Benni De Jagere

No coffee? No Insights!

Designing Impactful Visualisations for your Data

As Data is key, visualising said data is even more important. We want our message to be understood with ease, and merely with a couple of glances. Hence making sure the receiving party can do so with ease will be vital to our success.

During this session, we'll go through some steps on how to maximise the potential of data visualisations. Starting at choosing the right types of visualisations, and which colour palettes are good matches for your message, we'll also make sure that our designs are as inclusive as we can possibly make them. Wrapping up with a few common use cases, you'll definitely pick up a few new things to take home with you.

Walking out of this session, you can expect to have a decent understanding on a few common design principles for your data visualisations and reports.

Benni De Jagere?

Senior Data Insights Consultant

Inetum-Realdolmen

dataMinds .be, Co-leader

@BenniDeJagere

/bennidejagere

#SayNoToPieCharts

Microsoft® MVP Most Valuable Professional

Setting Expectations

- What not to do ☺
- (Intro to) Psychology of Visualisation
- The right visual and colours for the job
- Inclusive Design

Use Case

https://elidesc.com/wp-content/uploads/2012/07/Velo_Antwerpen.jpg

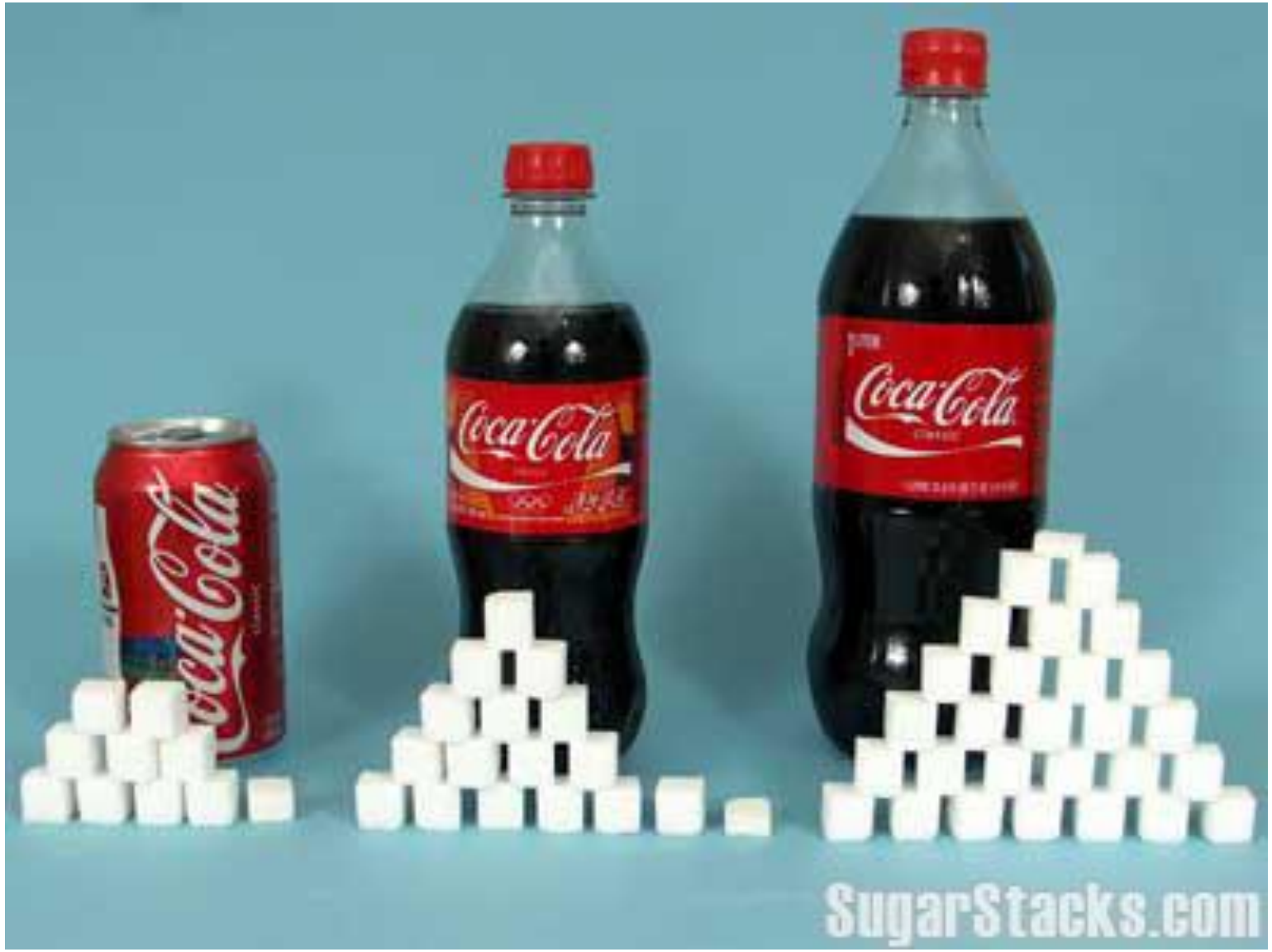
New York Citibikes

- www.citibikenyc.com/system-data
- Public Open Data
- Starts June 2013
- Information about every trip
  - Longer than 60 seconds
  - Starts at public station
- Masterdata

https://i0.wp.com/thenypost.files.wordpress.com/2013/12/citibike1.jpg

Data Visualisation – Thoughts?

- Graphs and charts
- Tell a story
- Pie Charts!
- Something I should think through more often
- Maps
- Looks easy, but is hard
- Just slap some things on there!
- Etc..


Coca-Cola
Coca-Cola
Coca-Cola
SugarStacks.com

Mark Milligan
@MarkMilliganDPT

Would you eat 6 donuts?

Dr. Glaucomflecken
@DGlaucomflecken

Honestly my take away from this chart is that donuts are healthier than I thought

Some things to keep in mind,,

Have no fear of perfection – you'll never reach it

Salvador Dali

Data Visualisaton is Intelligence made visible

Data Visualisation is the intermediary between information and understanding

01

Why?

Why Data Visualisation matters?

- Data Visualisation changes the way we work with data
- Allows to interpret large volumes of data in clear and cohesive ways
- Stimulates pattern recognition and identification of goals
- Discover trends and address issues
- Data Visualisation helps to tell a story

Why Data Visualisation matters?

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Data Visualisation is both an Art and Science

Cognitive Science for data visualisations

Iconic memory

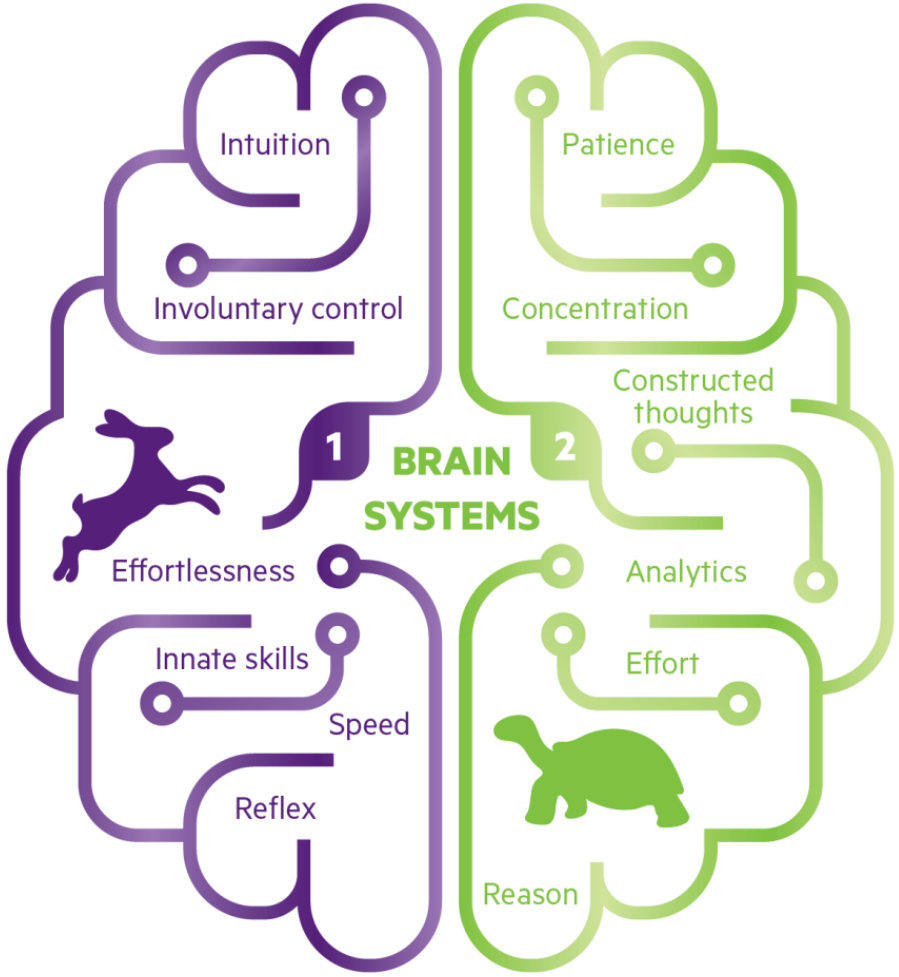
Short term memory

Long term memory

Brain Analysis

70% A significant amount of human brain is dedicated to visual processing.

