oversimplifying data so that you do not get enough context
- Truncating y-axis

TRUNCATING Y-AXIS

Percentage of Patients Doing Better on Medicines A, B, C, and D



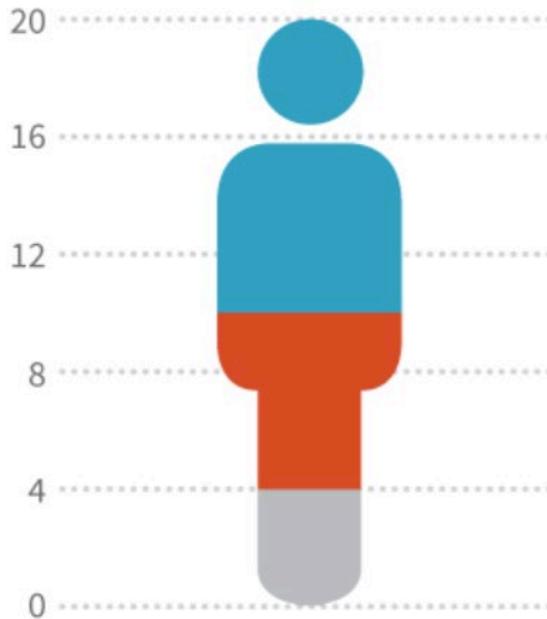
BEFORE



AFTER

ACTIVITY:WHAT'S WRONG HERE? .. I

Temperature Preference: 20 Test Subjects

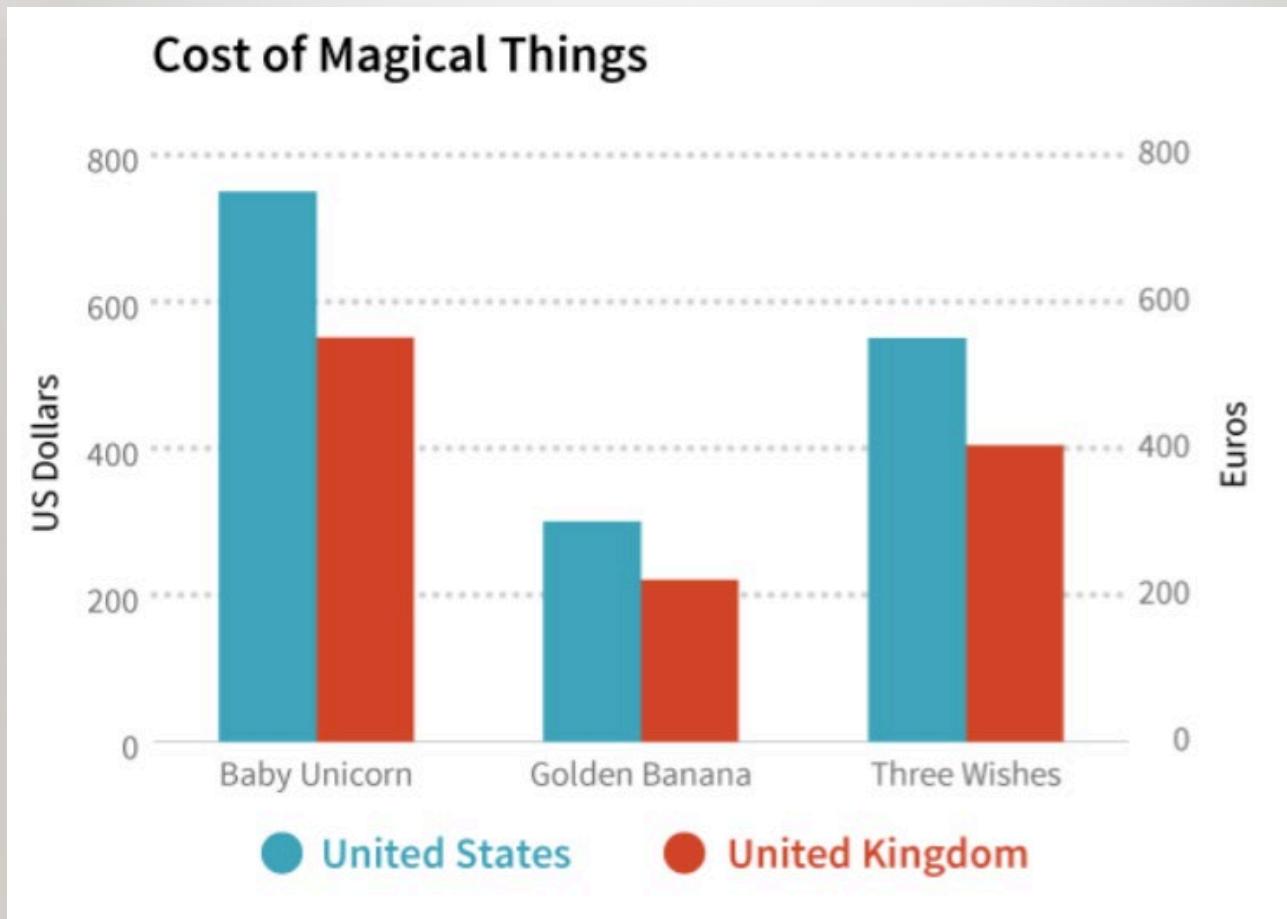


10 Prefer Cold

6 Prefer Hot

4 Prefer Neither

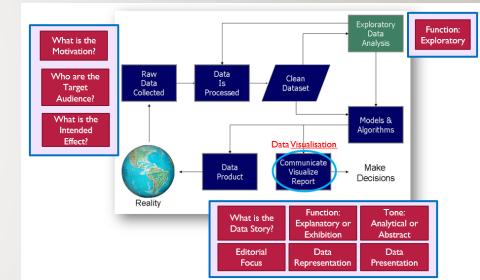
ACTIVITY:WHAT'S WRONG HERE? ..2



DATA VISUALISATION'S INTENDED EFFECT

WHAT IS THE INTENDED EFFECT?

- Could it be for **monitoring of signals**? or
- Could it be for **facilitating a visual lookup of data**? or
- Could it be a design that is intended to **grab attention or change behaviour**? or
- Could it be for **presenting arguments and telling a story**? or
- Could it be for **conducting analysis or ‘playing’ with data**?



What is the Visualisation's Function?

- A pragmatic and **analytical** portrayal?
- An emotive and **abstract** concept?

What is the Visualisation's Tone?

