Data Visualization

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a GlobalLogic company

METHOD

01 Why visual storytelling is important

02 Presenting the Data

03 Adding a Narrative to the Data

Visual storytelling helps make **complex stories easier to understand** and deliver a more **impactful message**.

It is also a way to **grab attention quicker** in an era where attention span is limited.

Facts are not as Memorable as Stories

DATA

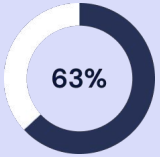
Cold, factual, objective

Only 5% remembered individual statistics

vs.

STORY

Warm, emotional, subjective



Yet 63% remembered visual

What is it used for

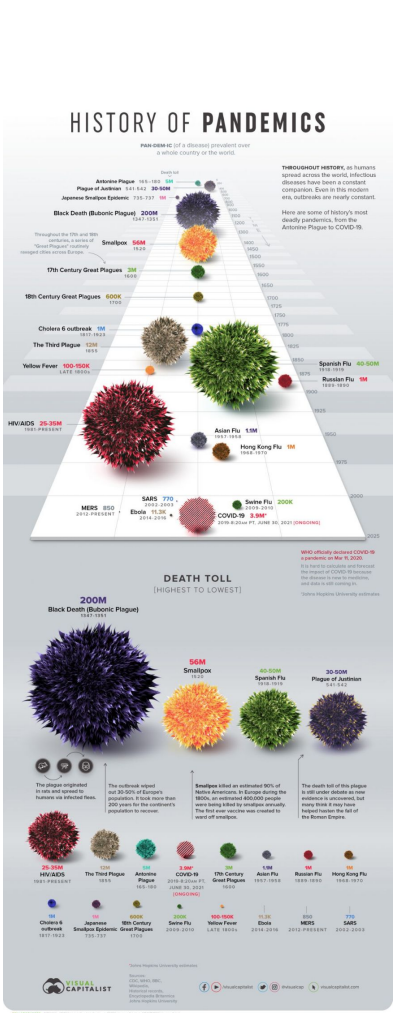
- Bring concepts to life
- Show a future vision
- Make data more consumable
- Make information more relatable
- Explain a difficult notion
- Animate information
- Redirect attention
- Engage to act
- Prove a point

What composes a visual story

- Illustrations
- Photos
- Videos
- Icons
- Narrative
- Text
- Data
- Charts
- Colors
- Style
- Structure

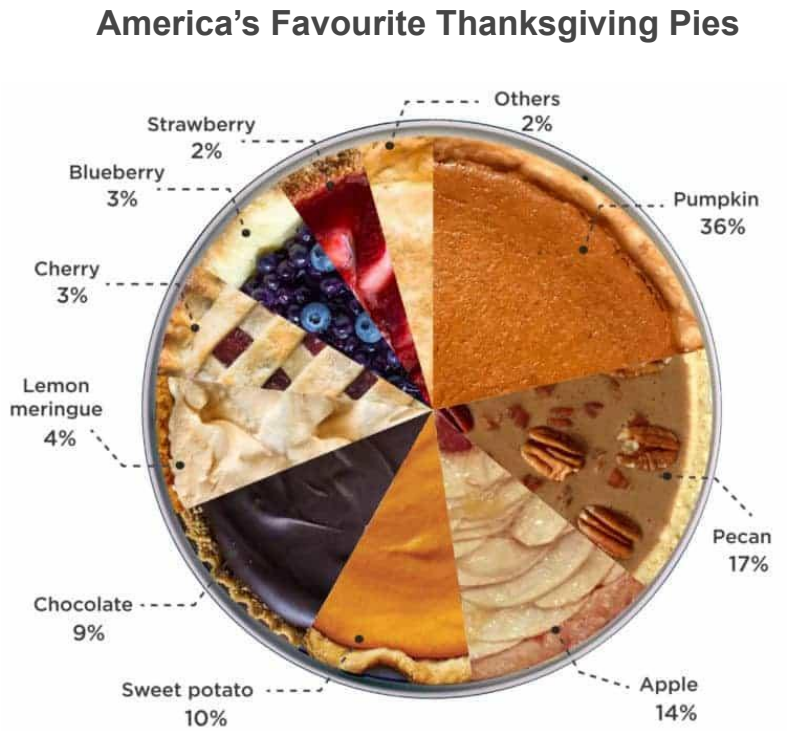
Some examples

Infographics

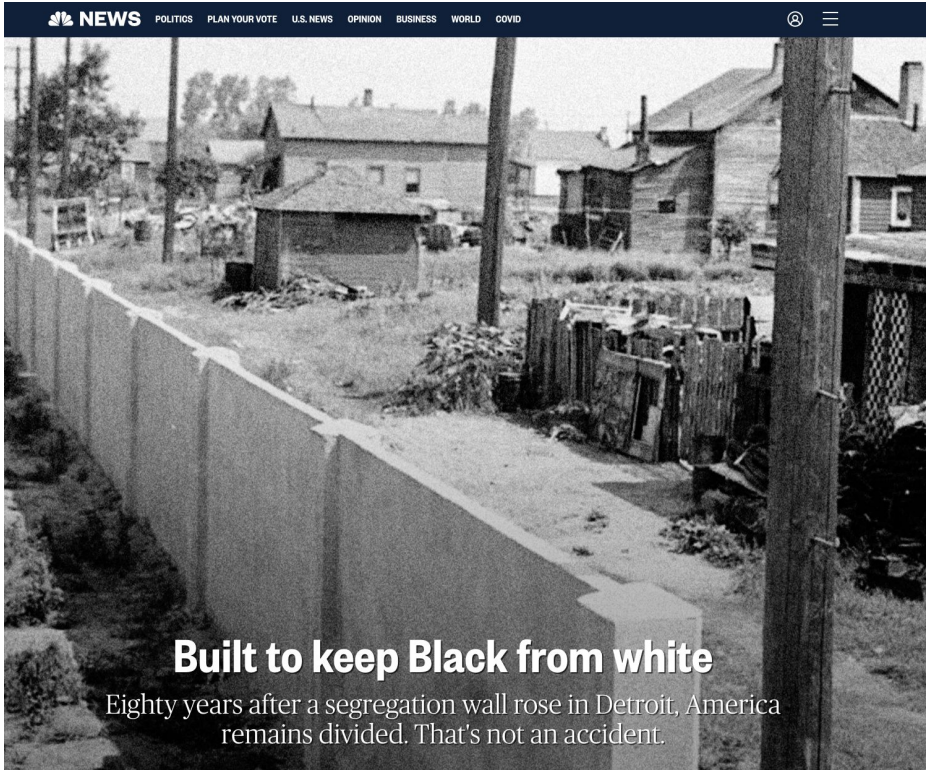


Data-driven movie

Graph with imagery



Website story



Pitch deck

01 Why visual storytelling is important

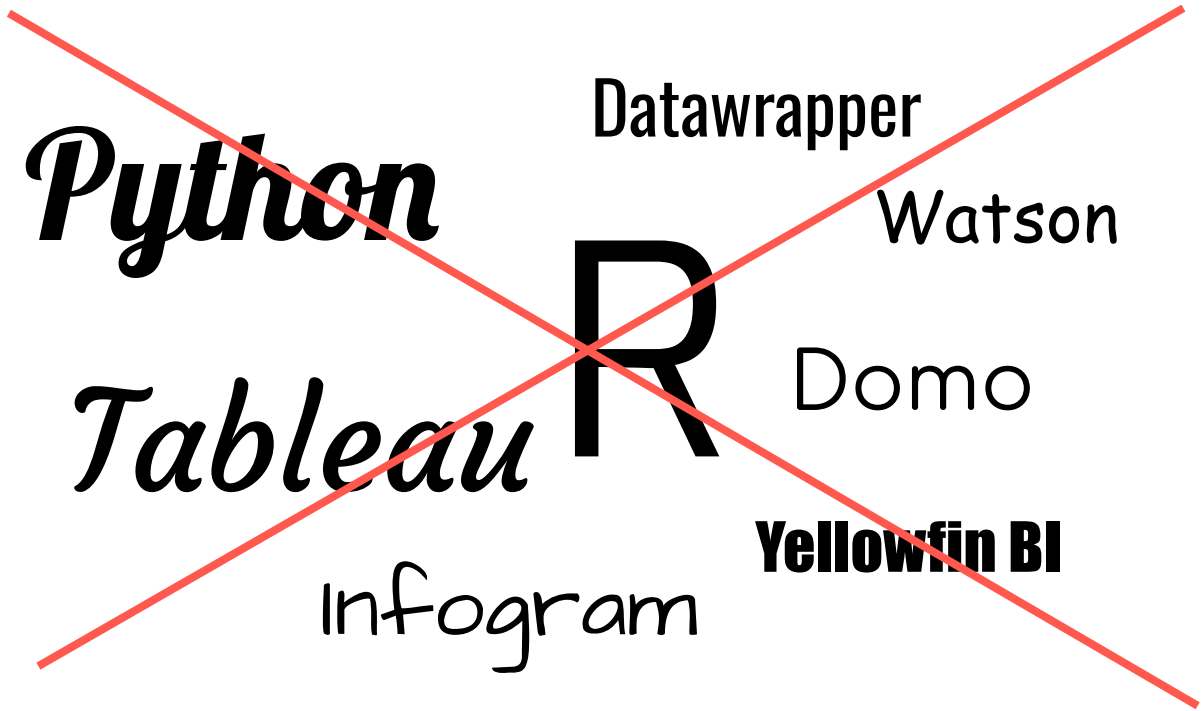
02 Presenting the Data

03 Adding a Narrative to the Data

What is Data Visualization

Data and information visualization is an interdisciplinary field that deals with the **graphic representation of data and information**. It is a particularly efficient way of communicating when the data or information is numerous as for example a time series.

FIGMA



POWERPOINT

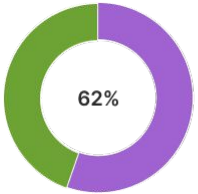
5 Principles for An Effective Data Visualization 📌

1. **Check for the right data:** sound and accurate data but also pick the data that will be the most relevant (% change, total, ratio…)
2. **Select the right visualization:** use of the right graph to represent the data
3. **Remove the noise:** identify the right signal, remove surplus data, aggregate less important data, remove unnecessary labels
4. **Focus attention:** use color contrasts, fonts, highlights
5. **Make it approachable:** make it easy (trends, reference lines, colors, icons, relatable comparisons…)

Do you see the difference?