Cognitive Science for data visualisations



https://medium.com/@ryansheffer/founders-need-to-think-slow-move-fast-6b683e94c110
https://bombbomb.com/blog/video-for-sales-thinking-fast-and-slow-kahneman/
https://www.amazon.com/Thinking-Fast-Slow-Daniel-Kahneman/dp/0374533555

Cognitive Science for data visualisations

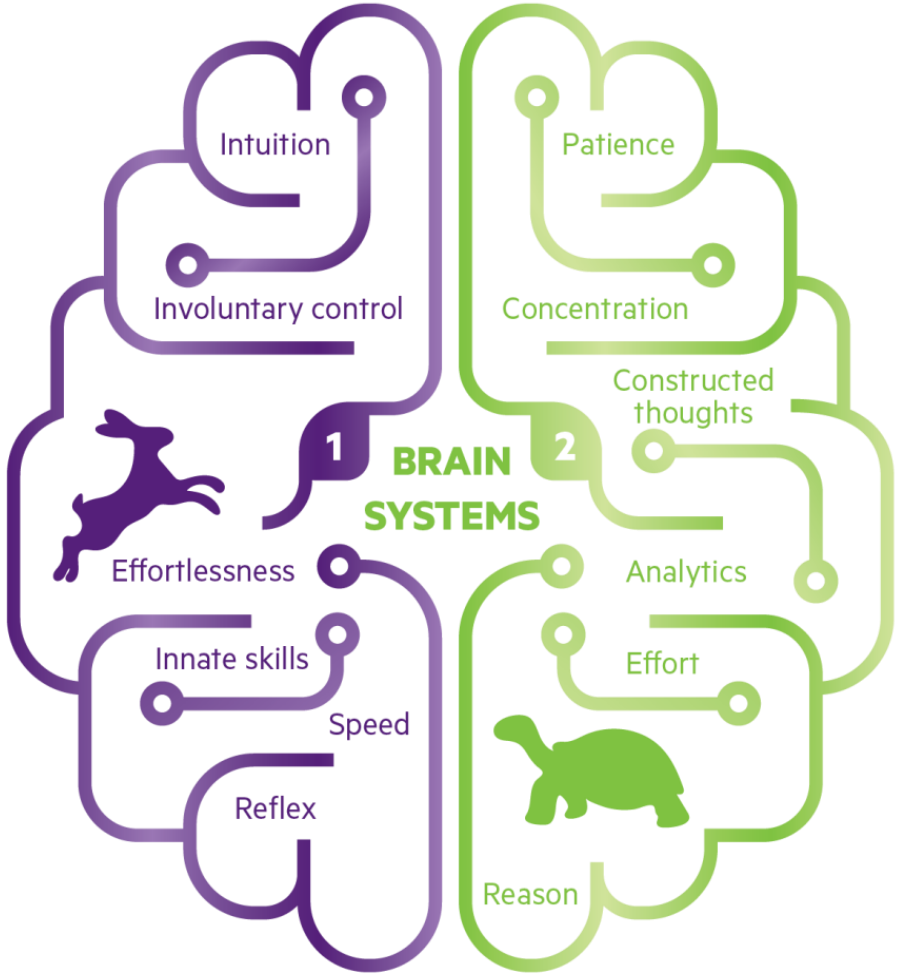
23 x 14 = ?

Cognitive Science for data visualisations

https://www.youtube.com/watch?v=ClTS8qlhAx4

23 x 14 = 322

Cognitive Science for data visualisations



https://medium.com/@ryansheffer/founders-need-to-think-slow-move-fast-6b683e94c110
https://bombbomb.com/blog/video-for-sales-thinking-fast-and-slow-kahneman/
https://www.amazon.com/Thinking-Fast-Slow-Daniel-Kahneman/dp/0374533555

02

A wild data visualisation appeared!

#MigraciónARV

LORENA BAEZA
PERIODISTA DE 'NEWTRAL'

13:38:40

LLEGADAS DE MIGRANTES A LAS COSTAS ESPAÑOLAS

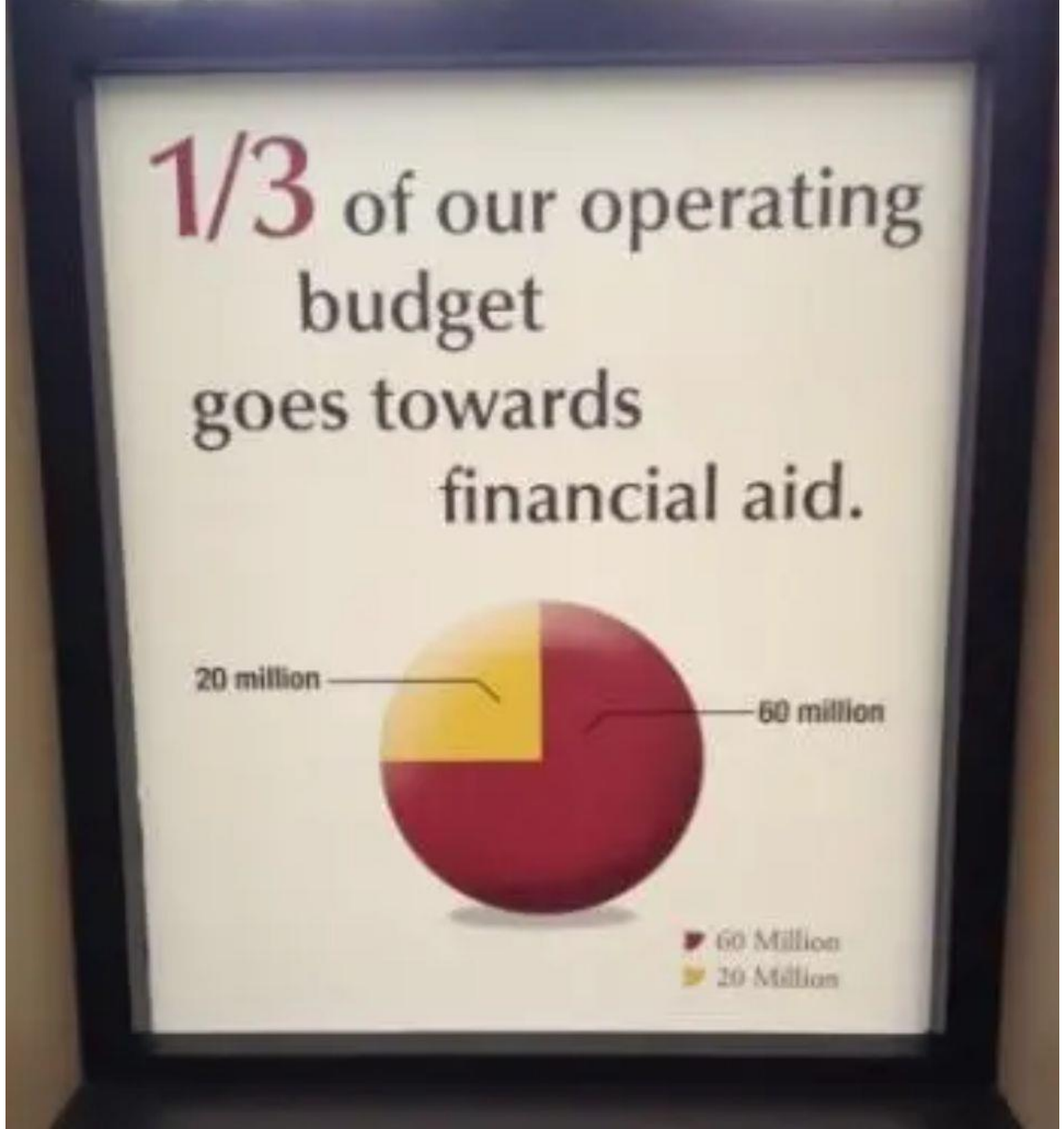
2014:	4.552
2015:	5.315
2016:	8.162
2017:	21.989
2018:	57.498

Fuente: Ministerio del Interior

NEWTRAL.ES

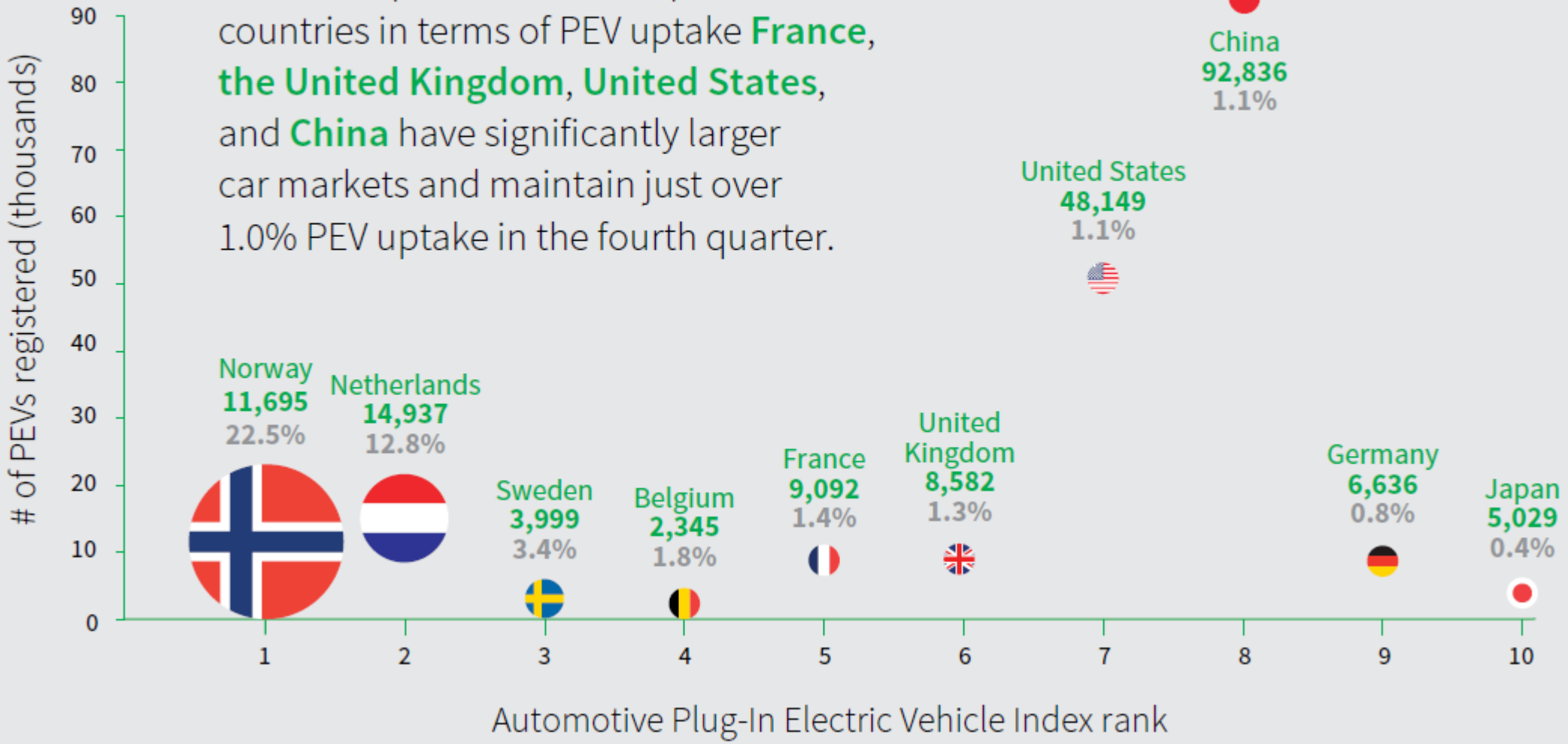
ARV ABASCAL CARGA SIN PUDOR CONTRA LA INMIGRACIÓN

6 HD 16


1/3 of our operating budget goes towards financial aid.
20 million
60 million
60 Million
20 Million

