

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

Designing Impactful Visualisations for your Data



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Benni De Jagere?

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dataMinds .be, Co-leader

 @BenniDeJagere

 /bennidejagere

#SayNoToPieCharts



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

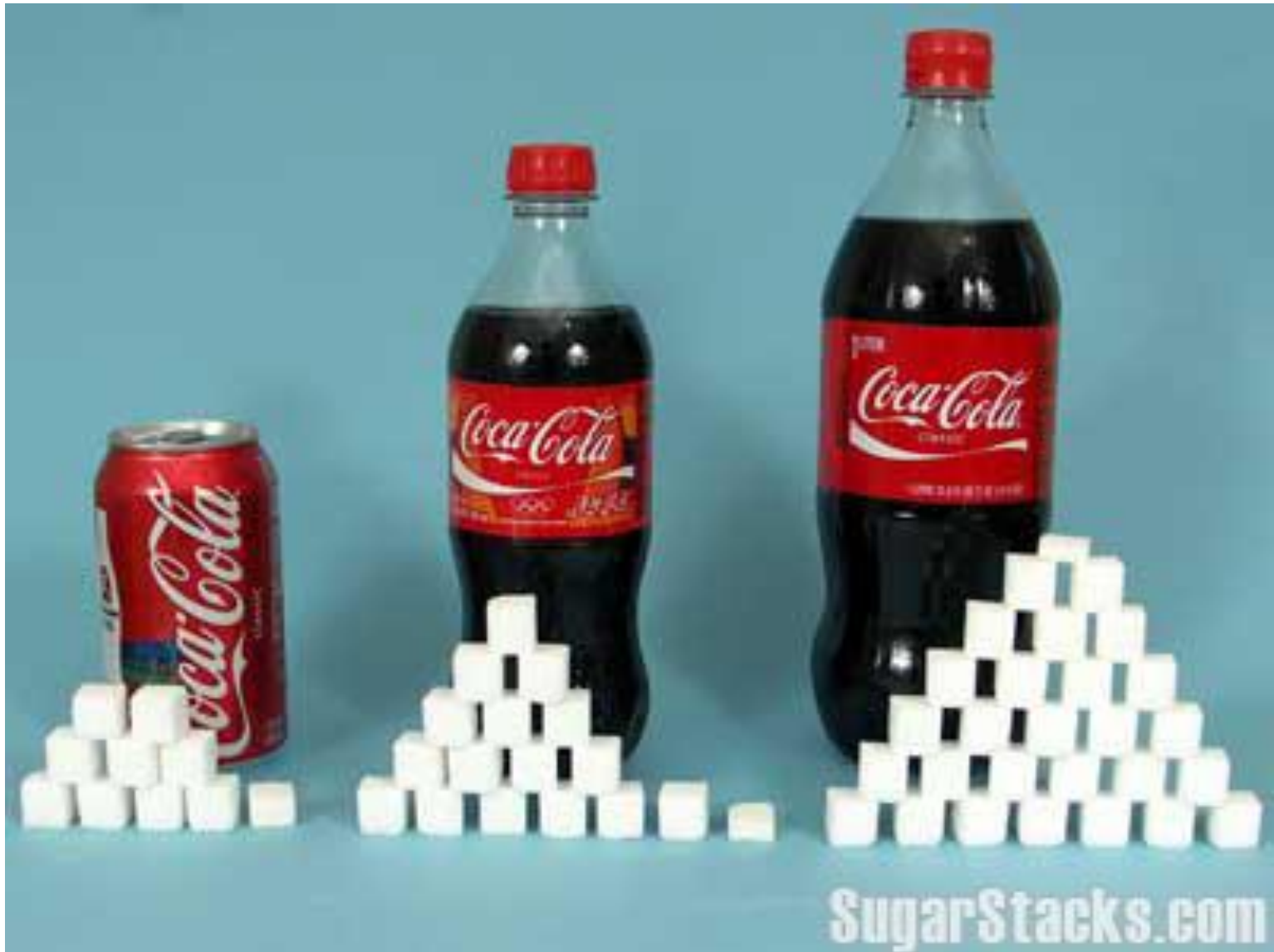
Masterdata



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

Data Visualisation – (Random) 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..





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 Visualisation is Intelligence made visible

Data Visualisation is the intermediary between information and understanding

01

A wild data
visualisation
appeared!