Question: "I can access the water I require to meet my household consumption needs."	Number of Responses	Percentage
Strongly disagree	6	10%
Disagree	10	16%
Neither agree nor disagree	7	12%
Agree	25	42%
Strongly Agree	12	20%
TOTAL	**60**	**100%**

OR

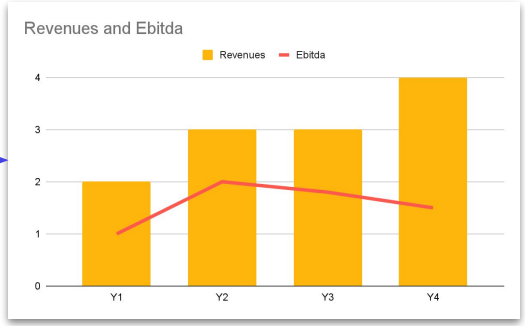


62% of respondants agree that they can access the water they need for their hourshold's consumption

Not All Data are Alike

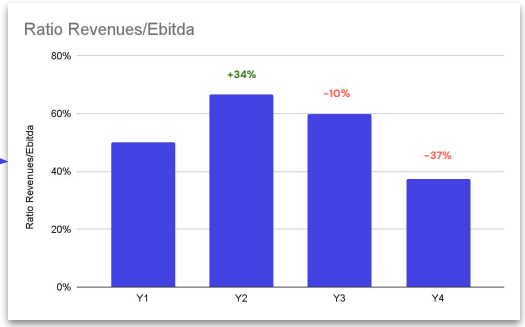
Deciding which data to focus on is changing the visualization and the message we are conveying

	Y1	Y2	Y3	Y4
Revenues	$2M	$3M	$3M	$4M
Ebitda	$1M	$2M	$1.8M	$1.5M



What interesting information can I also withdraw from these data?

Ratio Rev/Ebitda	50%	67%	60%	38%



Create new Data Points

Category	Total Funding Amount (CAN$)	% of Canada's Total International Assistance	% of Canadian International Assistance Targeting or Integrating Gender
Early Childhood Education	1,191,701	0.08	97
Primary Education	38,051,880	2.67	70
Secondary Education	66,767	0.02	19
Higher Education	8,005,070	0.56	80
Education Facilities and Training	14,411,611	1.01	84
Teacher Training	14,750,989	1.03	64
Education Policy and Administrative Management	27,893,532	1.96	87

ANSWER

- $ amounts
- Part dedicated to education vs. logistics
- International $ amount dedicated to education
- % of teacher training against all CAN funding

Create new Data Points

DISTRIBUTION OF WOMEN BY EDUCATIONAL LEVEL, 2005-2009

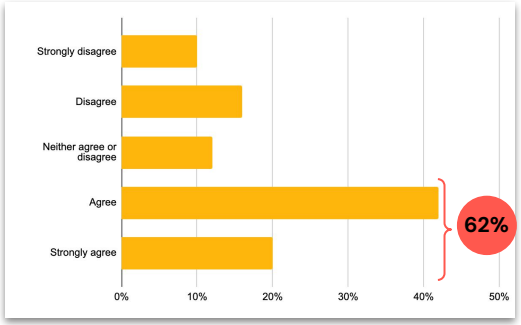
Annual census survey	No qualifications	Lower secondary	Upper secondary	Higher education
2005	14.4	34.1	20.5	31.1
2006	13.9	33.3	21.0	31.8
2007	13.6	32.3	21.4	32.8
2008	13.3	31.6	21.9	33.3
2009	12.9	30.5	22.2	34.4

Note: Age reached in the year. Table limited to women aged 20-49 given that most women aged 15-19 are still at school and have not yet completed their education.
Population: Metropolitan France, women aged 20-49 living in ordinary households at the time of the census survey.
Sources: INSEE, annual census surveys 2005-2009.

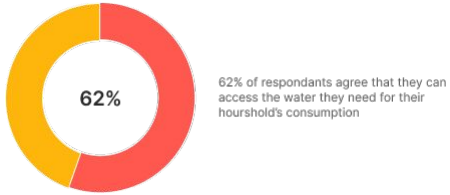
ANSWER
% increase between each year and for each education level

Data Visualization

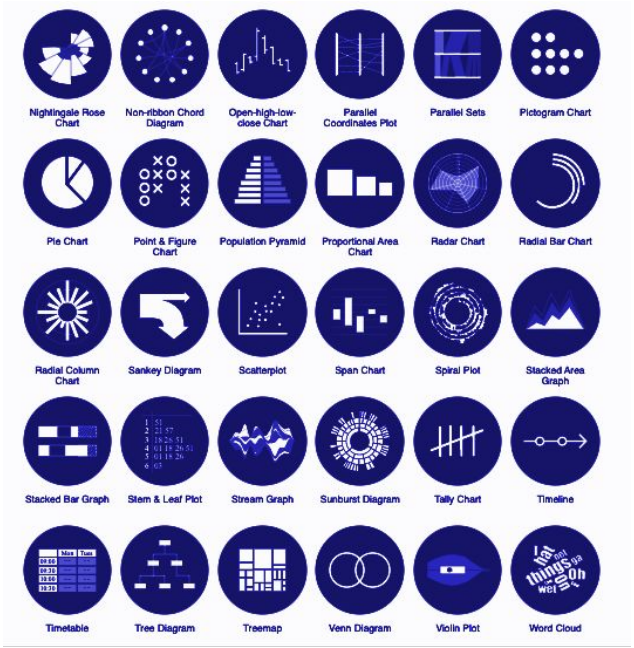
Do you see the difference?



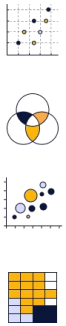
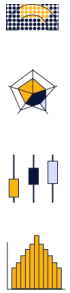
OR



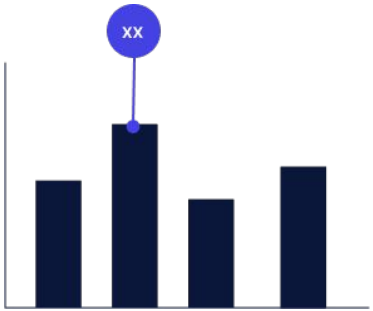
The Different Graphs

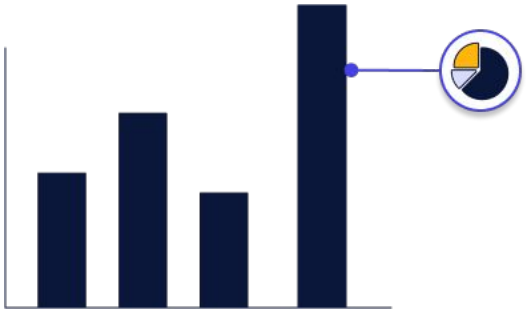


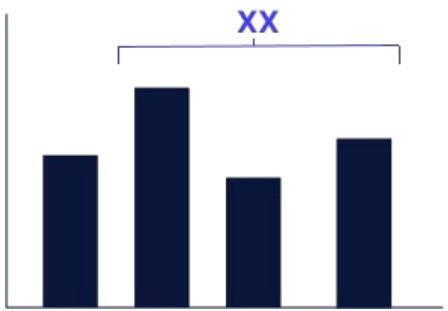
Which Graph to Use When

Trends	Composition	Relationship	Flow	Distribution	Comparison
					

Some ways to Emphasize Information







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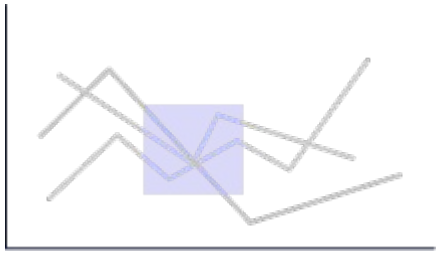
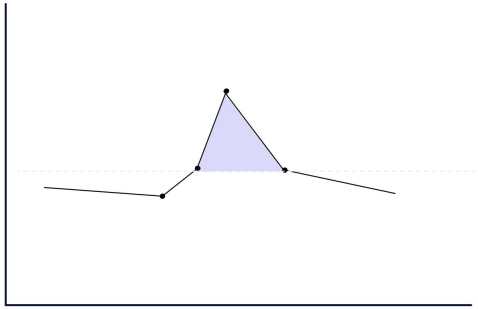
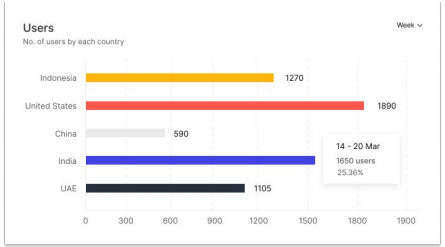
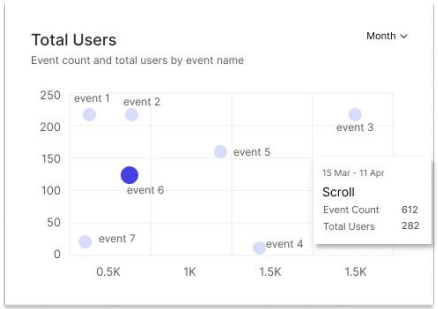




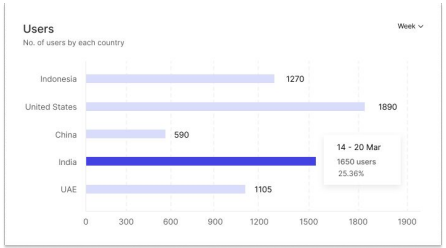
Some Do's & Don'ts

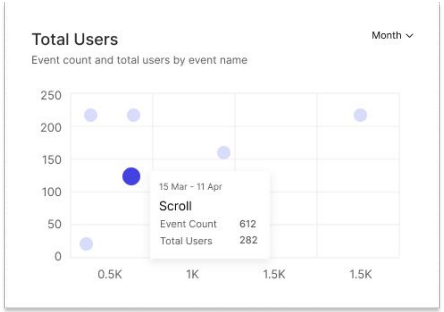
Don't





Do





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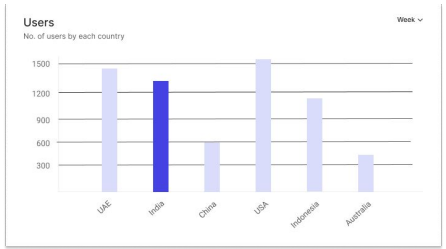