VISUALISATION'S FUNCTIONS

EXPLANATORY, EXPLORATORY,
EXHIBITION

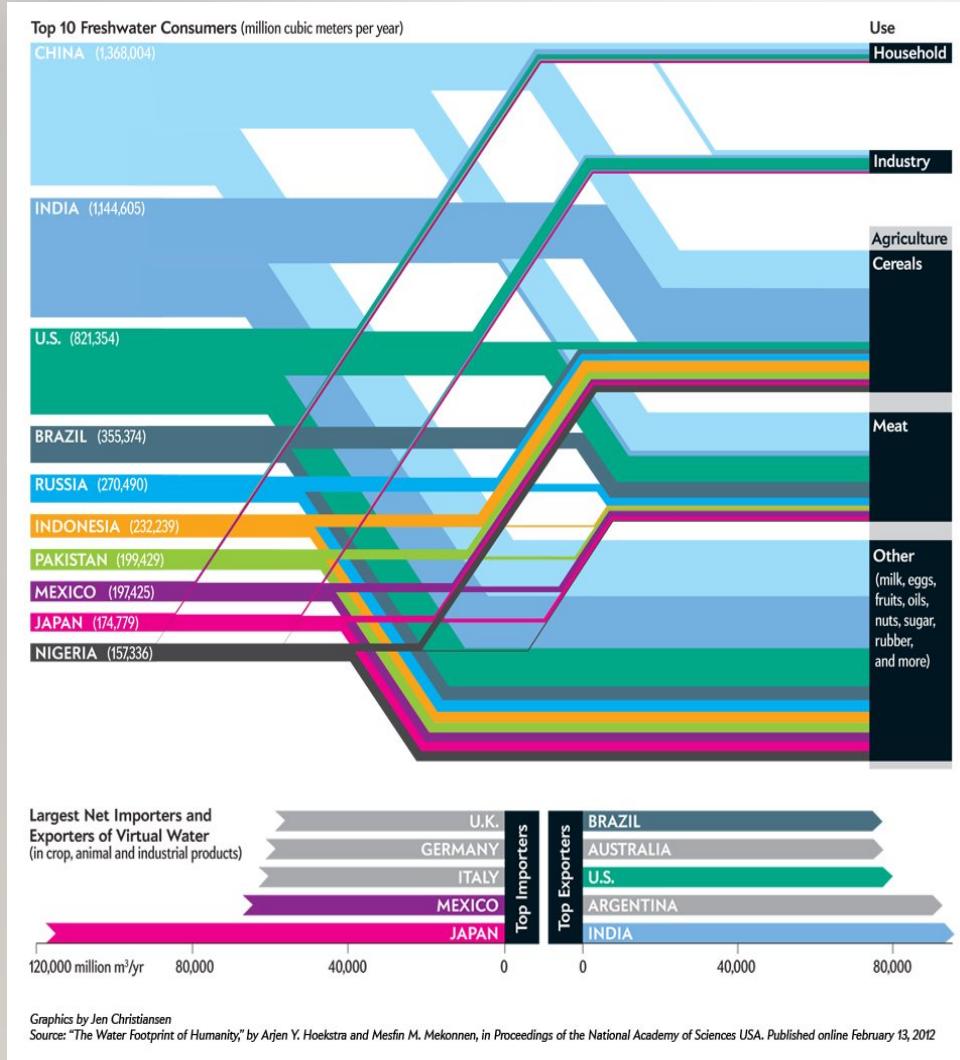
3 CATEGORIES OF FUNCTION

1. **EXPLANATORY:** Convey an explanatory portrayal of data to a reader
2. **EXPLORATORY:** Provide an interface to data in order to facilitate visual exploration
3. **EXHIBITION:** Use data as an exhibition of self-expression

EXPLANATORY

- Explanatory data visualization is about **conveying information** to a reader in a way that is based around a **specific** and **focused narrative**.
- It requires a **designer-driven, editorial approach** to synthesize the requirements of your target audience with the key insights and most important analytical dimensions you are wishing to convey.

EXAMPLE: SANKEY DIAGRAM



- A **Sankey** diagram with **explanatory visualisation**.
- **Portrays analysis** of the top ten freshwater-consuming countries and the breakdown of its usage.
- Explanatory visualizations are **not limited to just being static in design**.
- Some of the most impactful, narrative-driven pieces can be framed within an **interactive** or **animated** construction.