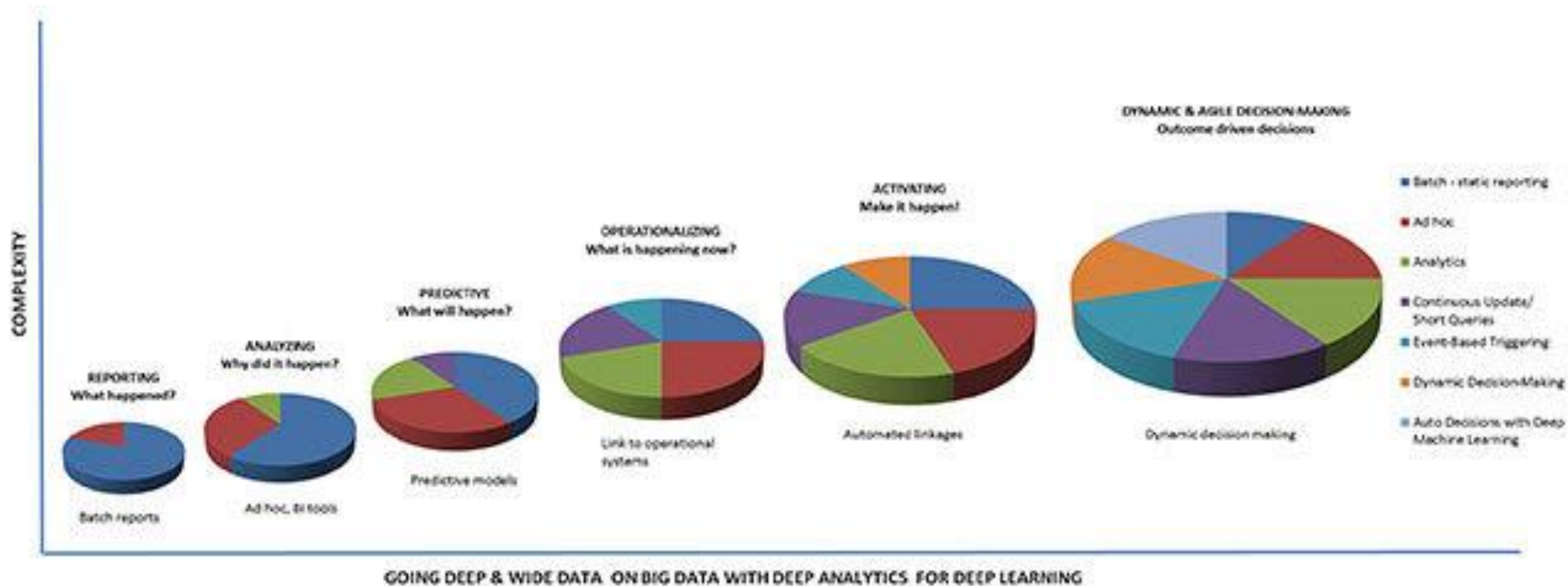


Bilister, der forvolder betydelig legemsskade på andre

Kilde: Rigsadvokaten / Anklagemyndigheden. Tallene viser antal domme for overtrædelse af straffelovens paragraf 249. Tallet for 2020 er opgjort pr. 7. november.

1/3 of our operating
budget
goes towards
financial aid.





03

Exceptions can
be made ..



DARK DESERT HIGHWAY

[PIE CHART]



- ON A DARK DESERT HIGHWAY
- COOL WIND IN MY HAIR
- WARM SMELL OF COLITAS
- RISING UP THROUGH THE AIR
- UP AHEAD IN THE DISTANCE
- I SAW A SHIMMERING LIGHT
- MY HEAD GREW HEAVY
- AND MY SIGHT GREW DIM
- I HAD TO STOP FOR THE NIGHT
- THERE SHE STOOD IN THE DOORWAY;
- I HEARD THE MISSION BELL
- AND I WAS THINKING TO MYSELF
- THIS COULD BE HEAVEN
- OR THIS COULD BE HELL

03

History Taught Us Well





04

Why?

Why Data Visualisation matters?

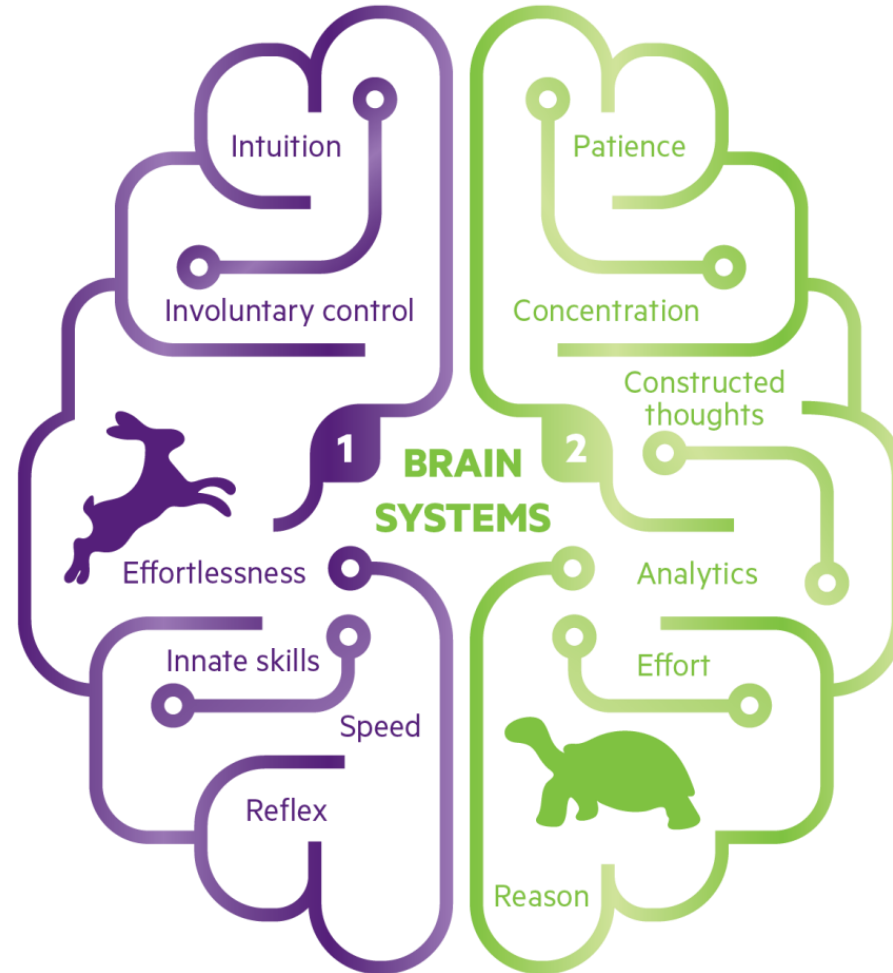
- Data Visualisation helps us identify insights otherwise unnoticed
- A good visualization gives ways to research data, investigate curious cause-effect relationships
- Understand data quickly
- Identify relationships and patterns
- Pinpoint emerging trends
- Communicate our findings as a story to others

Creating Data Visualisations appeals to both our
Artistic and Scientific side

90% of all information transmitted to our brains is *visual*.
People remember:



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



$$23 \times 14 = ?$$

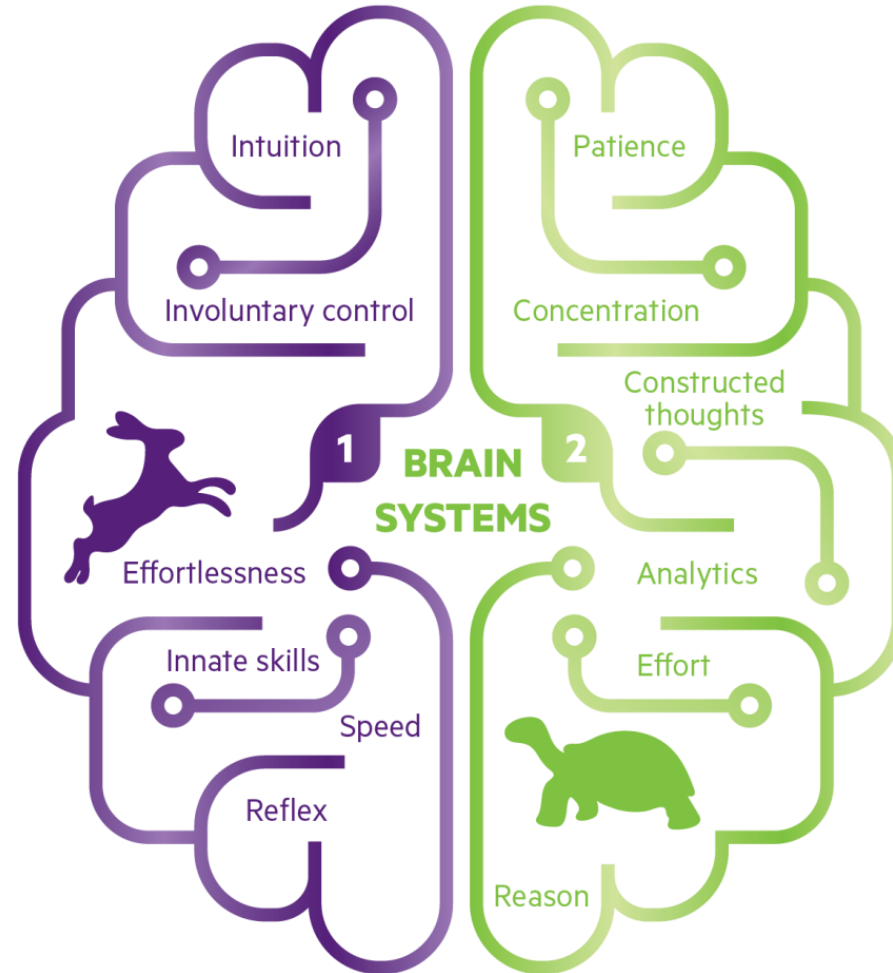
Cognitive Science for data visualisations



<https://www.youtube.com/watch?v=CITS8qlhAx4>

$$23 \times 14 = 322$$

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>

04

Principles of Visual Perception



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



Gestalt Principles of Visual Perception

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

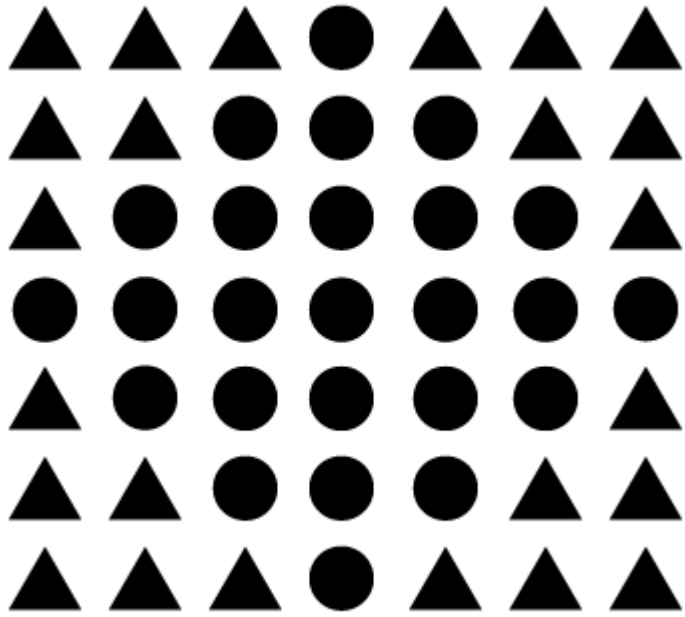
What happens when someone's eye meets your design creations?

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

Gestal Principles of Visual Perception

- Helps us 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





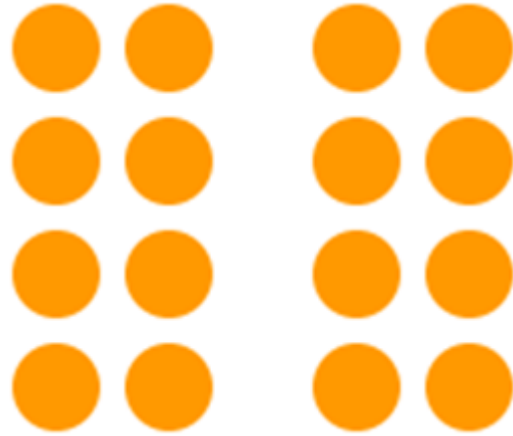
Similarity



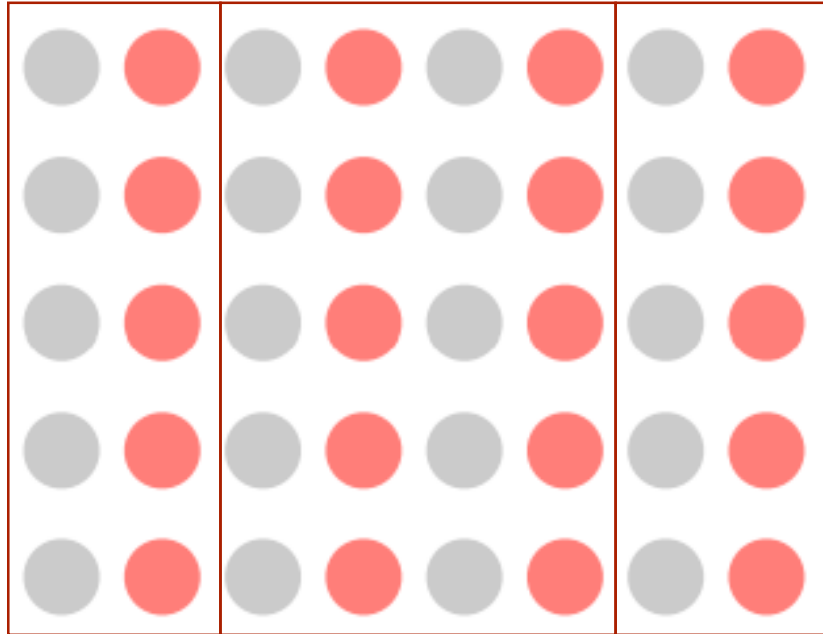
This is perceived to be one group and the components somehow related to each other.