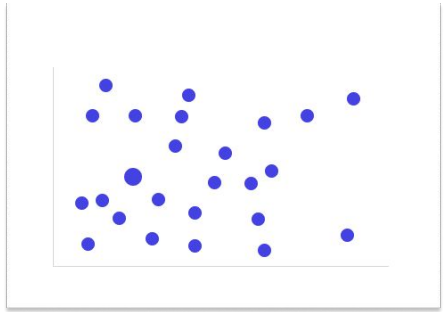

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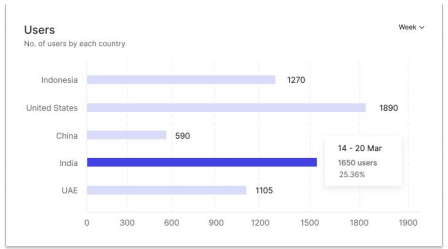

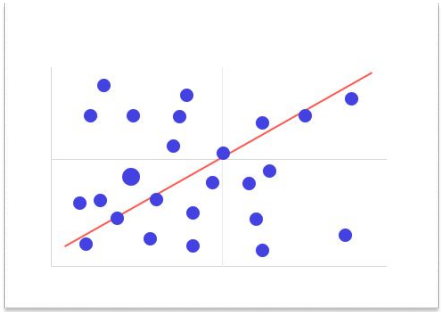

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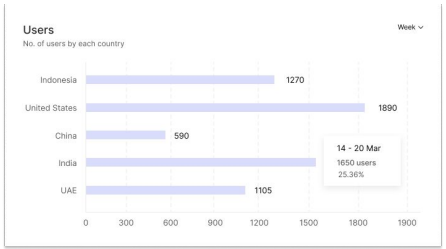
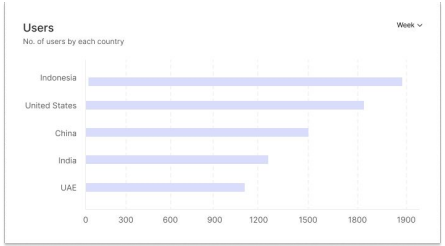
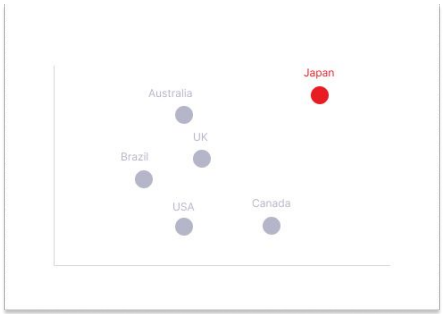
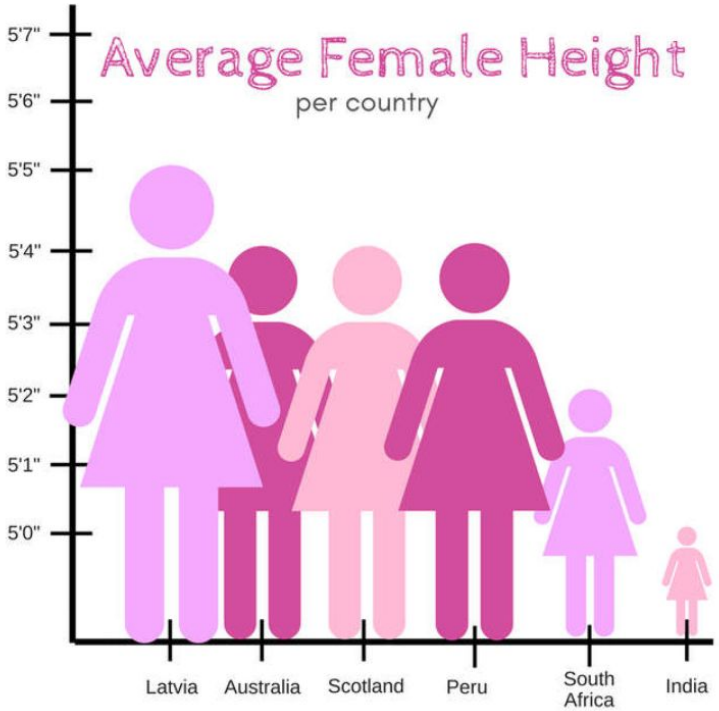


Do



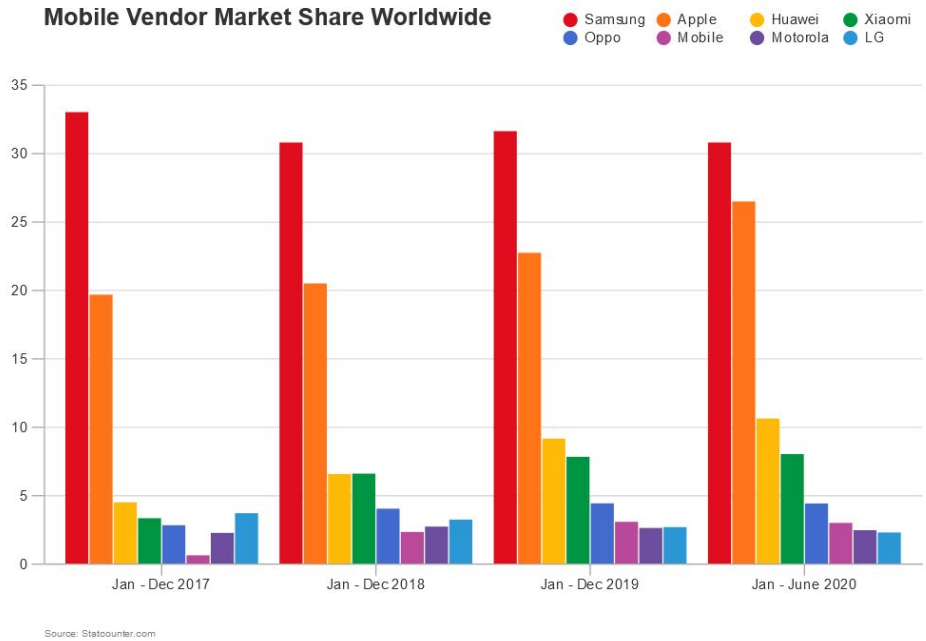


What is Wrong with this Graph?



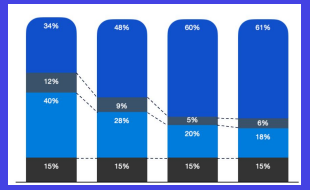
ANSWER
Proportions are not respected.

What is Wrong with this Graph?



ANSWER

Hard to read. Use a stacked bars to represent these data and add reference lines to show the trends.



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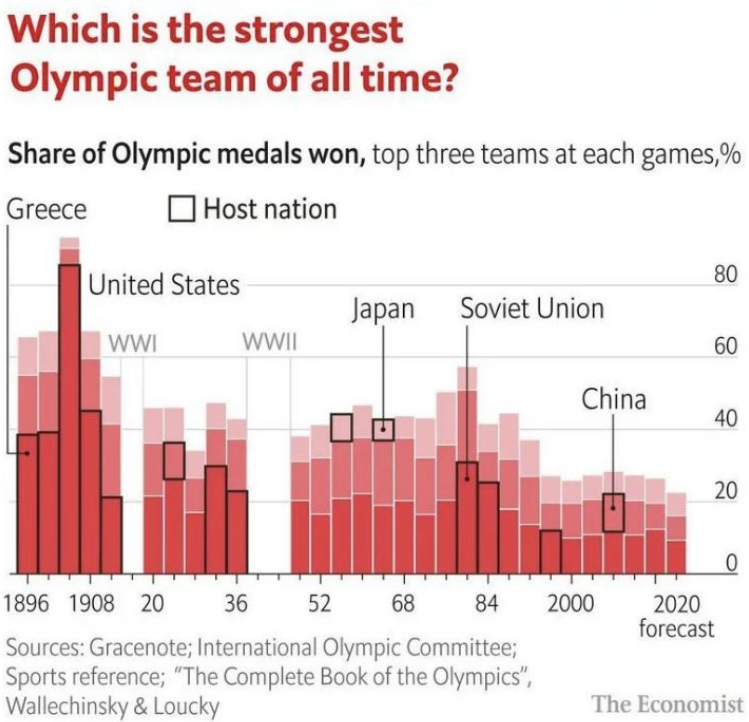
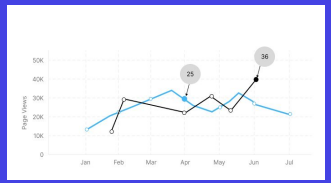


ANSWER

Hard to read. Cannot depict clearly what information we are trying to show. Trend lines with a highlight at the critical data points would have been a better representation.



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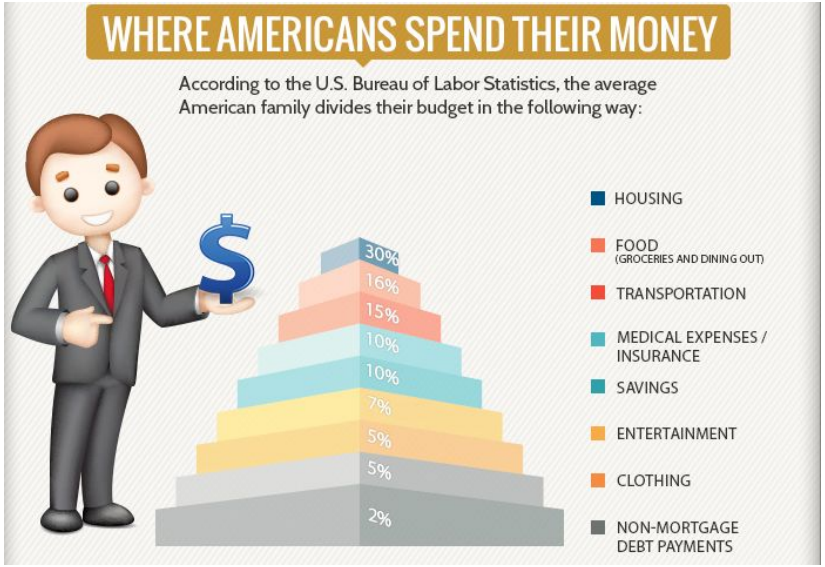
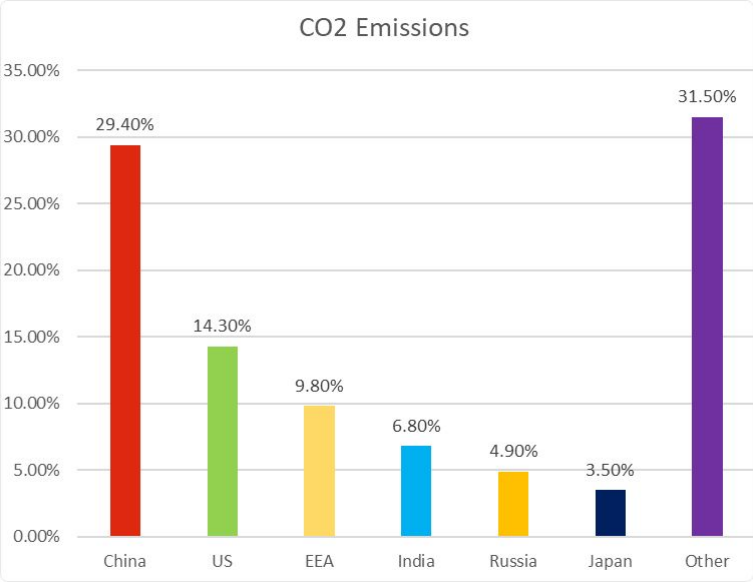


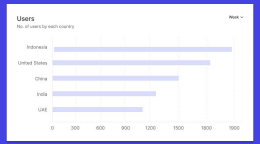
ANSWER
This representation is upside down. 2% is representing more area than 30%.