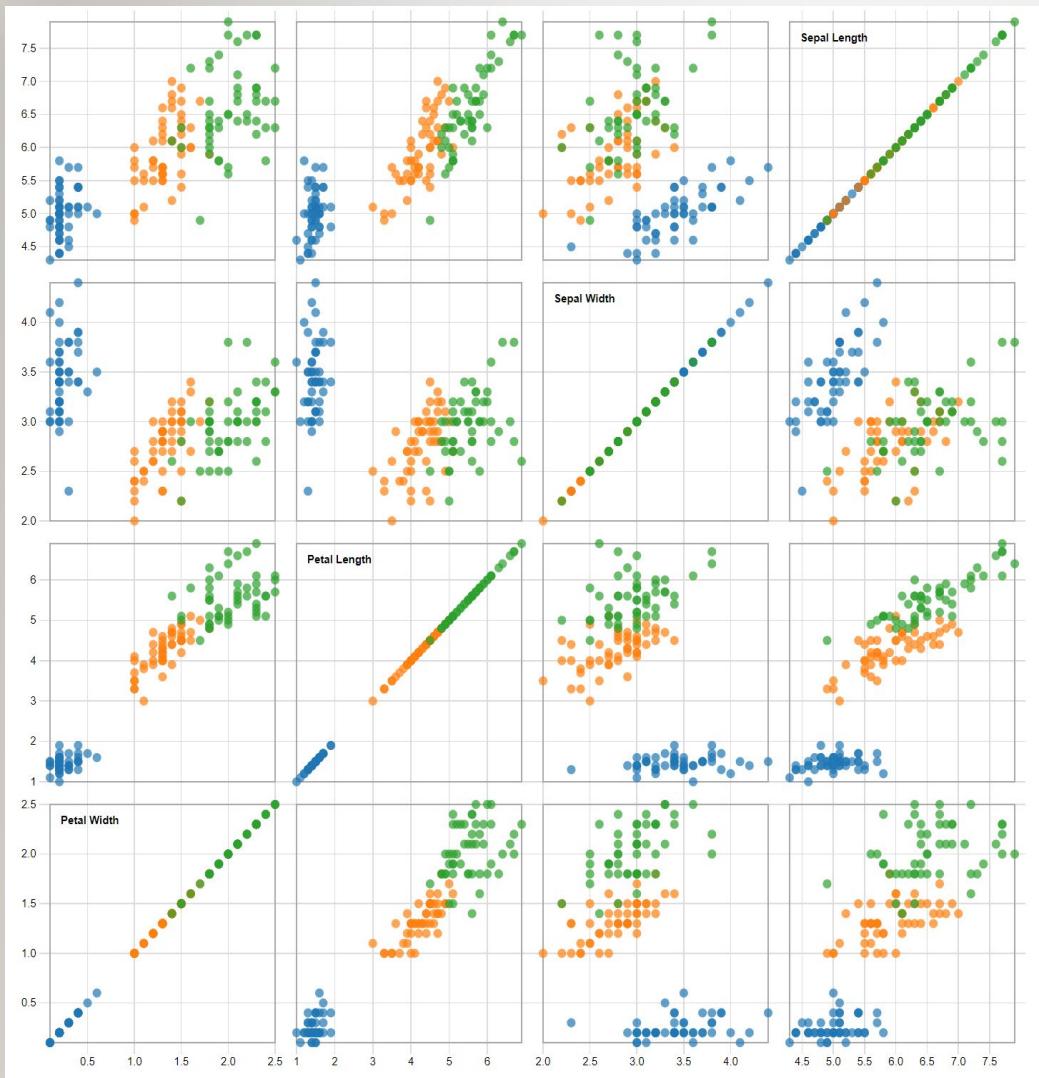
EXPLORATORY

- **Exploratory** data visualization design is a slightly different matter compared to creating an **explanatory** piece.
- We seek to facilitate the familiarization and reasoning of data **through a range of user-driven experiences**.
- In contrast to explanatory-based functions, **exploratory data visualizations lack a specific, single narrative**.
- They are more about **visual analysis** than just the visual presentation of data.

AIM TO CREATE A TOOL

- To provide the user with an interface to **visually explore the data.**
 - Aim to seek out personal **discoveries, patterns, relationships**, thereby triggering and iterating curiosities.
 - It opens up the possibility for chance or serendipitous (i.e. occurring or discovered by chance in a happy or beneficial way) findings caused by forming different combinations of variable displays.

EXAMPLE: SCATTERPLOT MATRIX



- A scatterplot matrix visualization.
- A method used to **reveal correlations across a multivariate dataset**, enabling the eye to efficiently scan the entire matrix to quickly identify variable pairings with strong or weak relationships.
- A perfect example of an **exploratory visualization design**.