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



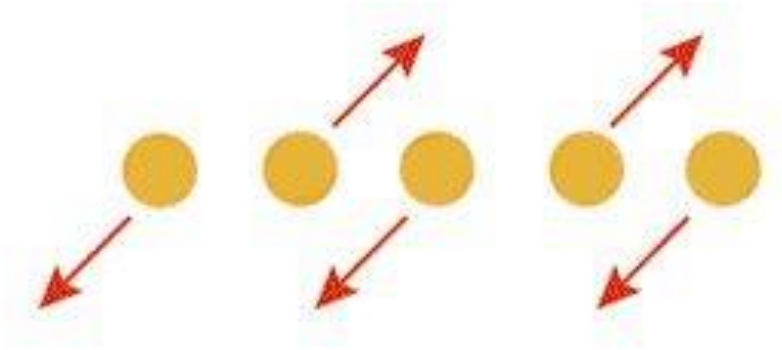
Proximity



Common Regions



Continuity



Common Fate



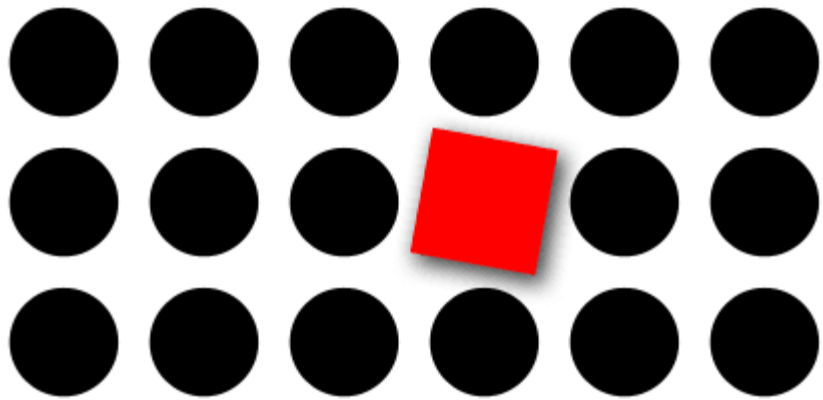


Figure - Ground

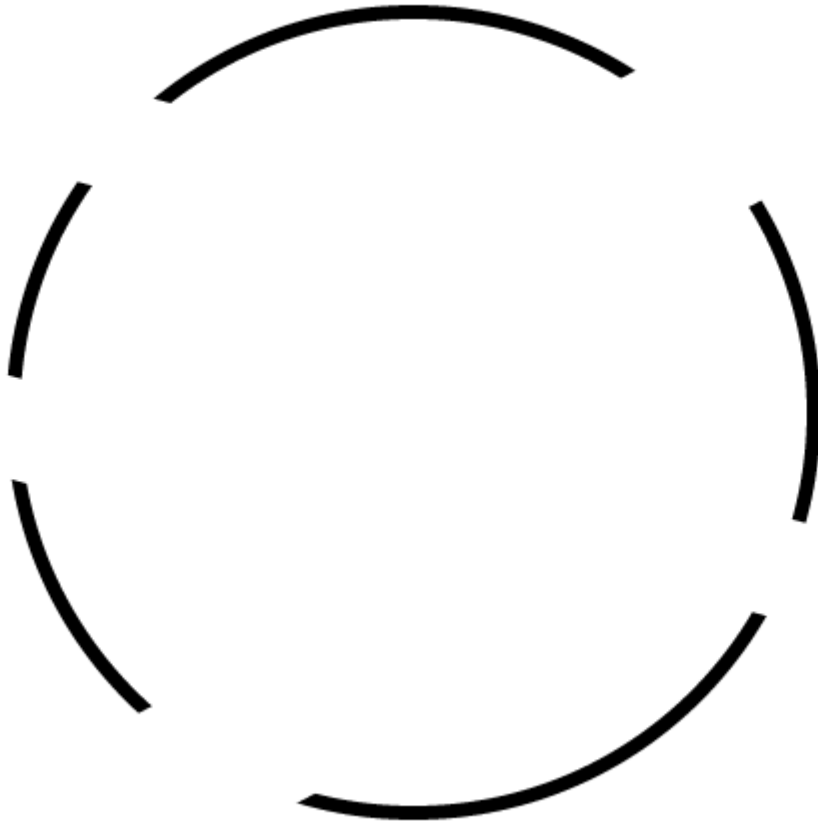
International Migrants Day: Mediterranean Death Trap