What is Wrong with this Graph?



ANSWER

Too many colors. It would have been better to rank the countries by order of magnitude.



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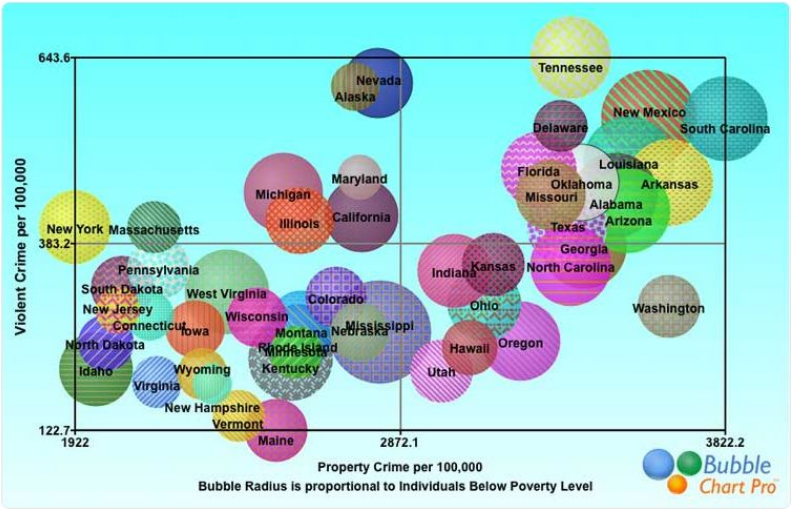


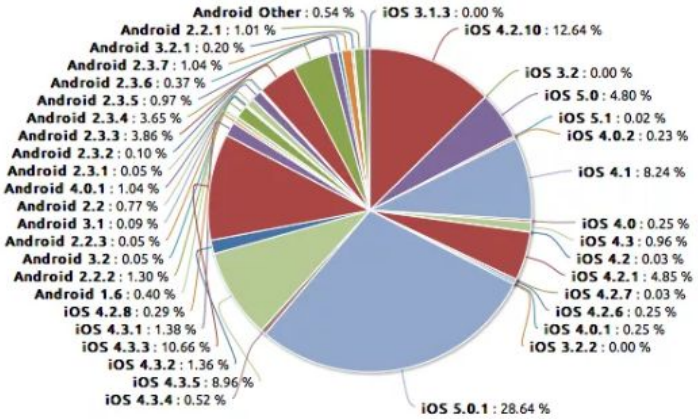
ANSWER

Too much noise. Reduce the number of colors, reduce the number of states being shown. Highlight the most important ones in the max and the min and do not show the others.

What is Wrong with this Graph?

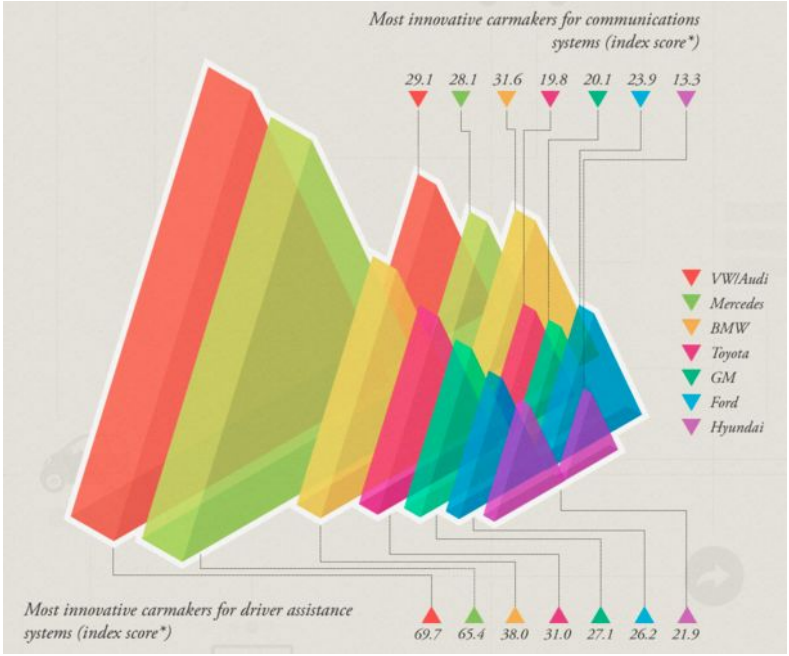
ANSWER
The axis does not start at 0 so the proportions are incorrect.

Improve the Following Graph



ANSWER
Group Android and IOS and represent only the part of each.

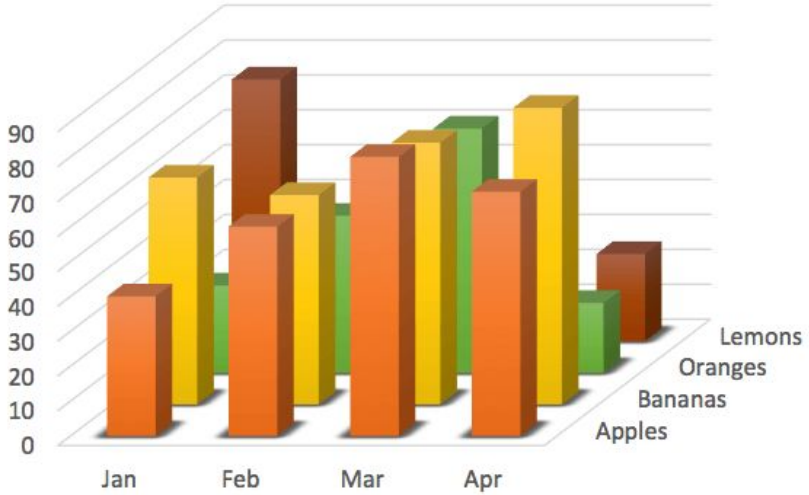
Improve the Following Graph



ANSWER

3D is usually a bad pick. Use horizontal bars or stacked bars to represent these data.

Improve the Following Graph



ANSWER

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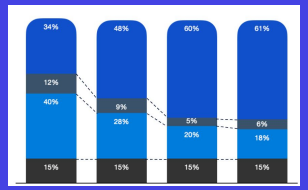


Homework #1

Data Visualization

Create one **data visualization** for each table, without narrative, and check with others about clarity and comprehension.

1

RespondentID	Gender	Country	Other Country	Age	Education
2951739021	Male	United States		26-34	Master's degree
2951693865	Female	United States		18--25	4-year college
2951417162	Male	United States		35-45	4-year college
2951221286	Female	Russia		26-34	Master's degree
2951163956	Female	United States		18--25	4-year college
2950968936	Male	United Kingdom		35-45	Professional degree
2950812533	Male	India		18--25	4-year college
2950804831	Male	Australia		18--25	4-year college
2950794813	Female	United Kingdom		18--25	4-year college
2950749702	Male	India		26-34	Professional degree
2950742811	Male	Netherlands		26-34	4-year college

2

Country Name	Country Code	Indicator Name	Indicator Code	2000	1990	1980	1970	1960
Antigua and Barbuda	ATG	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	10143.3681	9454.02125	4639.18769		
Argentina	ARG	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	7695.59407	5581.96234	7540.68526	6611.2342	5251.87675
Aruba	ABW	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	20589.7718	18467.9623			
Bahamas, The	BHS	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	21258.2924	19970.5083	17954.4174	16944.1771	11926.461
Barbados	BRB	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	9565.40123	8471.08863	7861.83475	6210.63034	3396.94571
Belize	BLZ	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	3329.66373	2476.81753	1979.79968	1193.02891	950.424005
Bolivia	BOL	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	1010.90737	871.226077	1071.00132	927.098223	894.756972
Brazil	BRA	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	3696.14677	3352.9654	3536.04587	1988.92152	1447.84381
Cayman Islands	CYM	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD					
Chile	CHL	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	5144.58925	3067.65058	2500.26773	2201.35147	1841.08015
Colombia	COL	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	2511.97467	2324.84363	2019.85473	1488.34837	1188.25353
Costa Rica	CRI	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	4068.82135	3119.63256	3189.03983	2371.55976	1797.96646
Cuba	CUB	GDP per capita (constant 2000 US	NY.GDP.PCAP.KD	2752.55209	3338.78508	2411.27844	1777.65568	