EXHIBITION

- The **intention** is somewhat removed from a pure desire to inform.
- **Objective:** exhibition or **self-expression** through data representation.
- Commonly known as “**data art**” which is characterised by a lack of structured narrative and absence of any visual analysis capability.
- **Motivation:** to create an artifact, an aesthetic representation or perhaps a technical/technique demonstration.
 - Sometimes, guided by the idea of fun or playfulness or maybe the creation of ornamentation.

EXAMPLE: VISUALIZING ADJECTIVES ..1/2



- An example of data art that visualizes all the adjectives used in Cormac McCarthy's book "**The Road**".
- The **adjectives** are **arranged radially** in alphabetical order.
 - **Each line represents a timeline** of the book beginning at the perimeter of the circle and ending toward the center.
 - The **points along each line** mark the **position in the book** where that particular adjective was used.

EXAMPLE: VISUALIZING ADJECTIVES ..1/2



- **Effect:** an interesting artifact to look at and its construction is representative of an impressive technical or algorithmic solution, but its primary intent is not to easily allow us to learn about the language in the book.
- This is between **exploratory visualization** and **data art (exhibition)**.

EXPLANATORY VS EXPLORATORY

- Key feature that differentiates an exploratory piece from an explanatory piece is **the amount of work you have to do as a reader to discover insights.**
- For **EXPLANATORY** pieces, the **designer should do the hard work** and create a clear portrayal of the interesting stories and analysis from a dataset.
- An **EXPLORATORY** piece will be more about the **readers doing the analysis themselves**, putting the effort in to discover things that strike them as being significant or interesting.

EXPLANATORY, EXPLORATORY, EXHIBITION

- **EXPLANATORY** visualisation characterised as a **single** visual experience.
- **EXPLORATORY** visualisation characterised as a **numerous** but finite set of experiences.
- The range of reactions to **exhibition-type** designs has a more open and **unlimited** potential.
 - It aims for and triggers more of an aesthetic reaction, which means our emotional connection and interpretation can vary significantly from one person to the next.

VISUALISATION'S TONE

PRAGMATIC AND ANALYTICAL
OR EMOTIVE AND ABSTRACT?

VISUALISATION'S TONE .. I/2

- It concerns the **type of stimulus or desired emotional response** that you are trying to create.
- Therefore, need to be able to reason what sort of design will achieve that tone.
- We need **visualizations** that look **appealing** and we need visualizations that **perform well**.

VISUALISATION'S TONE ..2/2

- Two potential motives behind creating a data visualization:
 - “**We need a chart to help monitor...**”
 - “**We need to present this in a way that persuades people...**”
- Here, we have two situations both aiming to better inform a reader or a user, but the intended effect or outcome from the experience will be different.

EXAMPLE: MONITOR

- A dashboard full of bar charts and line charts.
- Reaction of a user reading will be quite analytical and pragmatic in style.
- Unlikely to involve or stir much emotion.
- The style of the visualization design: **quite sober and with an emphasis on the precision of perception.**

EXAMPLE: PERSUADE

- A presentation that depicts **how many lives could be saved if a charity was able to achieve a certain level of fundraising:**
 - Setting and intent will be more about persuasion.
 - Emotionally charged.
 - Need to attempt to create an experience that is much **more personal and more impactful.**

TWO ENDS OF A SPECTRUM

- Tone is on a continuum from
 - a **pragmatic and analytical portrayal** through to
 - a more **emotive and abstract concept**.

PRAGMATIC AND ANALYTICAL TONE? .. 1/2

- A visualization is more effective than another visualization if the **information** conveyed by one visualization is **more readily perceived than the information in the other**.
- Designs that fit this classification will often involve **data being represented through the use of bar charts, line charts and dot plots**, for example.
- Stylistically, they will be characterized by a rather **clinical look-and-feel**.