Migrant deaths worldwide by region in 2016



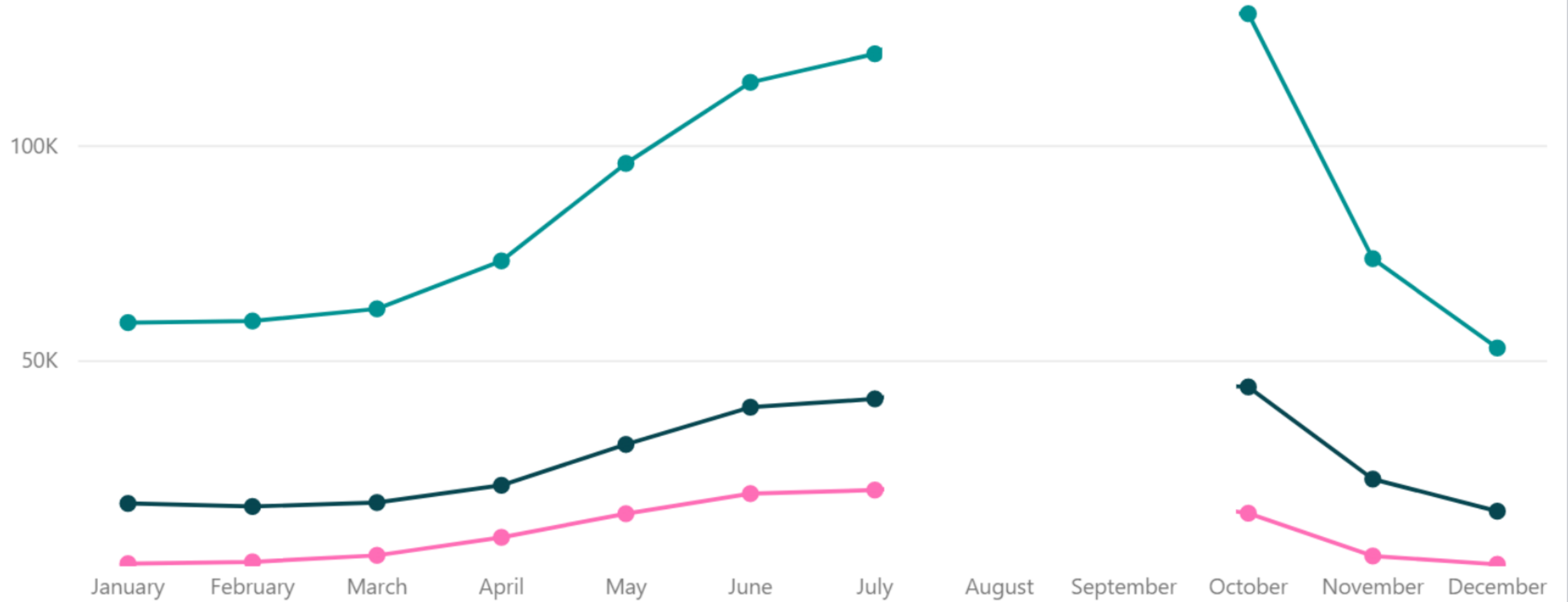


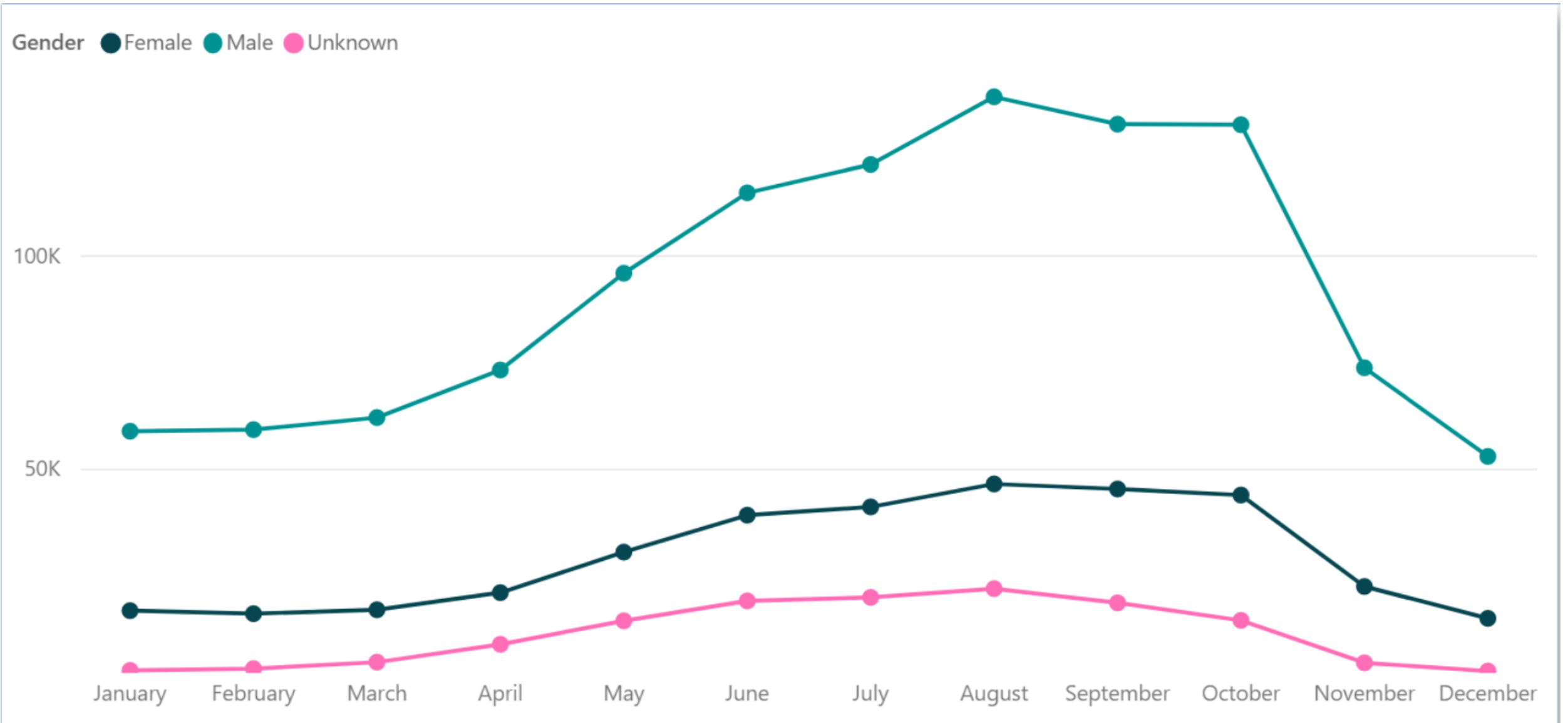
Focal Point

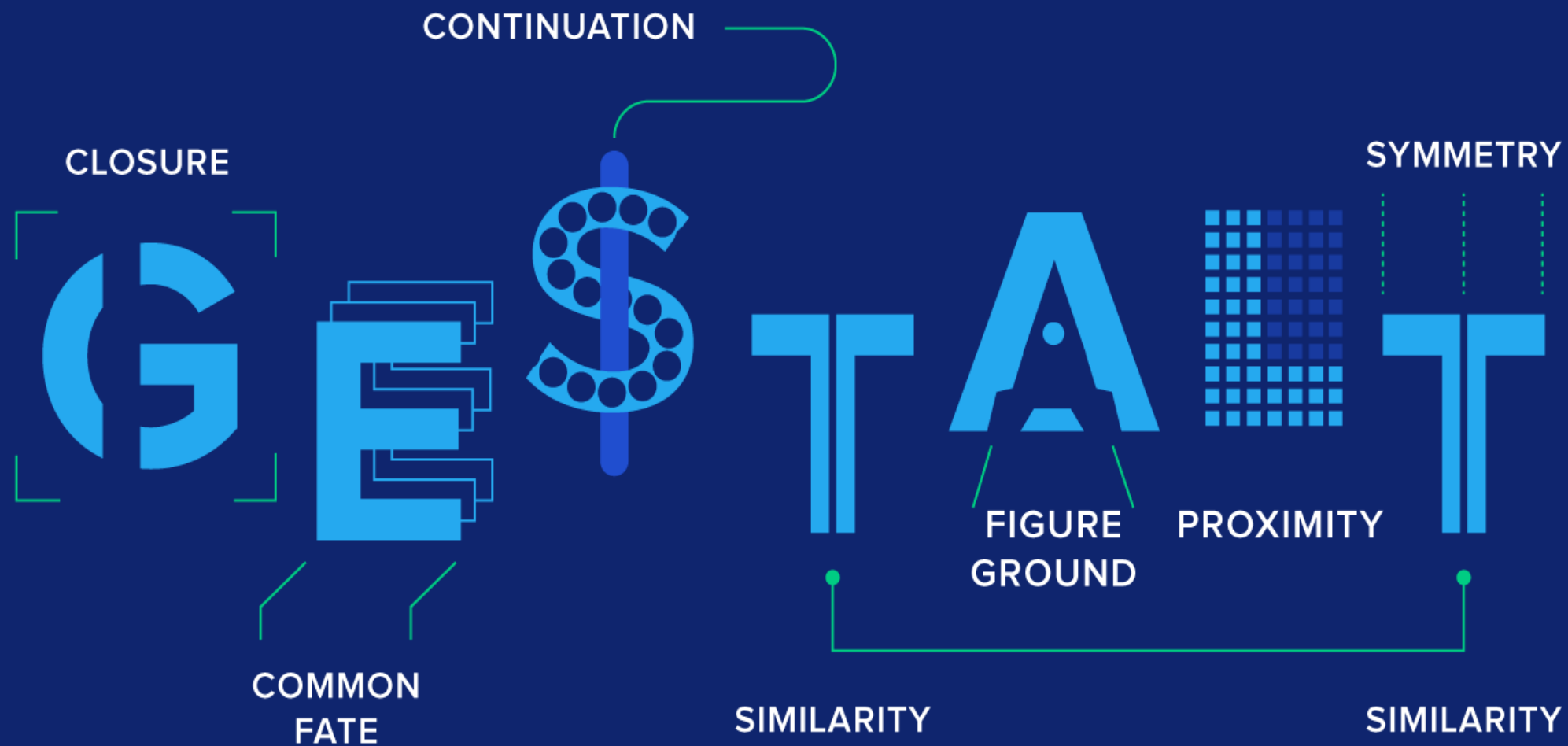


Closure

Gender ● Female ● Male ● Unknown







06

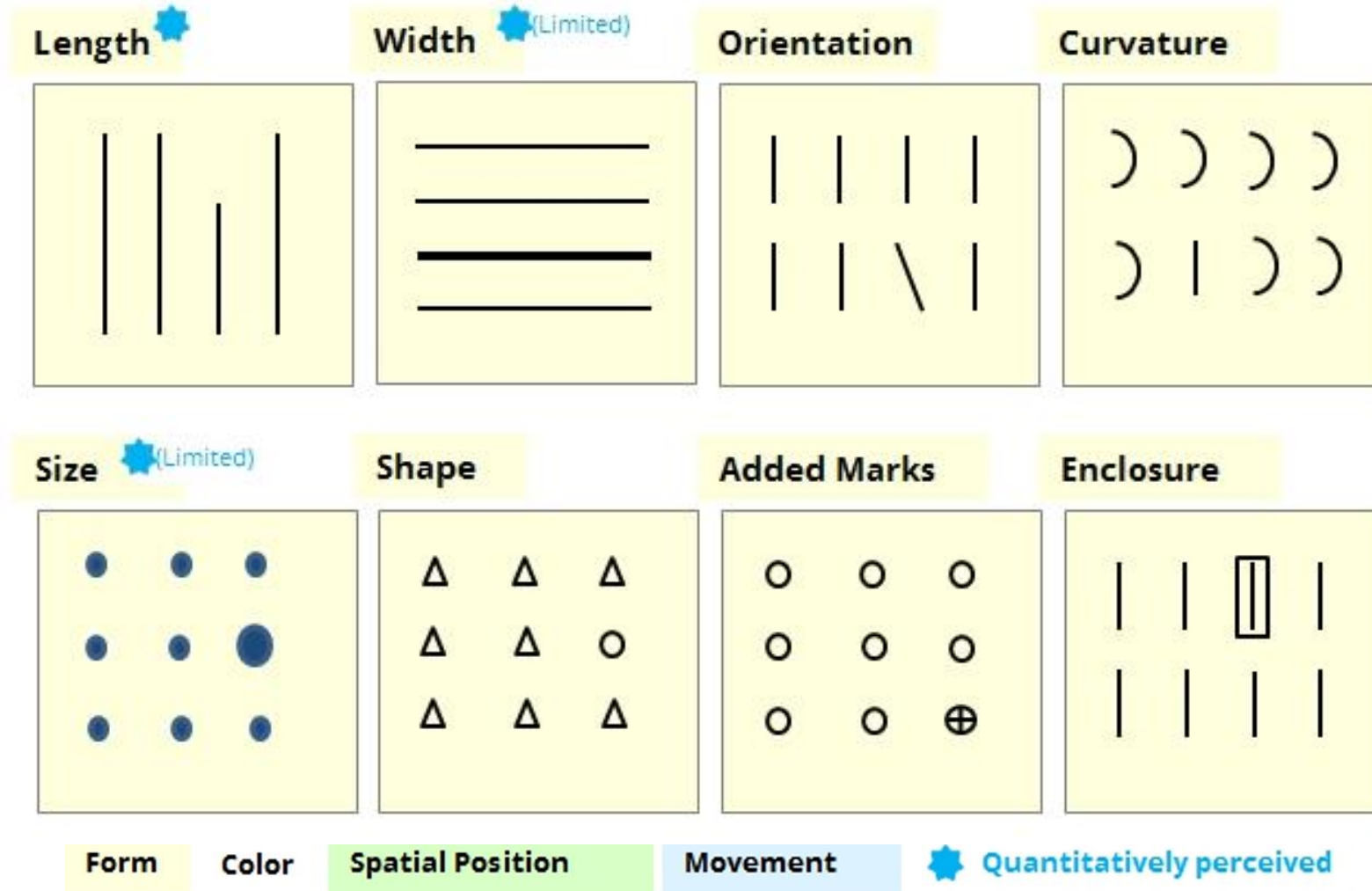
Preattentive Attributes

Preattentive attributes

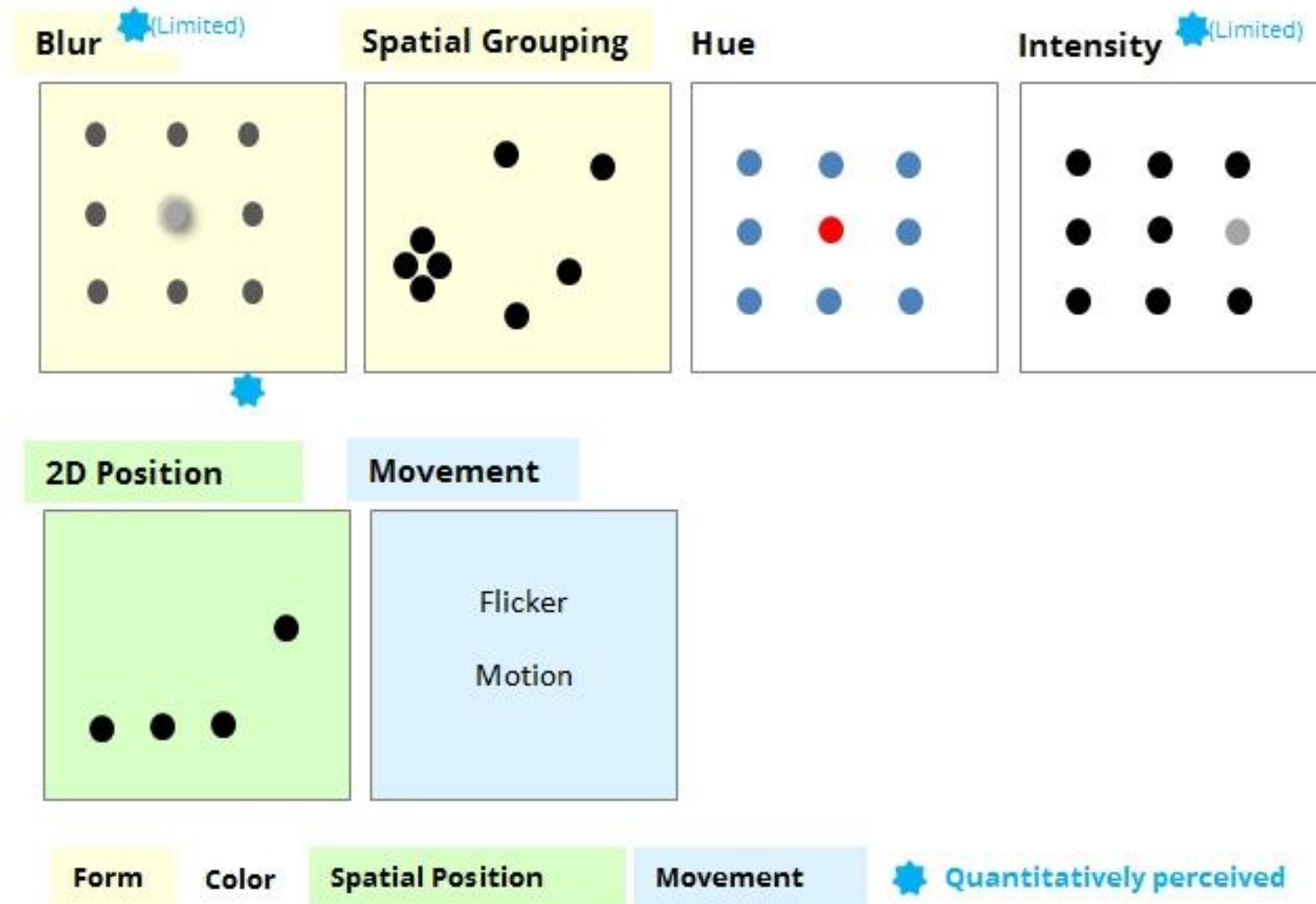


- 4 basic properties
 - Colour
 - Form
 - Movement
 - Spatial Positioning
- The human brain processes these properties with ease
- Occurs within 200 milliseconds of exposure to the visual

Preattentive attributes



Preattentive attributes



07

The right visual

Choosing the right visual - Context

- Explore your data!
- Speak with business people, if possible
- Familiarise yourself with :
 - Business Context
 - What does it mean when ..
- Keep extra attention for :
 - Amounts, Distributions, Proportions
 - X-Y relationships
 - Geospatial data
 - Uncertainty

Choosing the right visual

- FT visual vocabulary
 - <https://ft-interactive.github.io/visual-vocabulary/>
- Data to viz
 - <https://www.data-to-viz.com/#explore>