3

Analyte	Change in frequency response (Hz)	Change in resistance response (Ω)	Initial response time (sec)	Initial response slope (Hz/sec)	Return to baseline slope (Hz/sec)	Full width half maximum (sec)
Kiwi	1.2	0.016	16.1	-0.075	0.149	17.7
Mango	2.3	0.018	22.5	-0.102	0.186	20.1
Papaya	1.7	0.031	17.2	-0.099	0.110	17.9
Pineapple	1.6	0.018	20.4	-0.078	0.135	22.7
Strawberry	2.2	0.029	15.0	-0.146	0.147	26.3
Honeydew	3.2	0.074	29.0	-0.110	0.186	25.6
Cantaloupe	2.9	0.036	17.2	-0.169	0.203	19.2
Watermelon	4.8	0.044	31.1	-0.154	0.241	34.2
Red grape	4.1	0.055	10.7	-0.382	0.272	13.0
Ambrosia Apple	1.4	0.108	11.8	-0.119	0.112	15.6
Red Delicious Apple	1.3	0.087	11.8	-0.110	0.104	14.2
Granny Smith Apple	1.3	0.101	9.7	-0.135	0.093	16.4
Rome Apple	1.0	0.125	9.7	-0.103	0.080	16.7
Jazzenza Apple	1.8	0.222	8.6	-0.209	0.127	10.0
Gala Apple	1.8	0.139	11.8	-0.152	0.124	18.8
Navel Orange1	1.5	0.060	16.1	-0.093	0.093	18.6
Tangerine1	1.5	0.067	19.3	-0.078	0.114	17.2
Tangerine2	1.5	0.042	13.9	-0.108	0.101	17.6
Navel Orange2	1.2	0.052	10.7	-0.112	0.076	14.7
Red Onion	2.9	0.205	10.7	-0.270	0.179	15.8
Yellow Onion	1.2	0.095	14.0	-0.086	0.120	18.7
White Onion	1.3	0.081	14.0	-0.093	0.085	17.5
Garlic outer shell	1.7	0.104	11.8	-0.144	0.082	19.2
Garlic inner shell	1.5	0.116	7.5	-0.199	0.133	20.5
Garlic core	1.7	0.063	18.2	-0.093	0.161	15.0
Sharp Cheddar Cheese	1.4	0.040	11.8	-0.118	0.101	14.8
Swiss Cheese	1.5	0.040	16.1	-0.093	0.101	15.3
American Cheese	2.0	0.043	25.8	-0.078	0.158	15.5
White Merlot Wine	2.1	0.025	8.6	-0.244	0.129	16.8
White Zinfandel Wine	1.9	0.015	12.9	-0.147	0.132	12.6
Pinot Grigio Wine	2.5	0.030	7.5	-0.333	0.108	15.2
Average (mean)	1.9	0.070	14.9	-0.143	0.134	17.9
Standard deviation	0.9	0.051	6.0	0.075	0.047	4.6

Data Visualization

Create one **data visualization** for each table, without narrative, and check with others about clarity and comprehension.

4

Sales report						
Managers	January	February	March	April	May	June
Aaron	20450	27298	23501	27966	23709	18789
Alex	0	0	8445	10050	12230	10583
Ashley	14017	13223	16876	20082	20189	15299
Blake	30892	28993	34557	41123	35234	29808
Caroline	27738	26775	29901	35582	32830	25405
Daniel	15606	14255	17118	20370	16955	15341

5

	Daily Time Spent on Site	Age	Area Income	Daily Internet Usage	Ad Topic Line	City	Male	Country	Timestamp	Clicked on Ad
0	68.95	35	61833.90	256.09	Cloned 5thgeneration orchestration	Wrightburgh	0	Tunisia	2016-03-27 00:53:11	0
1	80.23	31	68441.85	193.77	Monitored national standardization	West Jodi	1	Nauru	2016-04-04 01:39:02	0
2	69.47	26	59785.94	236.50	Organic bottom-line service-desk	Davidton	0	San Marino	2016-03-13 20:35:42	0
3	74.15	29	54806.18	245.89	Triple-buffered reciprocal time-frame	West Terrifurt	1	Italy	2016-01-10 02:31:19	0
4	68.37	35	73889.99	225.58	Robust logistical utilization	South Manuel	0	Iceland	2016-06-03 03:36:18	0
5	59.99	23	59761.56	226.74	Sharable client-driven software	Jamieberg	1	Norway	2016-05-19 14:30:17	0
6	88.91	33	53852.85	208.36	Enhanced dedicated support	Brandonstad	0	Myanmar	2016-01-28 20:59:32	0
7	66.00	48	24593.33	131.76	Reactive local challenge	Port Jefferybury	1	Australia	2016-03-07 01:40:15	1
8	74.53	30	68862.00	221.51	Configurable coherent function	West Colin	1	Grenada	2016-04-18 09:33:42	0
9	69.88	20	55642.32	183.82	Mandatory homogeneous architecture	Ramirezton	1	Ghana	2016-07-11 01:42:51	0

6

Q4. Frequency of drinking

Duplicate | RAW DATA

Values	Colas (e.g., Coca Cola, Pepsi Max)?	Sparkling mineral water	Coffee
1	9.00	7.00	7.00
2	8.00	9.00	9.00
3	7.00	3.00	9.00
4	8.00	1.00	8.00
5	9.00	3.00	1.00
6	9.00	1.00	1.00
7	5.00	8.00	9.00
8	7.00	4.00	9.00
9	5.00	3.00	9.00
10	7.00	4.00	9.00
11	8.00	3.00	9.00
12	6.00	6.00	8.00
13	5.00	2.00	1.00
14	6.00	4.00	5.00
15	9.00	2.00	6.00
16	8.00	1.00	9.00

01 Why visual storytelling is important

02 Presenting the Data

03 Adding a Narrative to the Data

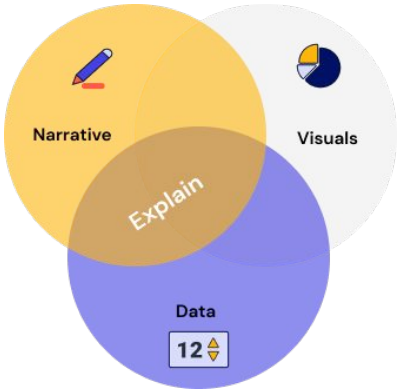
Do you see the difference?

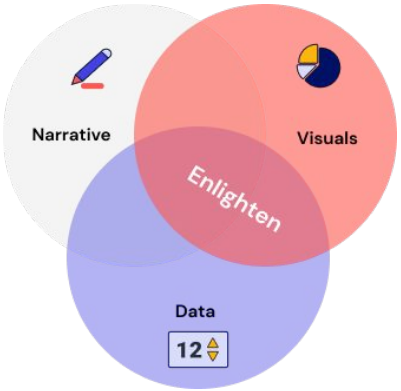
- You have driven X miles with Uber

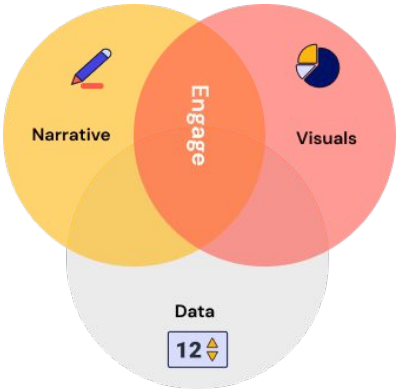
OR

- You have driven the equivalent of two journeys around the earth, that is X amount of miles

How Data, Visual, and Narrative Complement Each Other





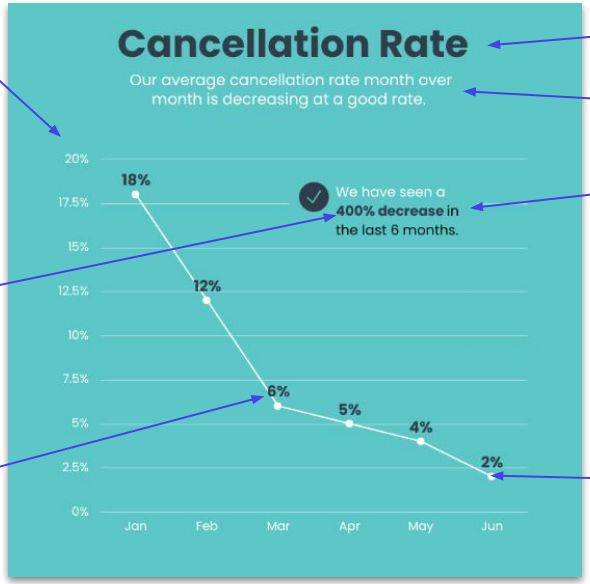


What Makes a Good Visualization

No noise (only the necessary data and info is presented). Clean and easy to understand

Focused attention with the right choice of color contrasts, fonts, highlights

Clear % highlights



Good title

Clear narrative

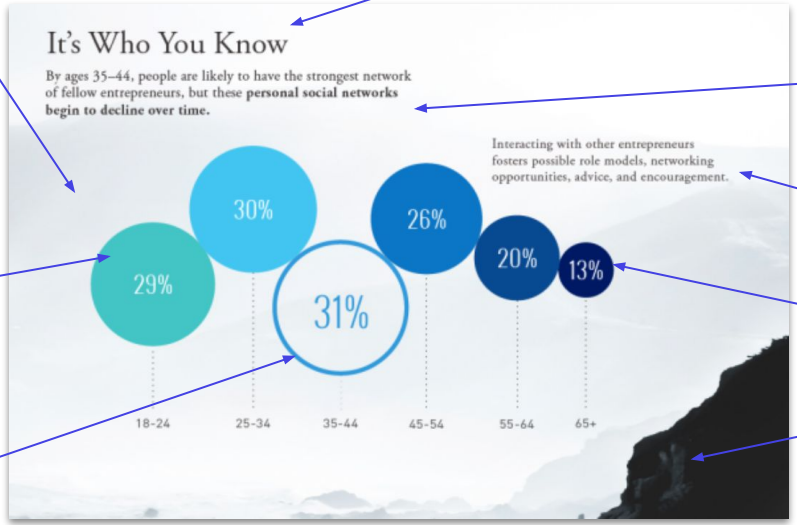
Hidden data

Good choice of graph

What Makes a Good Visualization

Good title

No noise (only the necessary data and info is presented). Clean and easy to understand



Clear narrative. Main point clearly defined

Context

Focused attention with the right choice of color contrasts, fonts, highlights. Good visual anchors