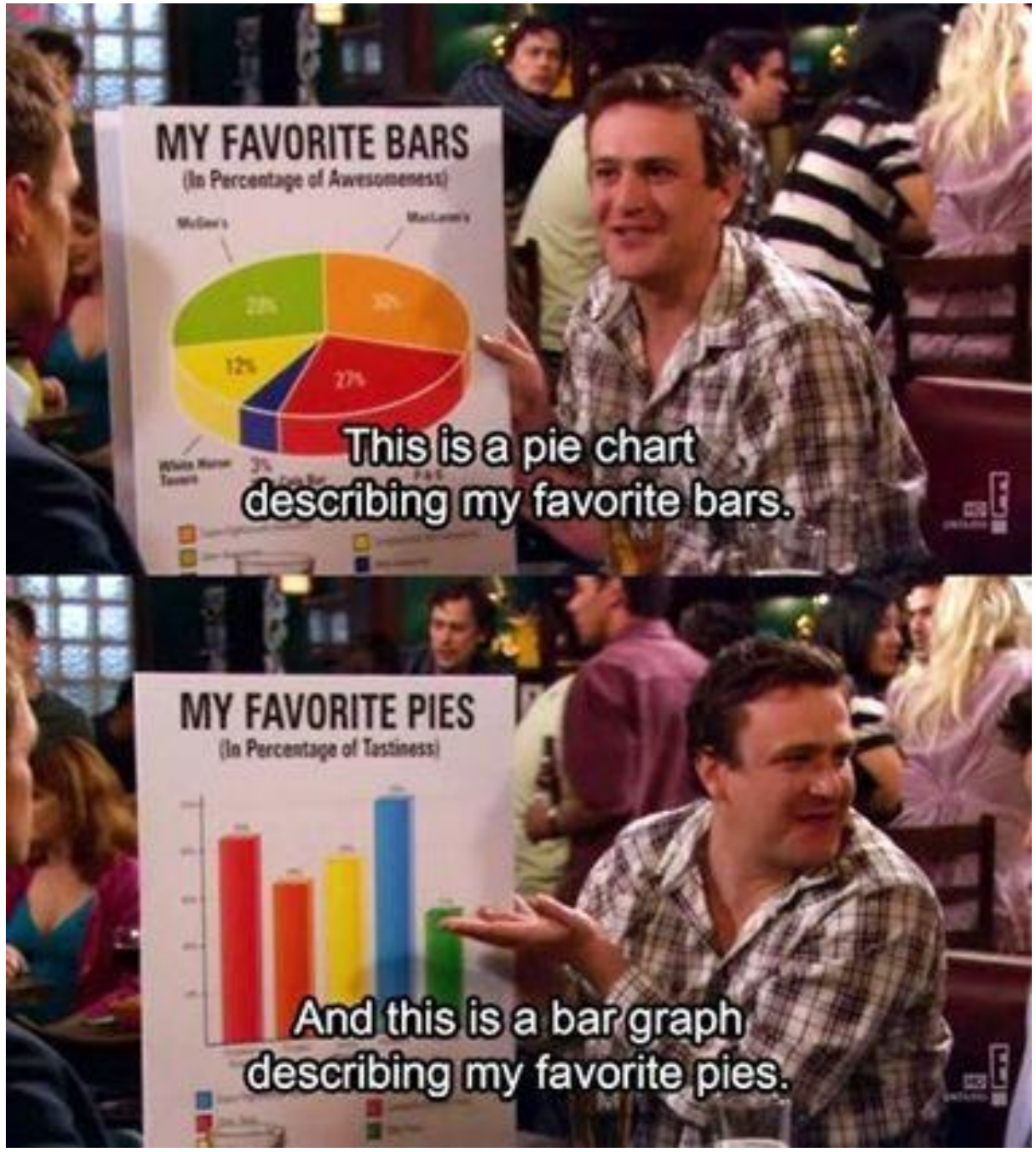
Q4 2016

When compared with the top three countries in terms of PEV uptake **France**, **the United Kingdom**, **United States**, and **China** have significantly larger car markets and maintain just over 1.0% PEV uptake in the fourth quarter.



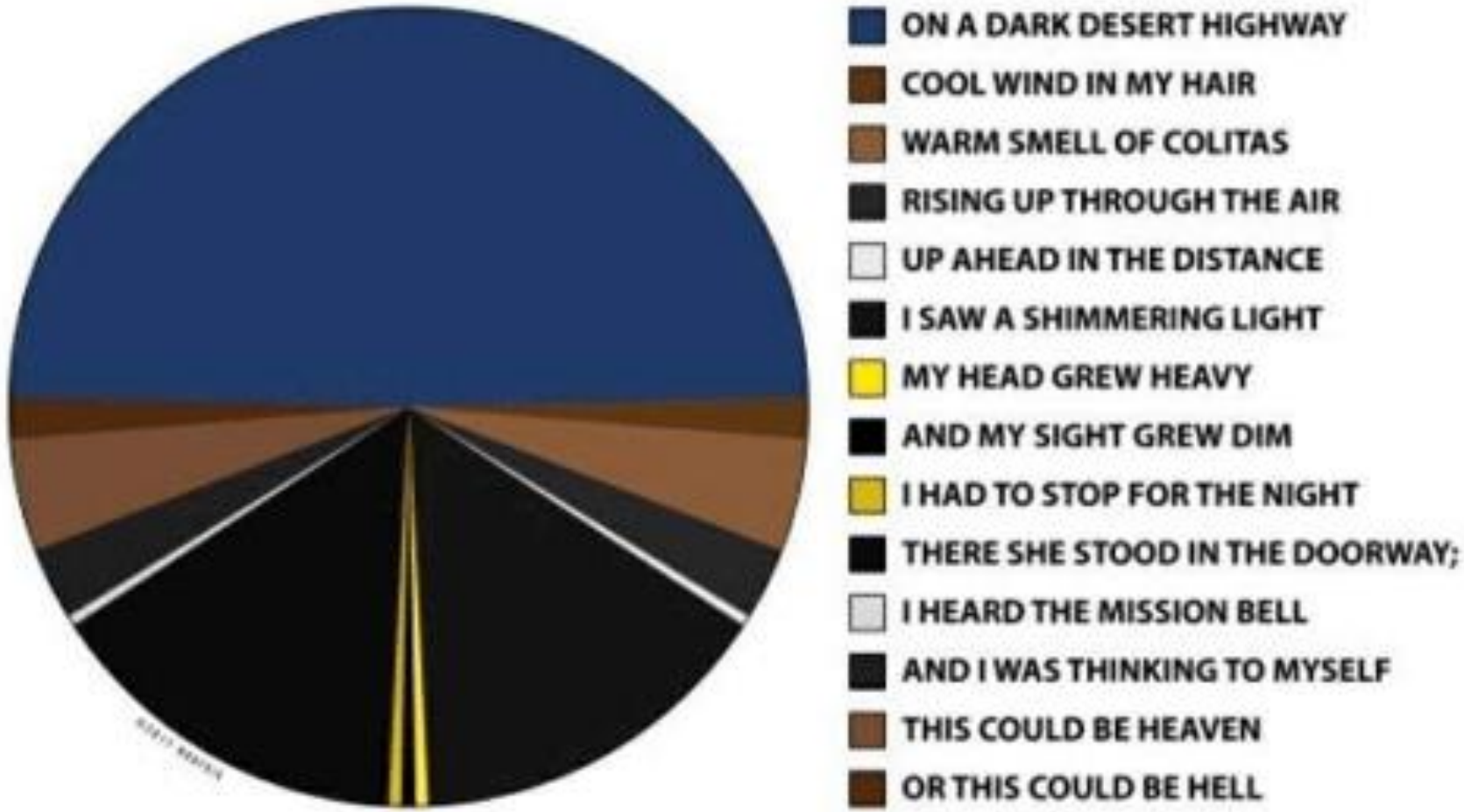
03

Exceptions can be made ..

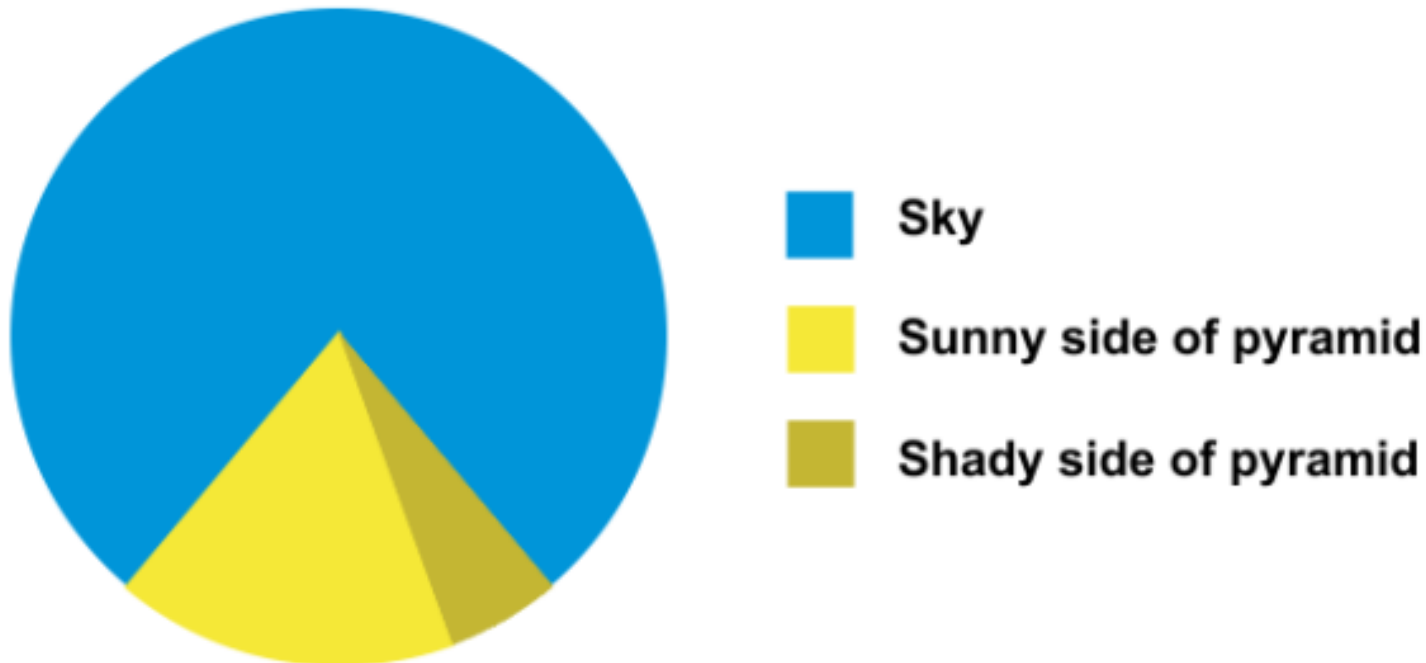

MY FAVORITE BARS
(In Percentage of Awesomeness)
28%
12%
27%
3%
This is a pie chart
describing my favorite bars.
MY FAVORITE PIES
(In Percentage of Tastiness)
And this is a bar graph
describing my favorite pies.