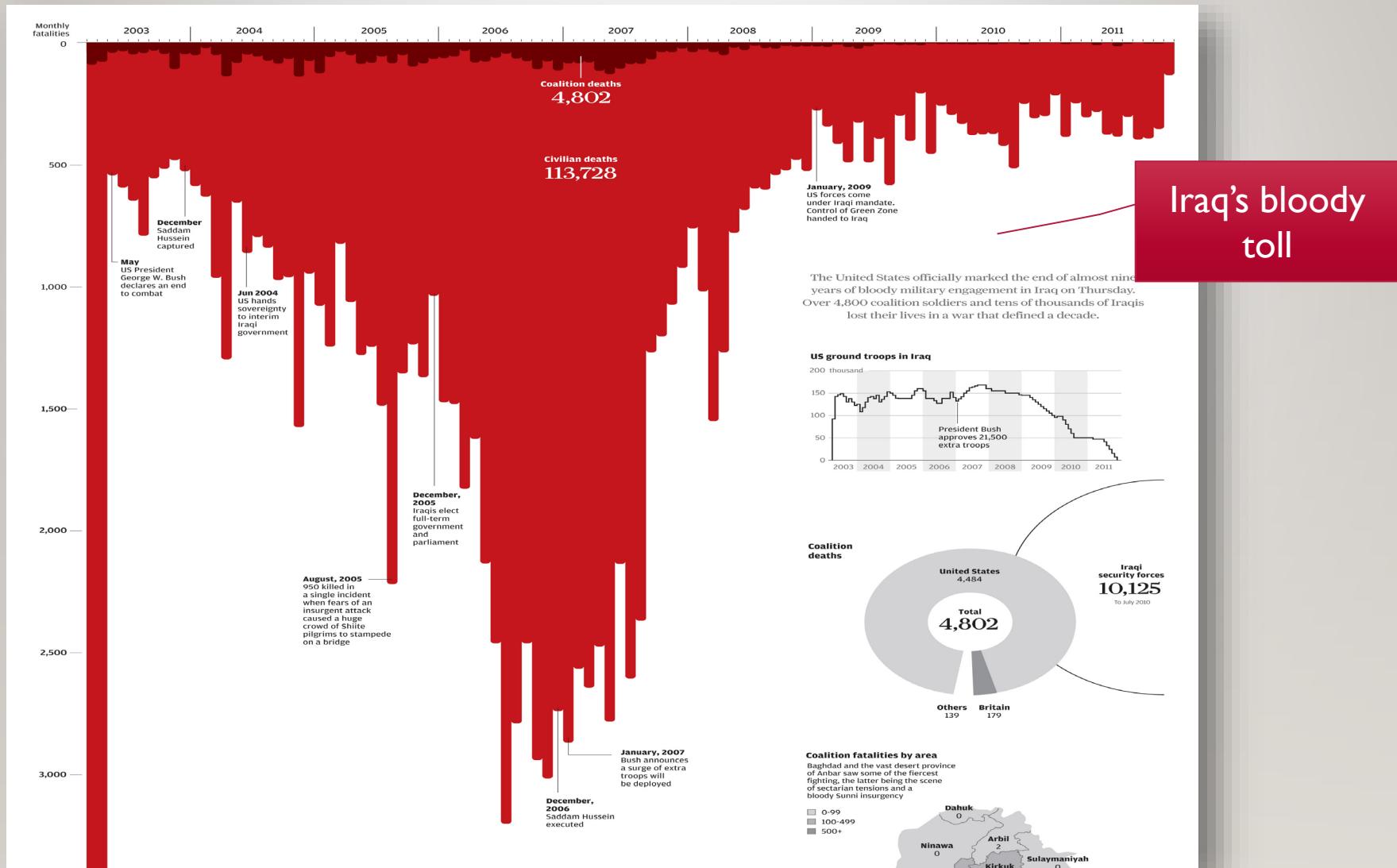
PRAGMATIC AND ANALYTICAL TONE? ..2/2

- Creating a visualisation with a pragmatic tone is about **recognizing a need for a design that delivers fast, efficient and precise portrayals of data.**
- Typically, **you will have a captive audience**, a readership who want to or need to interact and learn from the data.
- This could be a **corporate environment**, where people need to simply learn about recent performance of operational activity or undertake visual analysis to discover potentially revealing patterns.