Good choice of graph

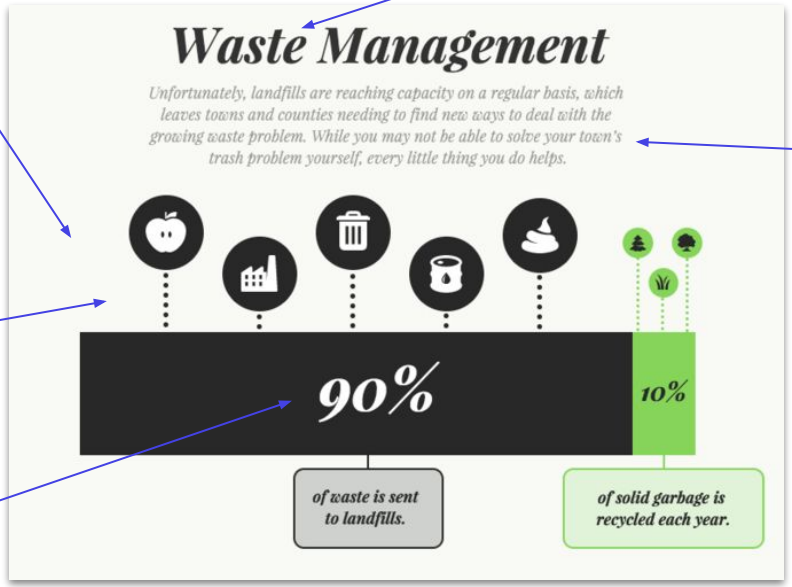
Clear % highlights

Polished presentation

What Makes a Good Visualization

Clear title

No noise (only the necessary data and info is presented). Clean and easy to understand



Clear narrative. Main point clearly defined and context presented

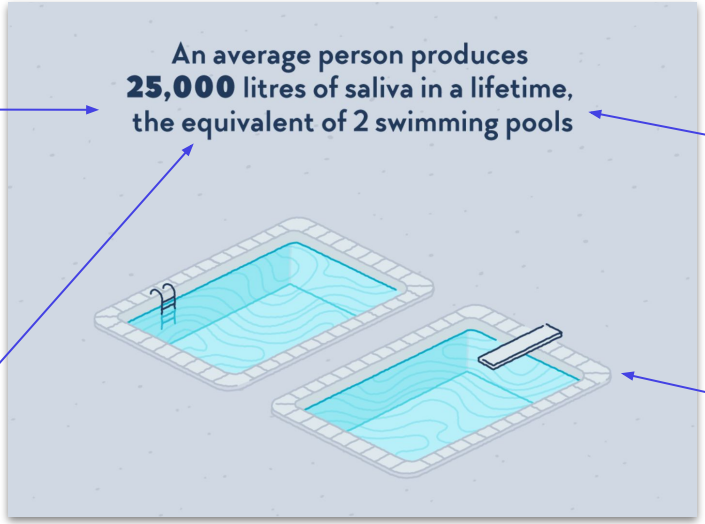
Focused attention and good visual anchors with the use of iconography

Clear % highlights

What Makes a Good Visualization

No noise (only the necessary data and info is presented). Clean and easy to understand

Relatable comparison



Clear narrative. Main point clearly defined

Simple design and good anchor points

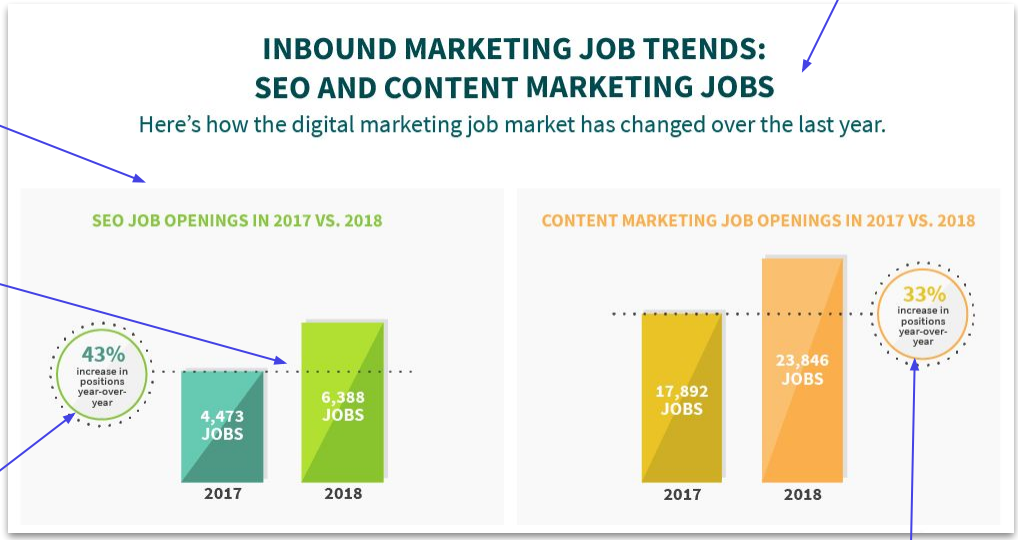
What Makes a Good Visualization

Clear narrative. Main point clearly defined

Clean and easy to understand

Reference line

Clear % highlights



Hidden data revealed

What Makes a Good Visualization

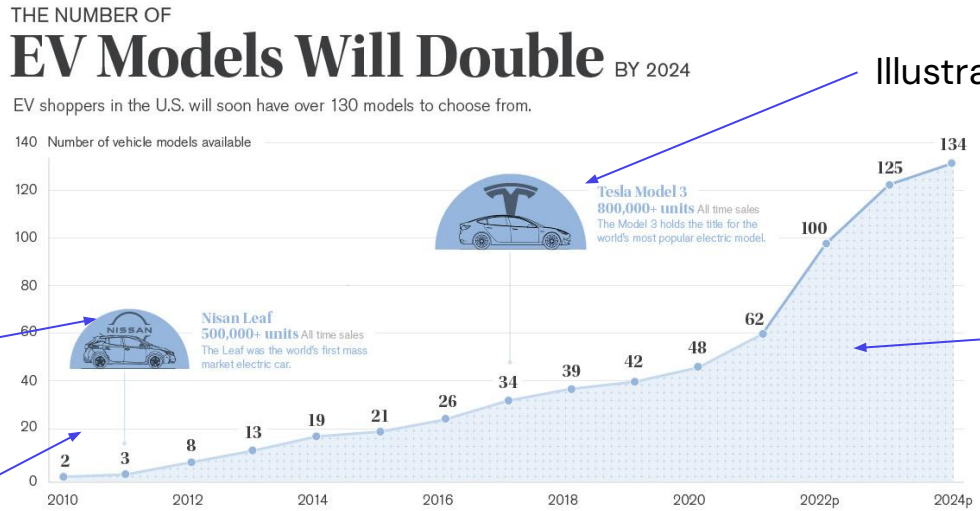
Clear narrative

Illustration

Hidden data revealed

Efficient graph

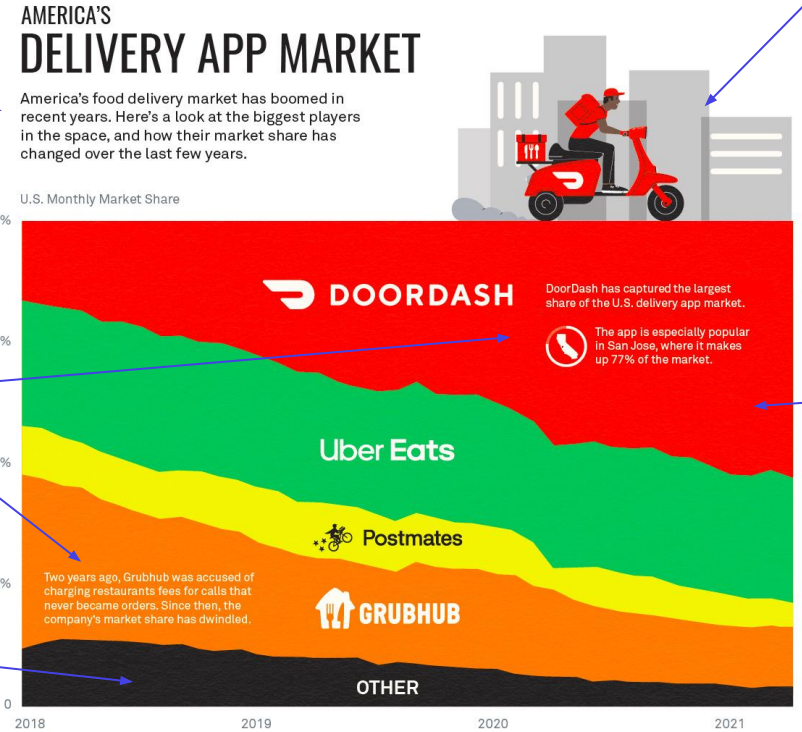
Approachable visualization



What Makes a Good Visualization

Illustration

Clear narrative



Hidden data revealed

Efficient graph

Approachable visualization

What Makes a Good Visualization

Clear title

Illustration

Clear narrative

Hidden information revealed

Approachable visualization

Hidden data revealed

What Makes a Good Visualization

Clear title

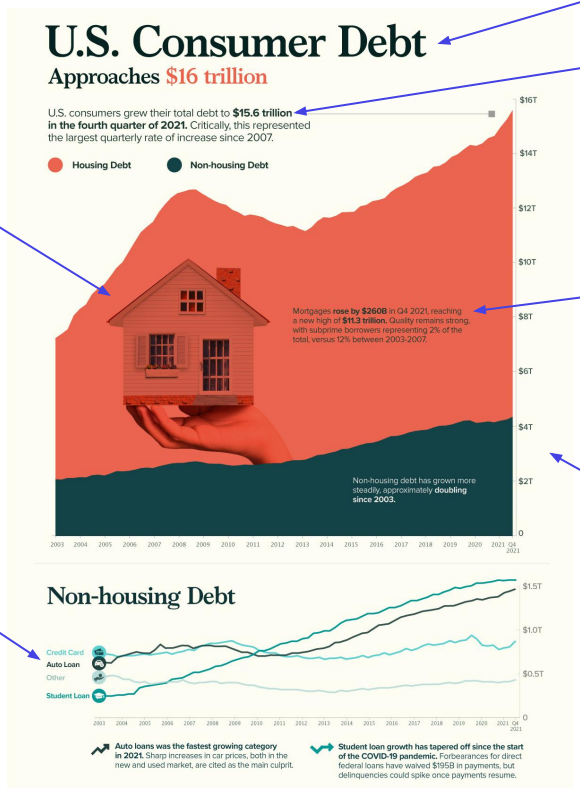
Clear narrative

Imagery

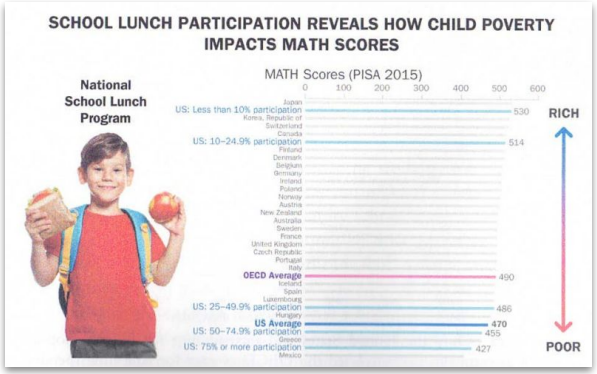
Hidden data revealed

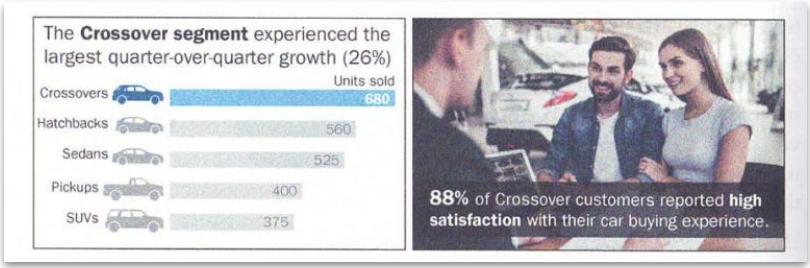
Noise removed and added as secondary element