DARK DESERT HIGHWAY

(PIE CHART)

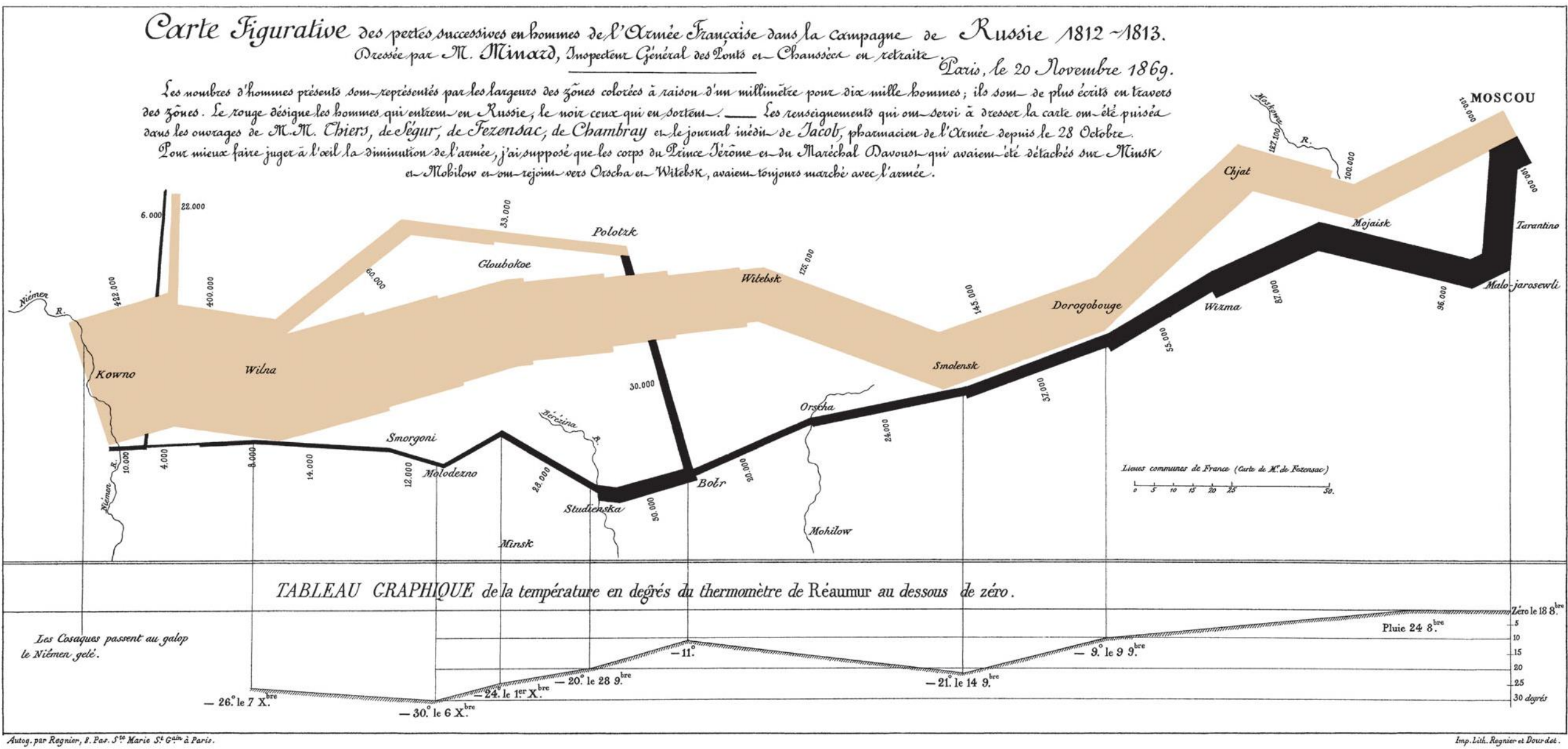


https://www.linkedin.com/groups/12241136/


Sky
Sunny side of pyramid
Shady side of pyramid

03

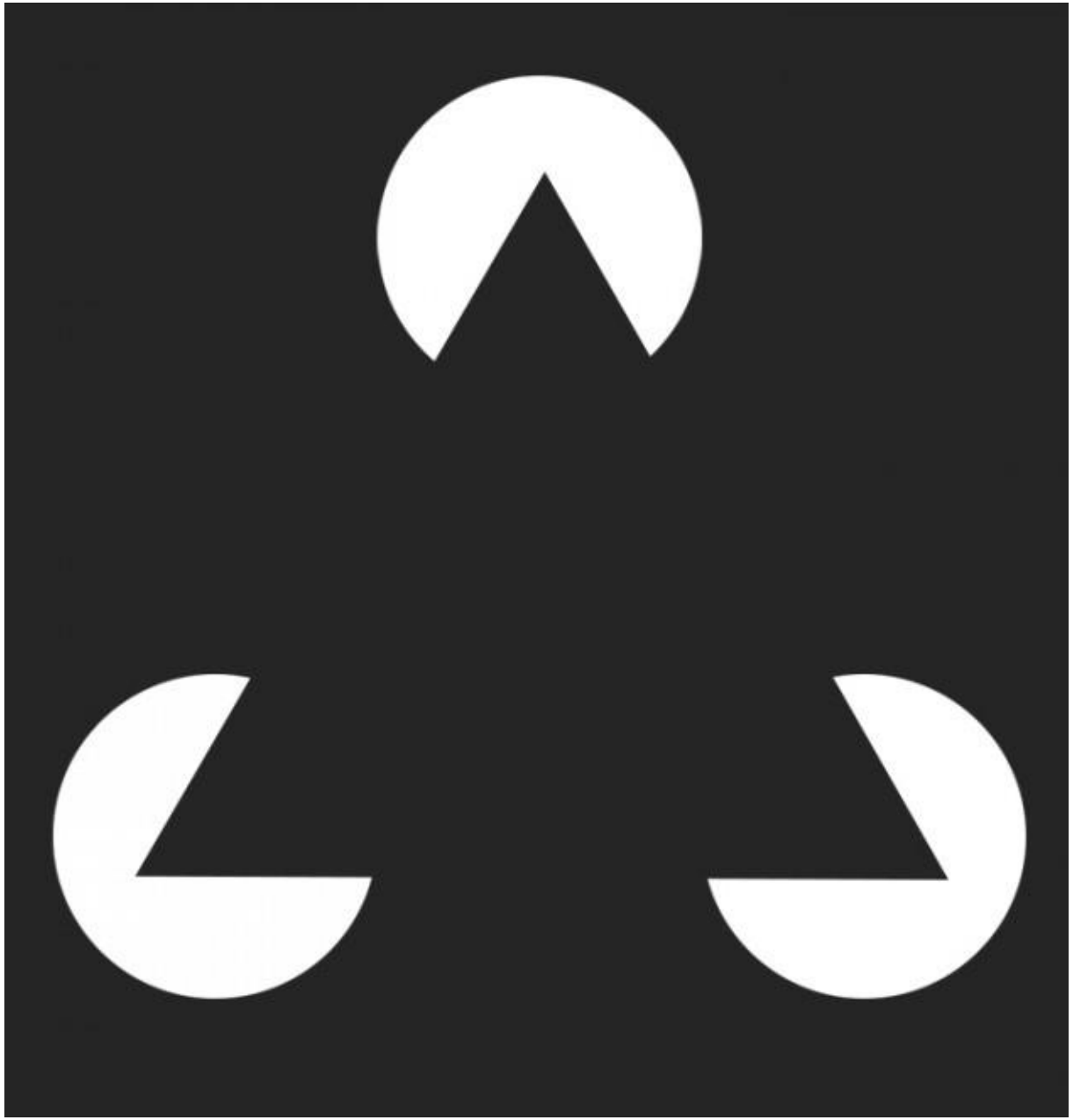
Historical Beauties



Charles Minard's map of Napoleon's disastrous Russian campaign of 1812.
The graphic is notable for its representation in two dimensions of six types of data: the number of Napoleon's troops; distance; temperature; the latitude and longitude; direction of travel; and location relative to specific dates.[4]

04

Principles of Visual Perception



Source: The Inspired Eye
https://www.usertesting.com/blog/gestalt-principles

People can recognise objects even when there are parts of them missing


GE$TART

Gestalt Principles of Visual Perception

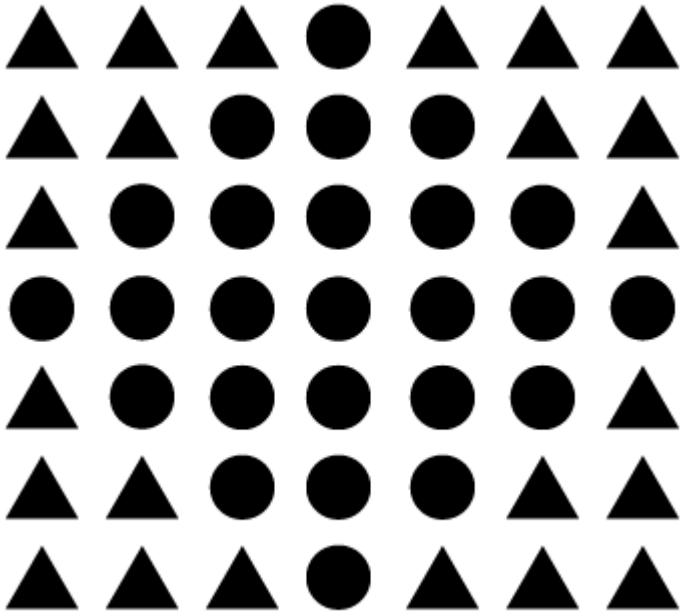
Great designers understand the powerful role that psychology plays in visual perception.

What happens when someone's eye meets your design creations?

How does their mind react to the message your piece is sharing?