EMOTIVE AND ABSTRACT TONE? ..1/2

- Sometimes you just want to and need **to move beyond bars, straight lines, and right angles and more towards curves, circles, and other bendy things.**
- **Abstract visualisation**, in terms of its tone, is more about creating an aesthetic that portrays **a general story or sense of pattern.**
- **Might not be able to pick out every data point or category**, but there is enough visual information to give a feel for the physicality of the data.
- **Consequences** of such choice:
 - Known reduction in accuracy of value perception.

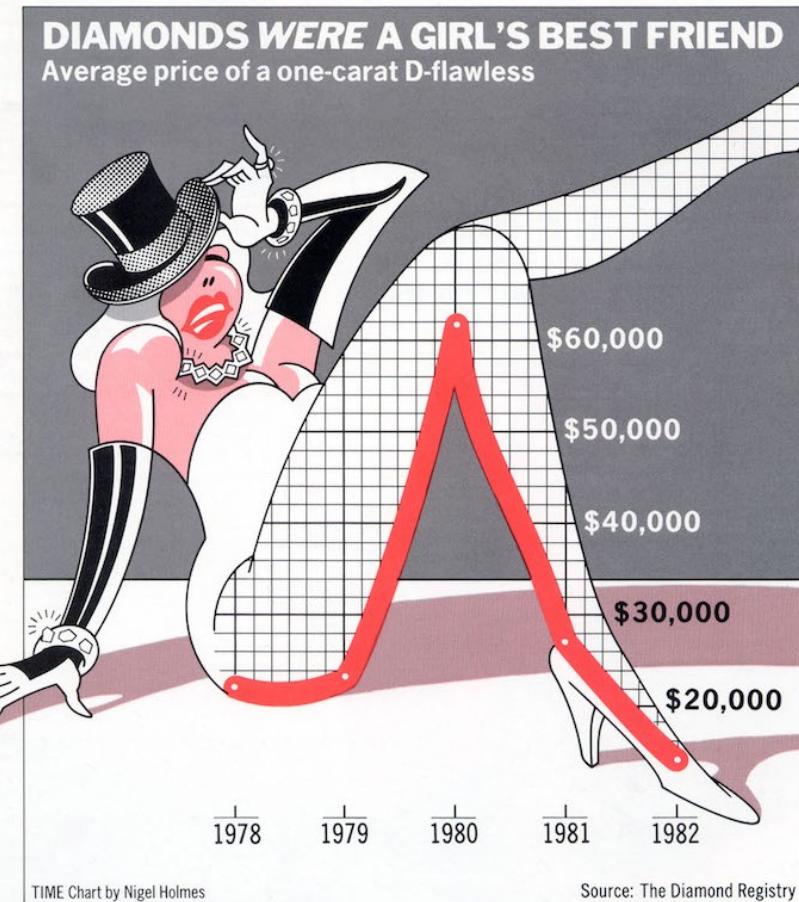
EMOTIVE AND ABSTRACT TONE? ..2/2



DO NOT STRETCH TOO FAR

- Do not stretch the functional and tonal responsibility and capability of visualisation too far.
- This is where any hype and disproportionate expectation about the potential impact of data visualisation can be misplaced.
- **DATA VISUALISATION** is **a means to an end**, not an end in itself.
- It is a **bridge** connecting the messenger to the receiver and its limitations are framed by our own inherent irrationalities, prejudices, assumptions, and irrational tastes.

STRETCHED TOO FAR



Classified as a
Junk Chart

DATA VISUALISATION

BIG DATA ANALYTICS
AND VISUALISATION