Approachable visualization



Humanize the Data



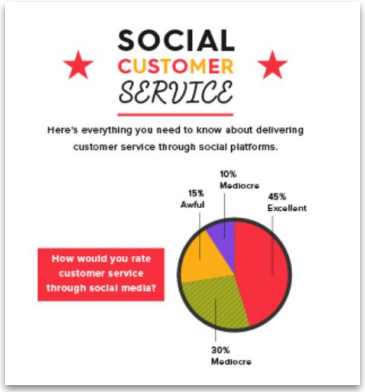


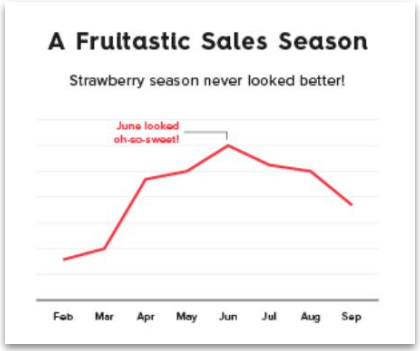
Pitfalls to Visualization

- Nice does not always mean efficient (focusing on the visual only)
- Using information that do not add value (putting narrative for the good sake of using narrative)
- Not having a focus point (does not highlight one main information but multiple)
- Being disconnected from context (no good correlation between the slides or with the data)
- Trying to sound too smart (using too many data or highlighting hidden data that are irrelevant)
- Overdoing it (too much content, graph too sophisticated)

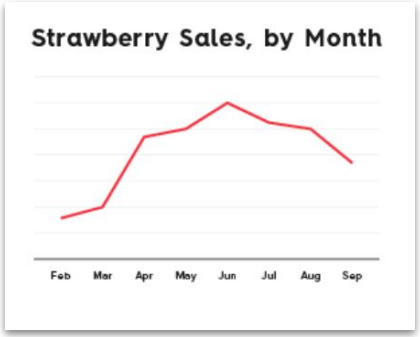
Some Do's & Don'ts

Don't



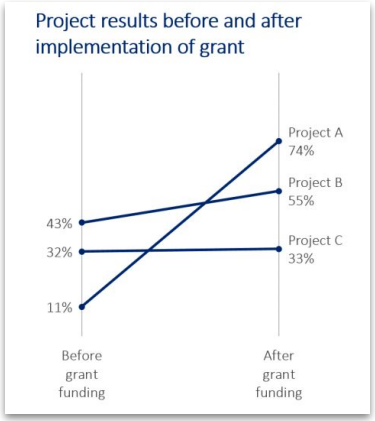


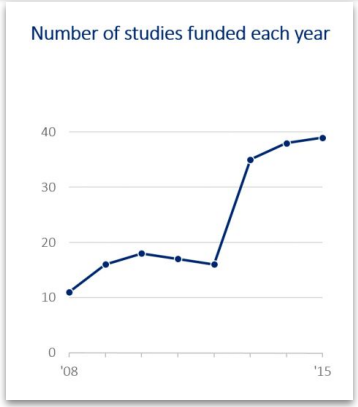
Do



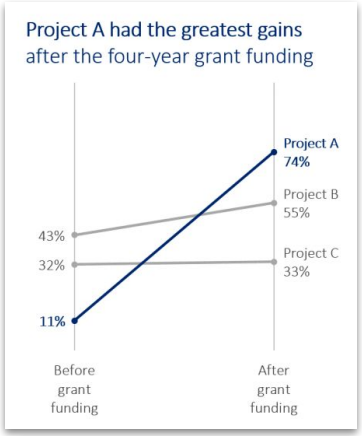
Some Do's & Don'ts

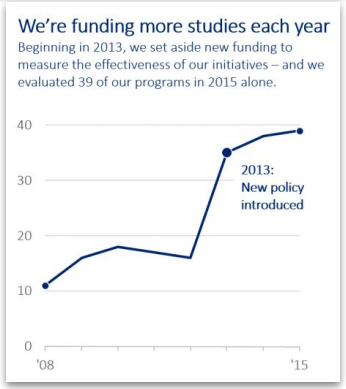
Don't





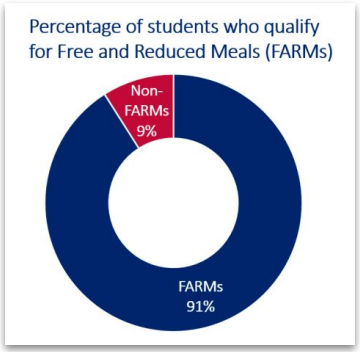
Do

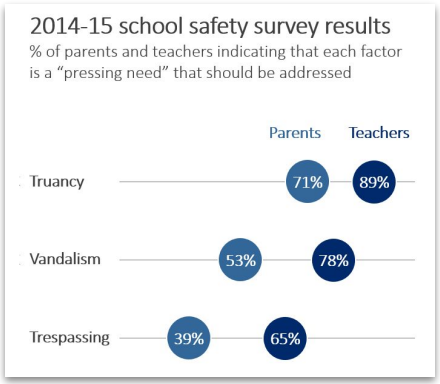




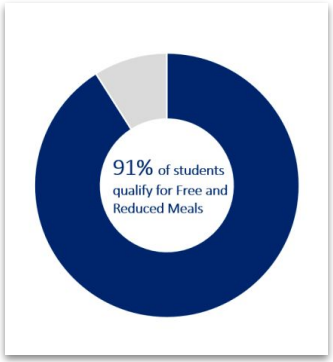
Some Do's & Don'ts

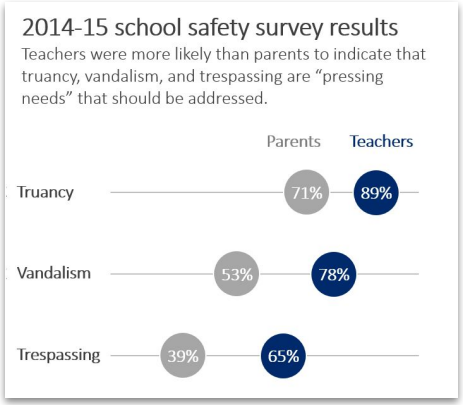
Don't





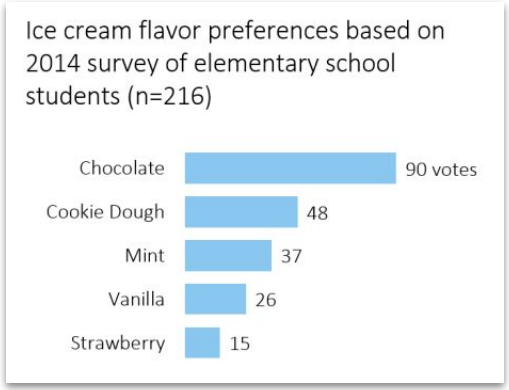
Do





Some Do's & Don'ts

Don't



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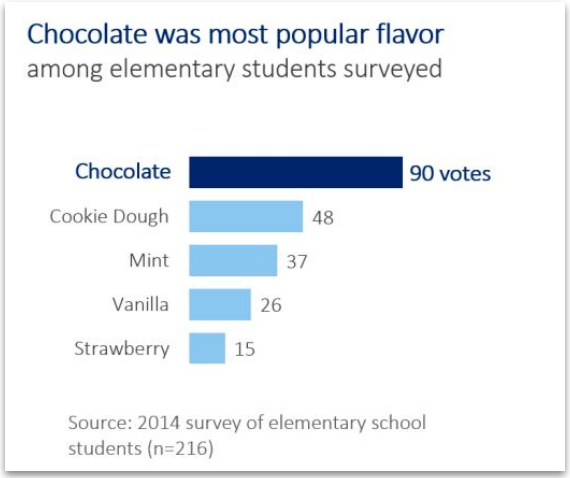
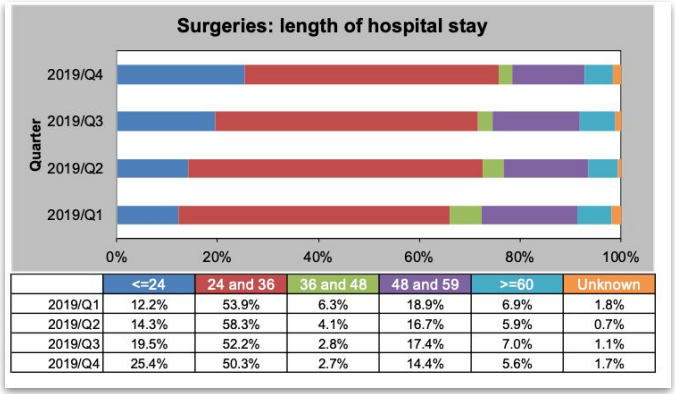