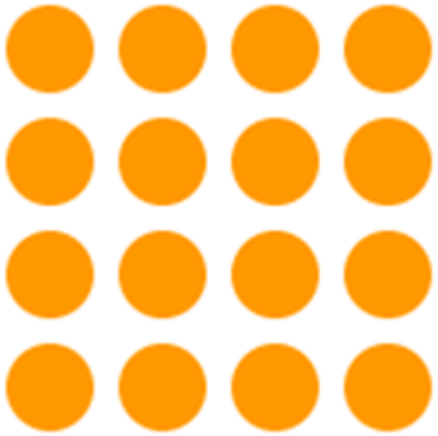
Gestal Principles of Visual Perception

- Help you determine which elements are most effective in a given situation
- Hold power to influence our visual perception
- Allows designers to direct attention to specific points of focus, take action, or provoke behavioural change
- Help us design data visualisations that are intuitive, beautiful and functional

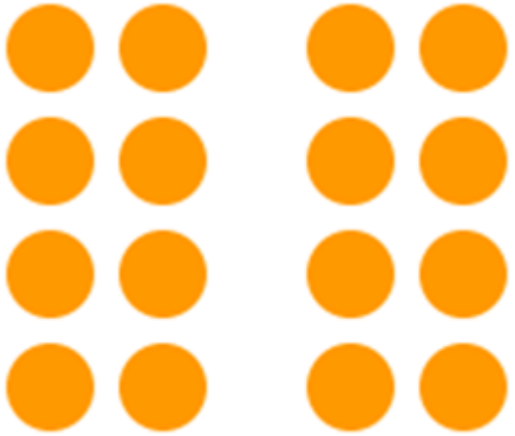


Similarity

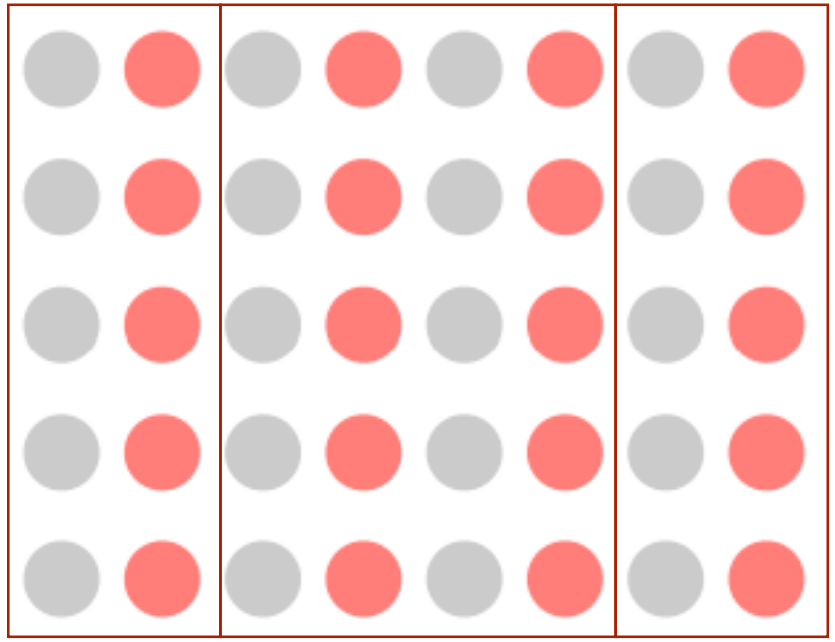
This is perceived to be one group and the components somehow related to each other.



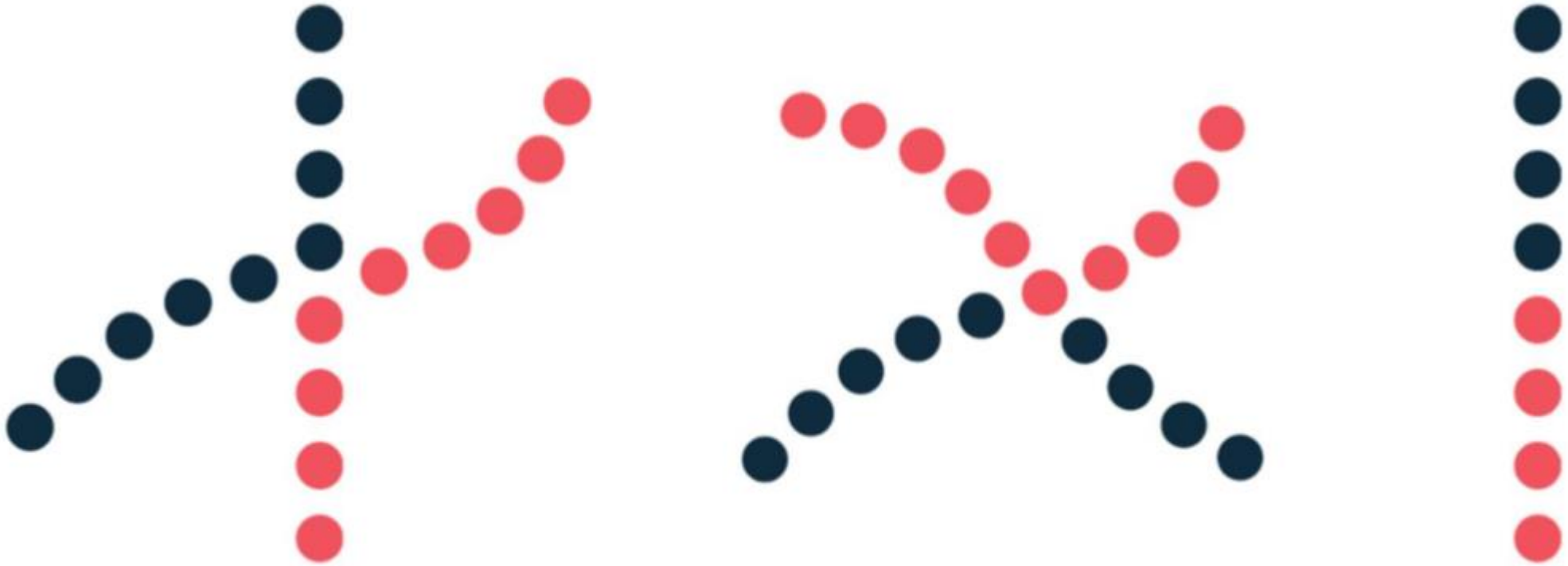
We perceive two groups here, and understand that there are differences between them.



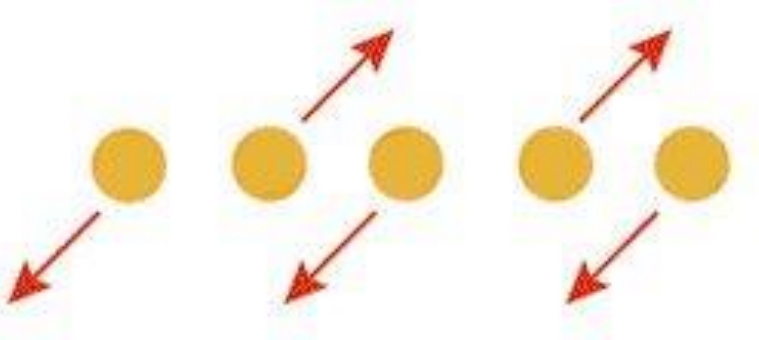
Proximity

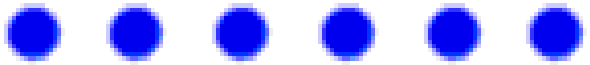


Common Regions



Continuity





Common Fate

Figure - Ground

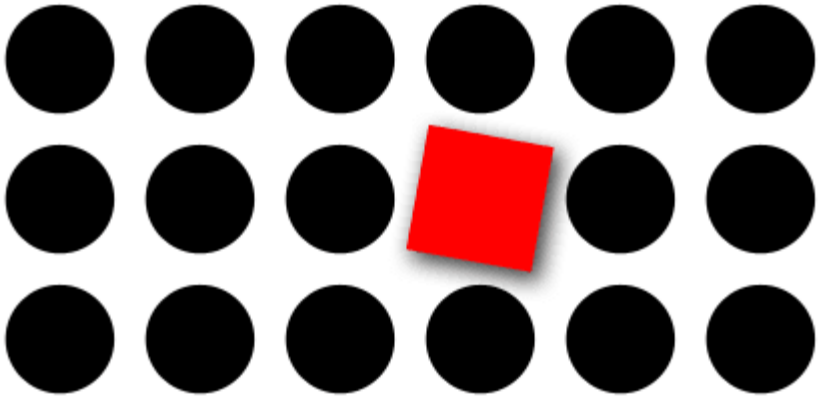
International Migrants Day: Mediterranean Death Trap

Migrant deaths worldwide by region in 2016

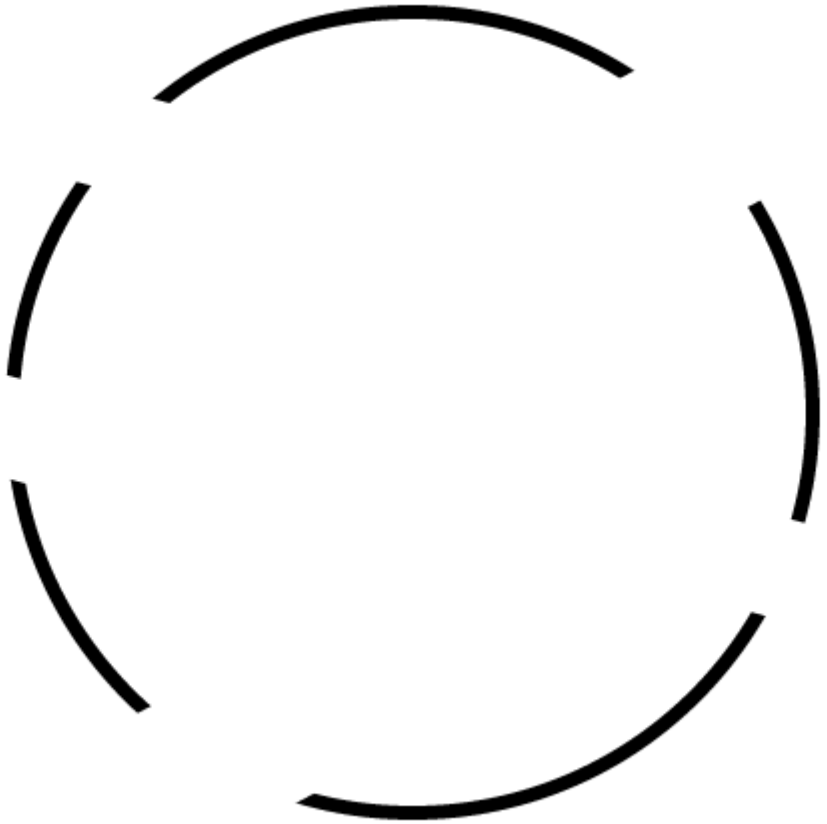
International Migrants Day on Dec 18, 2016

Source: IOM

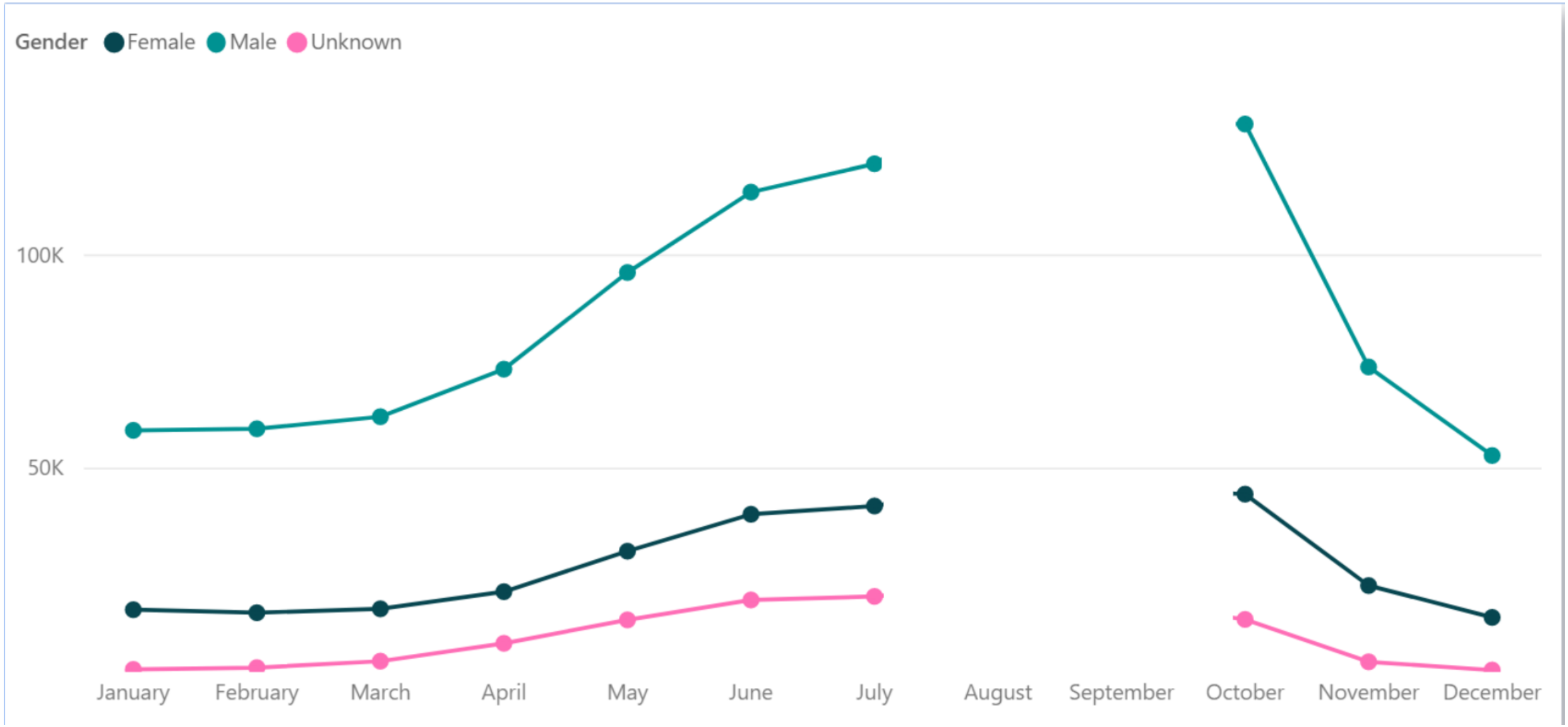
statista

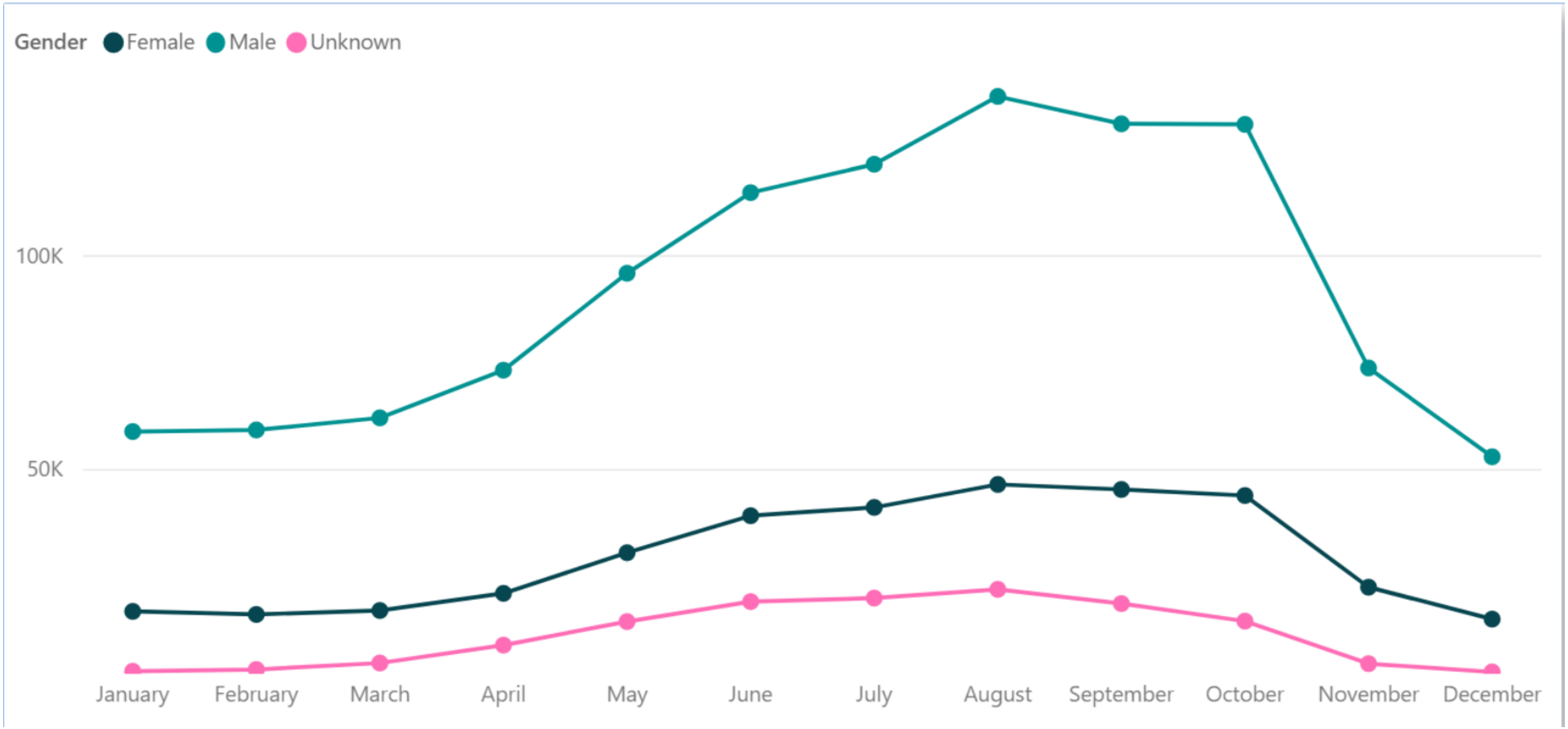


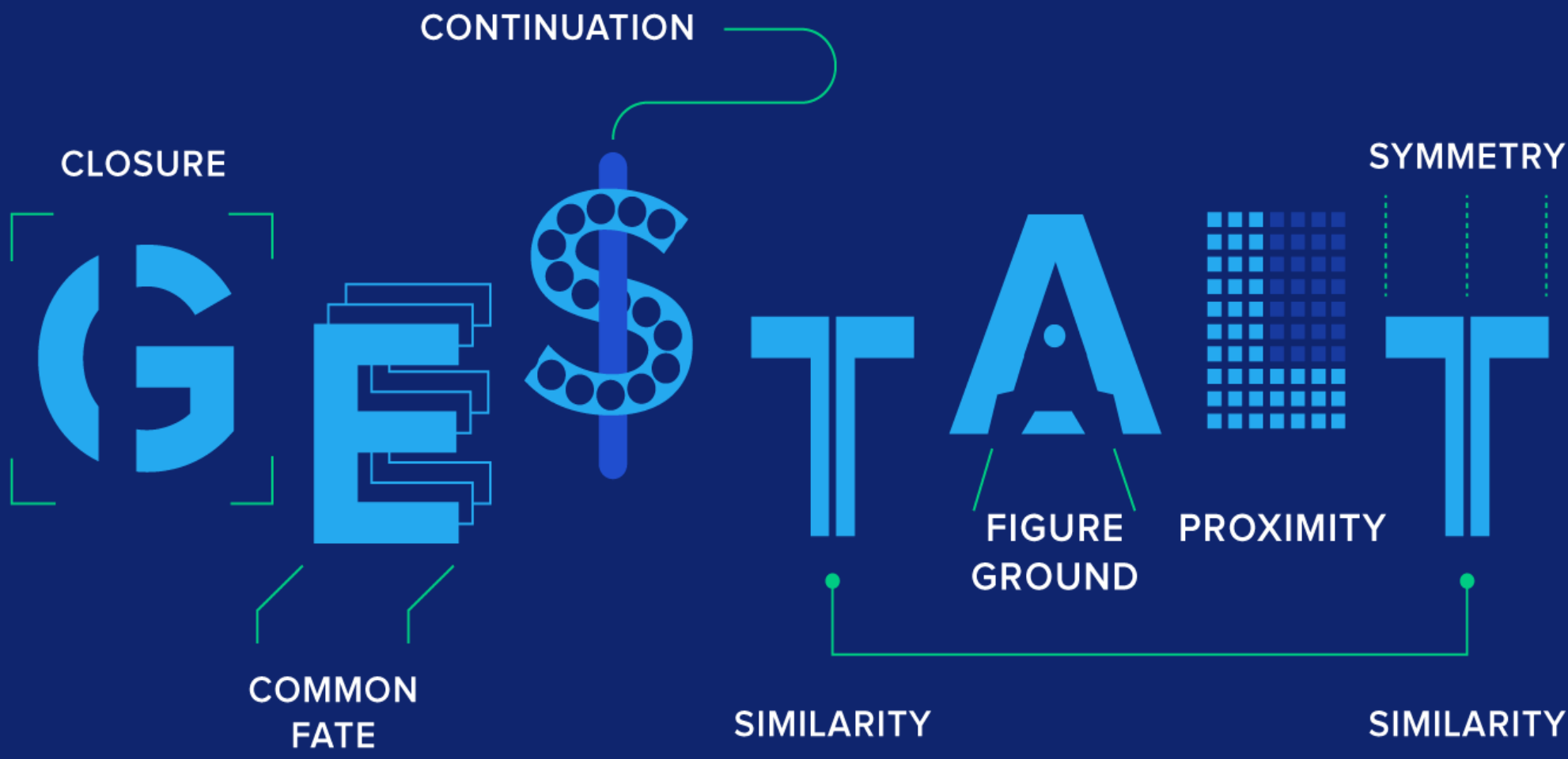
Focal Point



Closure


Gender
Female
Male
Unknown
100K
50K
January
February
March
April
May
June
July
August
September
October
November
December


Gender
Female
Male
Unknown
100K
50K
January
February
March
April
May
June
July
August
September
October
November
December