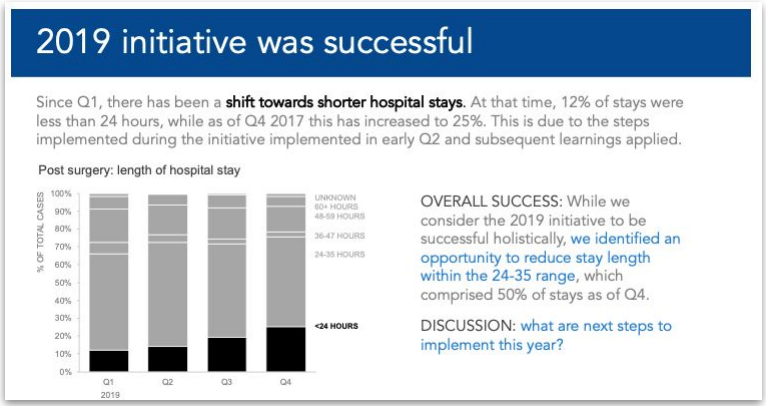
Some Do's & Don'ts

Don't



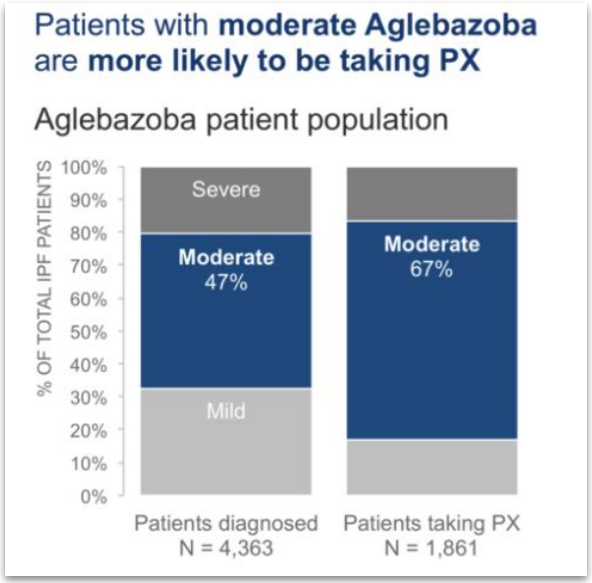
	<=24	24 and 36	36 and 48	48 and 59	>=60	Unknown
2019/Q1	12.2%	53.9%	6.3%	18.9%	6.9%	1.8%
2019/Q2	14.3%	58.3%	4.1%	16.7%	5.9%	0.7%
2019/Q3	19.5%	52.2%	2.8%	17.4%	7.0%	1.1%
2019/Q4	25.4%	50.3%	2.7%	14.4%	5.6%	1.7%

Do



Some Do's & Don'ts

Don't



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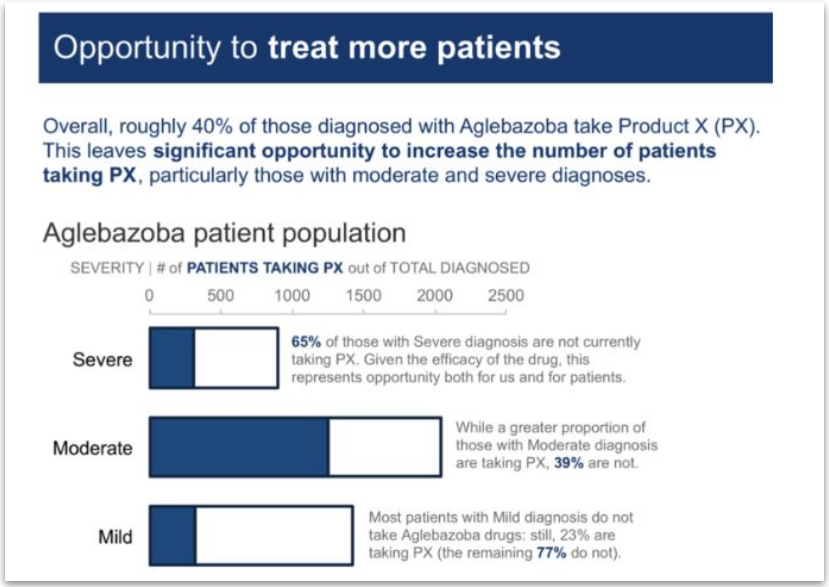
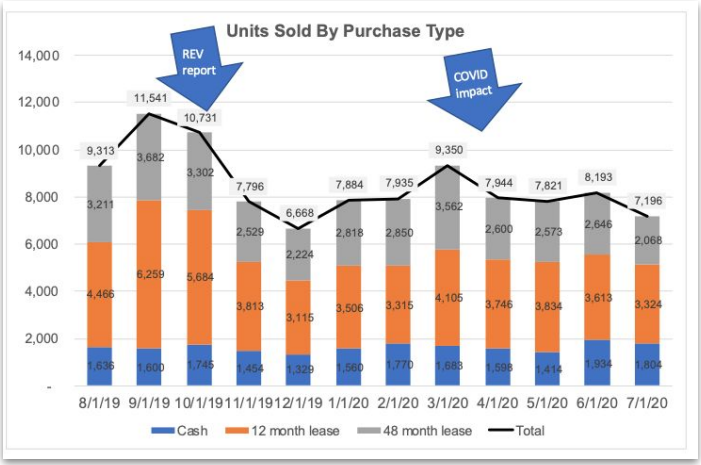


Some Do's & Don'ts

Don't



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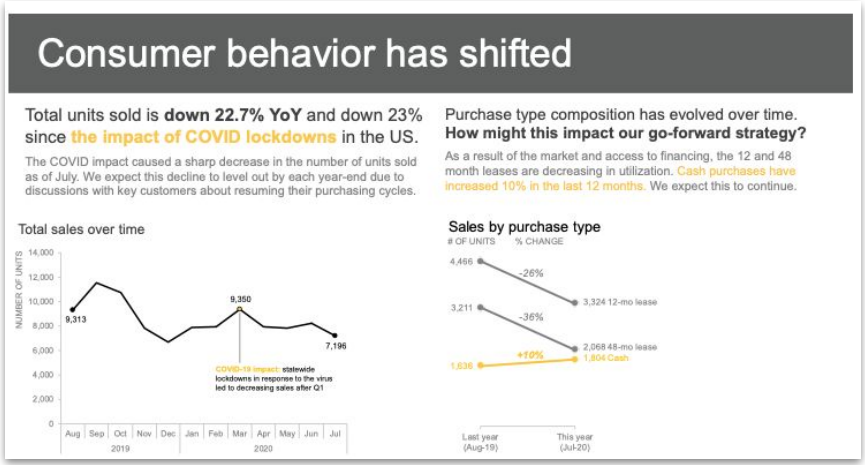

Homework exercise #2

Data Visualization

Create one **data visualization** for each table, WITH narrative, and check with others about clarity and comprehension.

1

Meals served over time

Campaign Year	Meals Served
2010	40,139
2011	127,020
2012	168,193
2013	153,115
2014	202,102
2015	232,897
2016	277,912
2017	205,350
2018	233,389
2019	232,797

2

Encounters over Time by Type
Per 1000 Patients

		2015	2016	2017	2018	2019	2020 (Proj)
In Person	Total	3,659	3,721	3,588	3,525	3,447	3,384
	Primary Care	1,723	1,735	1,681	1,586	1,526	1,500
	Specialty Care	1,936	1,986	1,907	1,939	1,921	1,884
Telephone	Total	28	39	138	263	394	535
	Primary Care	26	34	125	212	295	375
	Specialty Care	2	5	13	51	99	160
Video	Total	0.3	0.5	1.6	2.8	3.4	4.5
	Primary Care	0.2	0.3	0.4	0.8	1.2	2.0
	Specialty Care	0.1	0.2	1.2	2.0	2.2	2.5
Email	Total	1,240	1,287	1,350	1,368	1,443	1,580
	Primary Care	801	831	852	856	897	950
	Specialty Care	439	456	498	512	546	630
TOTAL	Total	4,927	5,048	5,078	5,159	5,287	5,504
	Primary Care	2,550	2,600	2,658	2,655	2,719	2,827
	Specialty Care	2,377	2,447	2,419	2,504	2,568	2,677

3

Step	Users	Conversion	Obstacles
Viewed Home Page	13,129	7.9%	Messaging
Viewed Sign Up Page	1,044	20.6%	Cost, credit card
Signed Up	215	31.2%	Credit card required
Entered Credit Card	67	50.7%	HTML, deployment
Received Submission	34		

Data Visualization

Create one **data visualization** for each table, WITH narrative, and check with others about clarity and comprehension.

4

What's Your Dream Company?

Consulting firm Universum asked some 6,700 young professionals with one to eight years of work experience to choose their ideal employers from a list of firms. Here's the percentage of respondents that chose each company.

<< first < prev 1 2 3 next > last >>

Company	Rank	Percent
Google	1	19.67%
Apple	2	12.74%
Facebook	3	8.90%
U.S. Department of State	4	7.89%
The Walt Disney Company	5	7.67%
Amazon	6	6.63%
FBI	7	6.59%
Microsoft	8	5.76%
Sony	9	5.14%
Central Intelligence Agency	10	5.04%
Nike	11	5.01%
Teach for America	12	4.34%

5

	1997			2002		
Item	% first mention	combined %	combined *n*	% first mention	combined %	combined *n*
Health	36.6	53.1	4803	38.3	52.7	4361
Family	11.0	40.3	3646	15.4	44.2	3660
Finance	9.8	37.7	3414	8.2	33.9	2808
Happiness	9.9	28.5	2580	9.2	25.6	2116
Friends	3.6	20.5	1854	2.8	16.7	1379
Home comforts	5.3	15.7	1417	4.0	12.0	989
Leisure	3.1	15.4	1394	3.7	17.8	1474
Employment	4.2	14.2	1287	2.7	9.6	795
Freedom	2.8	7.3	659	3.0	8.8	730
Time for self	3.1	7.2	651	3.6	9.9	818
Miscellaneous other	1.9	7.2	648	2.1	8.4	693
Other material benefits	1.2	6.6	595	1.1	5.8	478
Environment, community	1.5	6.6	594	1.5	5.3	442
Other personal	1.8	6.4	578	0.7	3.3	272
Negative mentions	2.1	5.2	469	1.8	3.4	282
Spiritual, moral	1.2	4.6	412	0.8	3.6	300
Don't know	1.0	1.0	93	1.0	1.0	82
N	9,047			8,272		

6

Month	U.S Sales	Canada Sales
Jan-18	386	162
Feb-18	397	234
Mar-18	428	211
Apr-18	387	153
May-18	406	289
Jun-18	429	323
Jul-18	405	309
Aug-18	463	211
Sep-18	411	270
Oct-18	417	337
Nov-18	562	321
Dec-18	551	345
Jan-19	459	336
Feb-19	404	389
Mar-19	489	298
Apr-19	475	337
May-19	527	423
Jun-19	483	403
Jul-19	521	424
Aug-19	500	329
Sep-19	585	342
Oct-19	570	428
Nov-19	583	395
Dec-19	609	360

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