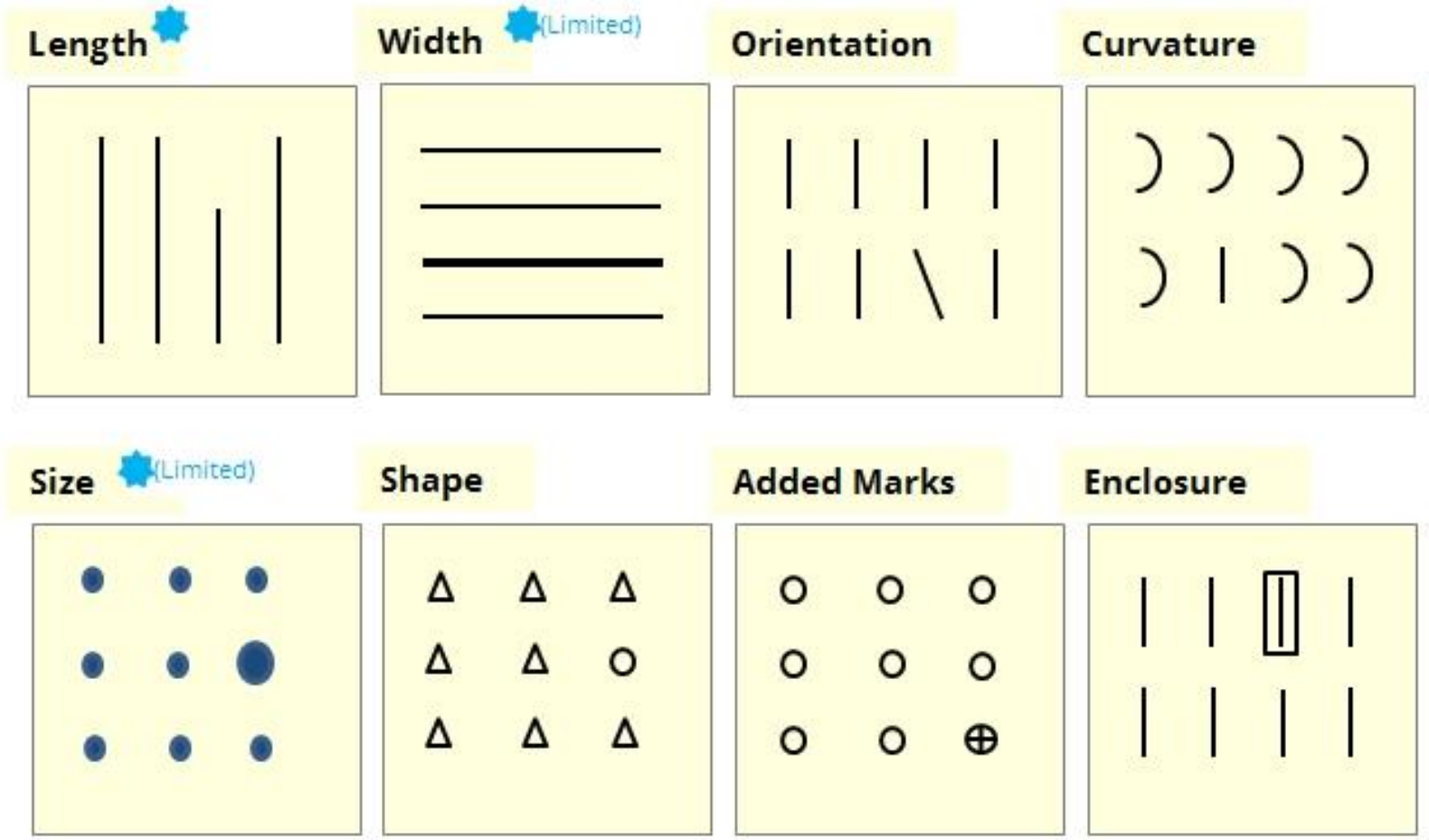

CONTINUATION
CLOSURE
SYMMETRY
FIGURE
GROUND
PROXIMITY
COMMON
FATE
SIMILARITY
SIMILARITY

06

Preattentive Attributes

Preattentive attributes

- The human brain processes these properties with ease
- Occurs within 200 milliseconds of exposure to the visual



http://daydreamingnumbers.com/blog/preattentive-attributes-example/

Preattentive attributes

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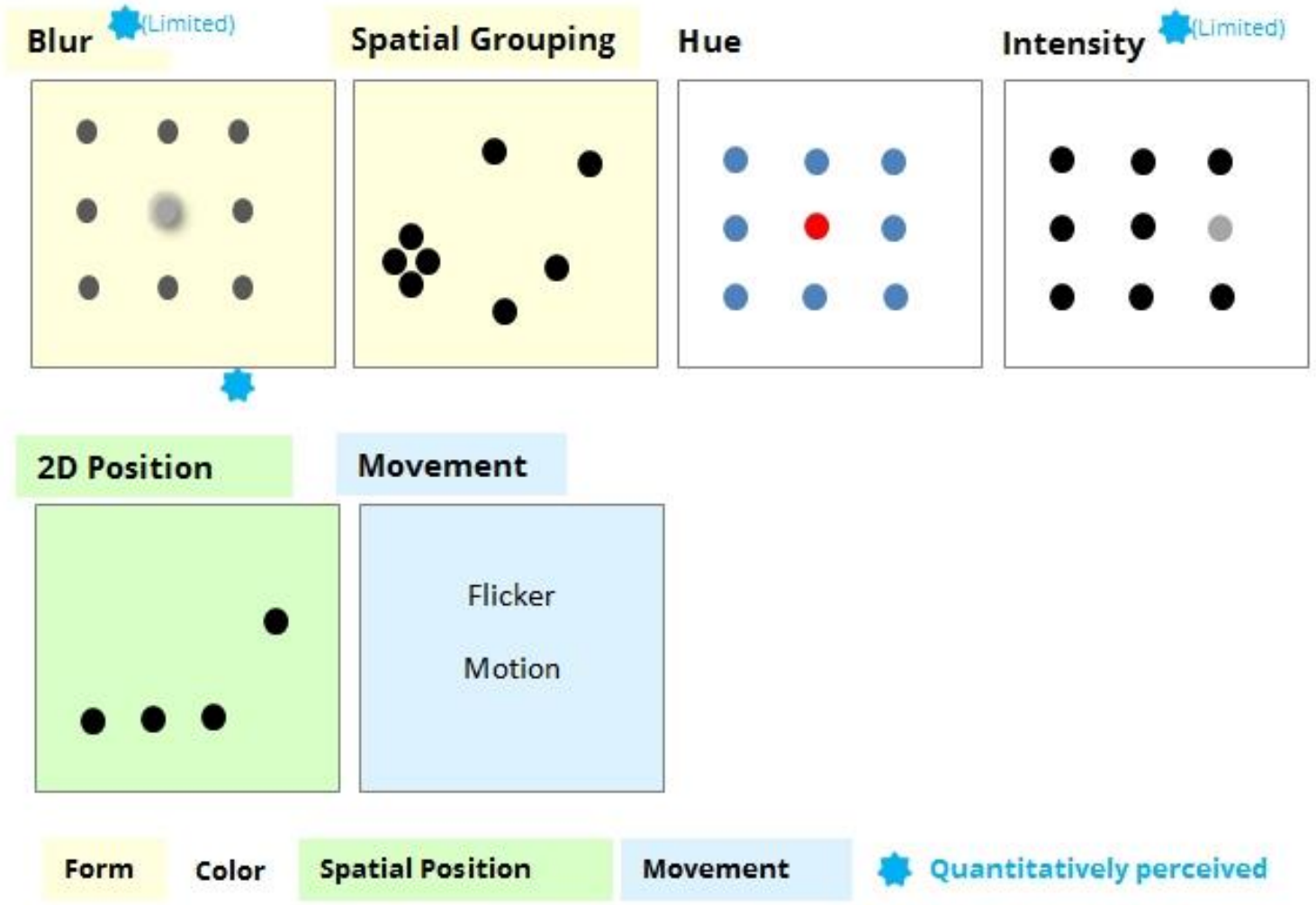


http://daydreamingnumbers.com/blog/preattentive-attributes-example/

07

The right visual

Choosing the right visual - Context

- Amounts
- Distributions
- Proportions
- X-Y relationships
- Geospatial data
- Uncertainty

Choosing the right visual

- Data to viz
  - https://www.data-to-viz.com/#explore
- FT visual vocabulary
  - https://ft-interactive.github.io/visual-vocabulary/
- Power BI FT example by Jason Thomas –
  - https://community.powerbi.com/t5/Data-StoriesGallery/FT-Visual-Vocabulary-Power-BI-Edition/td-p/584460

08

Colour Theory

Colour Theory

- Colours are subjective, not every person responds the same
- Colours have different cultural meaning
- Colour Theory is based on research, to help us decide

Colour Theory

- Let’s focus on the HSL Model
- Hue
  - Aligns to what people describe as a colour
- Saturation
  - Intensity of said colour
  - Scaled on how much the colour differs from neutral grey (0%)
- Luminance
  - Describes the spectrum of a hue from dark, based on the amount of black added

Step 1 : Decide what the colours will represent

- Know your data, perform data exploration
- Decide on the aspect of your data that you want to represent
- Stick to one aspect per colour
- Colour scales can be used as well

Step 2 : Understand your data scale

- Sequential – when data values go from low to high
- Divergent – when data has data points at both ends of the scale, with an important pivot in the middle.
- Qualitative – when the data does not have an order of magnitude.

Step 3 : Look for obvious options

- Look at the data and it’s application
- Is there an occurence in nature?
- Is there a corporate style guide?
- Try to pick colours users will easily understand

Step 4: Decide on the number of hues

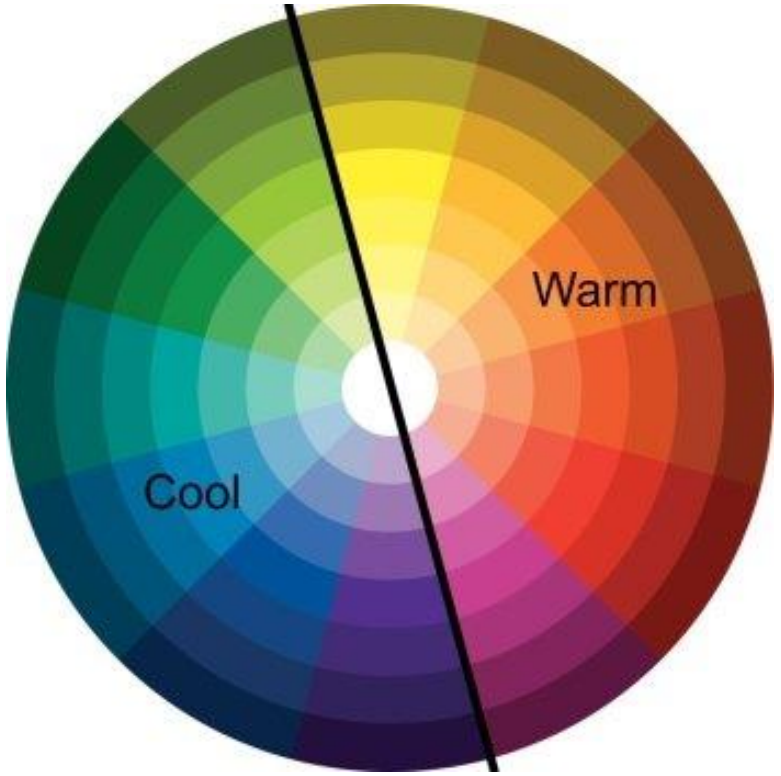
- Sequential data usually requires one hue, using luminance or saturation to define scale.
- Changes in luminance and saturation are hard to perceive
  - With a scale containing more than five data points, consider two hues
- Divergent data requires two hues, decreasing in saturation or luminance towards a neutral (usually white, black or gray).
- Qualitative data requires as many hues as values
- Remember the limitations of the human brain.
- Our brain struggles to perceive and remember more than seven colours. More than 12, and our brain struggles to differentiate

Step 5 : Be Consistent

- Upon deciding with your colours, be consistent
- Users will develop a mental map
- Increased familiarity helps the preattentive attributes

Step 6 : Create your palette

- Look at online resources (ie. ColorBrewer, Adobe Color)
- Decide on your warm or cool colours as a base

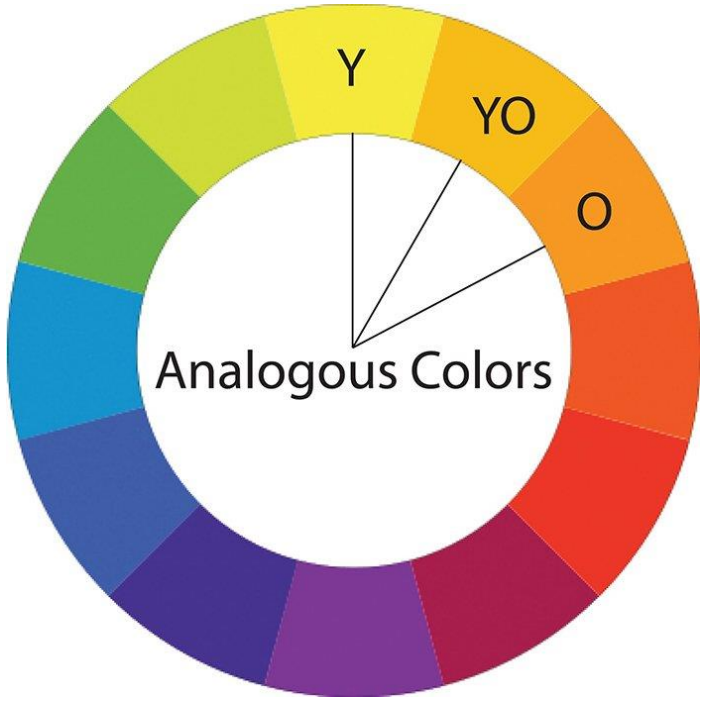


Step 6 : Create your palette

Monochromatic – shades of a single hue, ideal for sequential data.

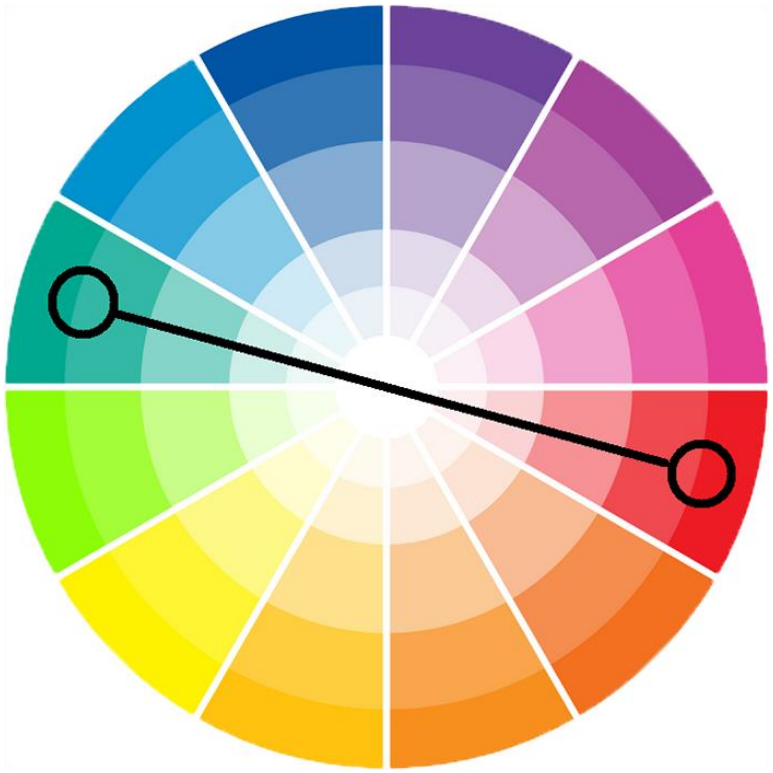
Step 6 : Create your palette

Analogous colors – colors that sit beside each other on the color wheel. These provide a more varied alternative for sequential data visualization.



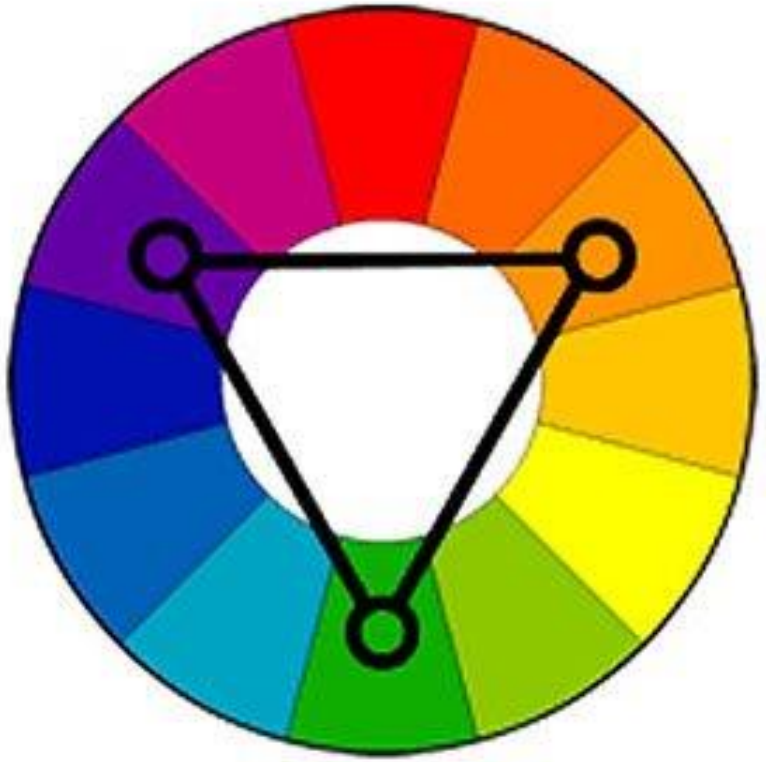
Step 6 : Create your palette

Complementary colors – from opposite sides of the color wheel. When paired with a neutral (e.g. white or gray) these palettes are perfect for diverging data.



Step 6 : Create your palette

Triadic colors – 3 colors equally spaced around the wheel, which are a good starting point for a qualitative palette.



Step 7 : Don’t fear grey

- Not everything has to be a vibrant colour
- Use white and grey to add contrast to your report
- Consider creating your report in grey, black and white before choosing colours

Step 8 : Make sure everyone is invited

	Men	Women
Red-green (Overall)	7 to 10%	—
Red-green (Caucasians)	8%	—
Red-green (Asians)	5%	—
Red-green (Africans)	4%	—
Monochromacy	—	—
Rod monochromacy (disfunctional, abnormally shaped or no cones)	0.00001%	0.00001%
Dichromacy	2.4%	0.03%
Protanopia (L-cone absent)	1% to 1.3%	0.02%
Deuteranopia (M-cone absent)	1% to 1.2%	0.01%
Tritanopia (S-cone absent)	0.001%	0.03%
Anomalous Trichromacy	6.3%	0.37%
Protanomaly (L-cone defect)	1.3%	0.02%
Deuteranomaly (M-cone defect)	5.0%	0.35%
Tritanomaly (S-cone defect)	0.01%	0.01%

https://www.colour-blindness.com/general/prevalence/

Step 8: Make sure everyone is invited

- Keep accessiblity in mind when visualising your data
- Accessiblity Checklist – Meagan Longoria
  - https://whocanuse.com/
  - http://www.color-blindness.com/coblis-color-blindness-simulator/
  - http://www.vischeck.com/vischeck/vischeckImage.php

Step 9 : Create a theme file

- Creating a theme file helps your consistency
- And easily share your presets with different users
- PowerBI.tips has a theme generator

Takeaways

10

Takeaways

- Remove Clutter and Avoid Visual & Data Overload
- Manage White Space
- Leverage Gestalt Principles
- Use the Power of Preattentive Attributes!
- Colours are key
- Keep accessibility in mind
- Tell a Story!

Reading Material

- https://www.datapine.com/blog/best-data-visualization-books/?fbclid=IwAR1lb77vZR3Sx4NX0Dua6bzyZaCctIfNbFUTS7jHOAzLBcPGtvY_rsQpgS0
  - Alberto Cairo
  - Stephen Few
  - Donald Miller
  - Edward R. Tufte
  - Cole Nussbaumer Knaflic
  - Steve Wexler

References

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- https://www.reddit.com/r/DataIsUgly
- https://www.reddit.com/r/dataisbeautiful
- https://datasavvy.me/design-concepts-for-better-power-bi-reports/
- Prathy's Blog... -
- http://daydreamingnumbers.com/blog/preattentive-attributes-example/
- https://learnforeverlearn.com/preattentive/

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- https://www.usertesting.com/blog/gestalt-principles
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  https://vizzendata.com/2020/07/06/utilizing-gestalt-principles-to-improve-your-data-visualization-design/
- http://daydreamingnumbers.com/concepts/gestalt-laws-data-visualization/
- https://www.interaction-design.org/literature/article/preattentive-visual-properties-and-how-to-use-them-in-information-visualization

Resources

- Adobe Color - https://color.adobe.com/create/color-wheel
- i want hue - https://medialab.github.io/iwanthue/
- ColorBrewer - https://colorbrewer2.org/
- Colours from an image - https://html-color-codes.info/colors-from-image/#
- Canva - https://www.canva.com/color-palette/#
- Dribble colors - https://dribbble.com/colors/e8e230?percent=30
- Colours co - https://coolors.co/browser/latest/1
- Colors Hexa - https://www.colorhexa.com/3589a1
- Color Combos - https://www.colorcombos.com/popular-color-combinations/2

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#SayNoToPieCharts

Microsoft® MVP Most Valuable Professional