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 occurrence in nature, or in-person?
- Is there a corporate style guide?
- Try to pick colours users will easily understand

Step 4: Decide on the number of hues (base colours)



- 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

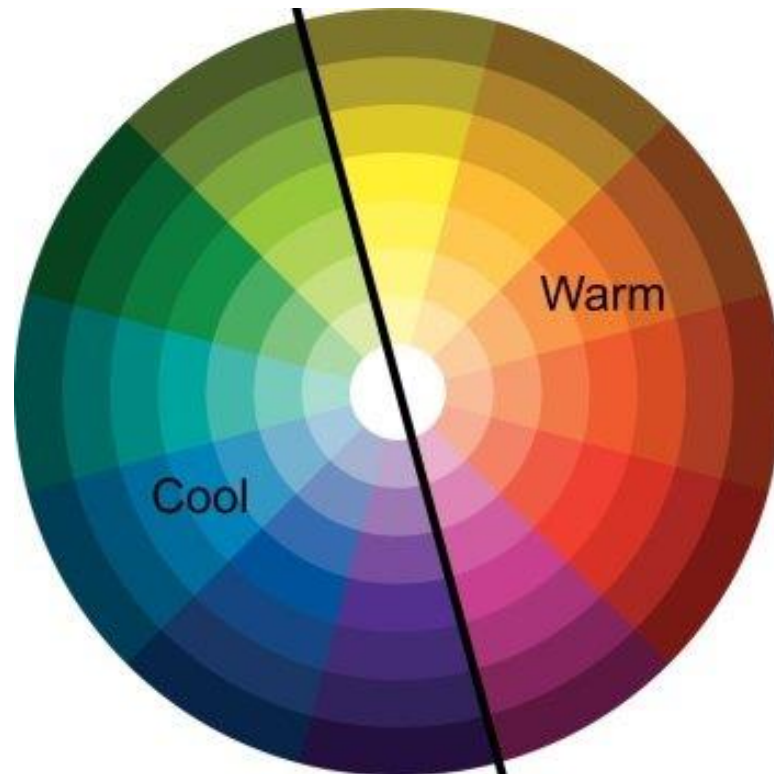
Step 5 : Be Consistent



- 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



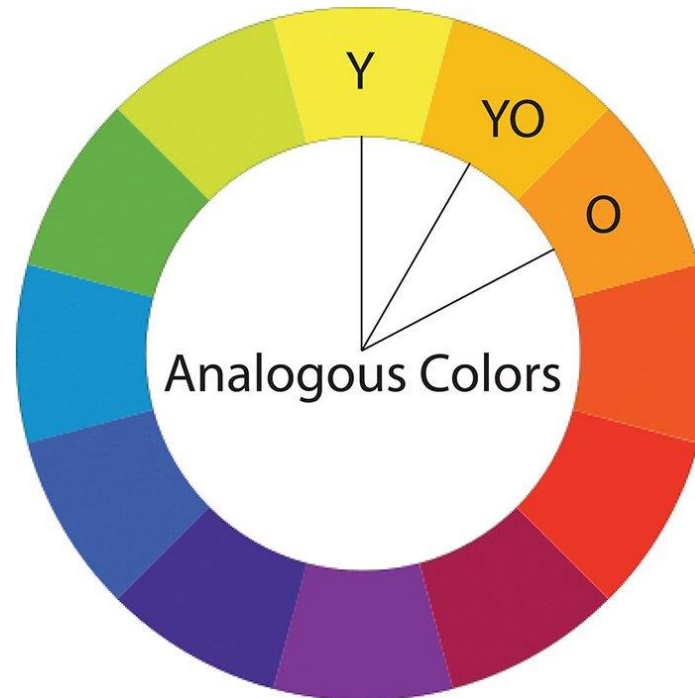
Step 6 : Create your palette

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



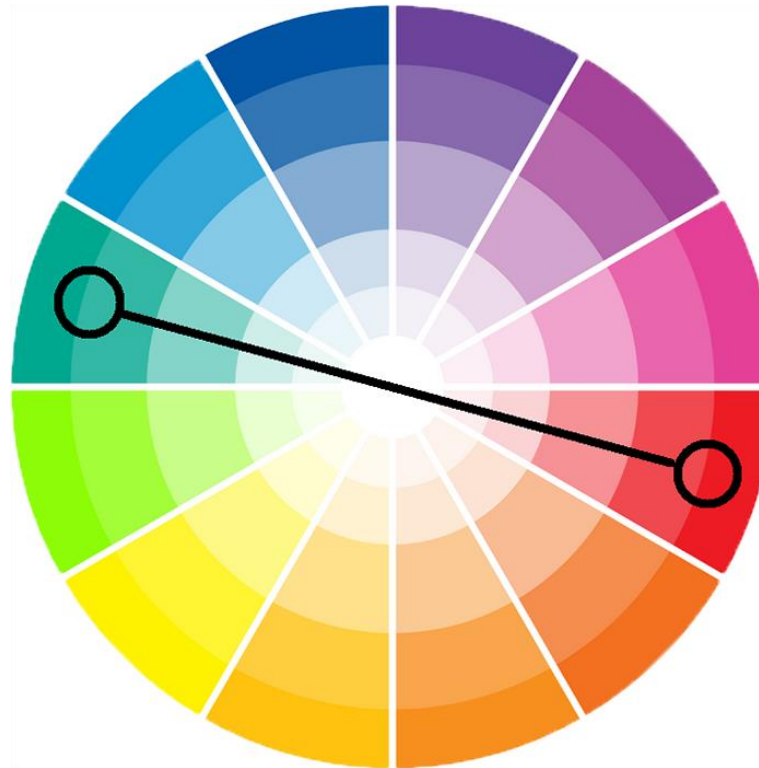
Step 6 : Create your palette

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

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

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%
Deutanopia (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%

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, use them wise
- Keep accessibility in mind
- Tell a Story!

Reading Material

- https://www.datapine.com/blog/best-data-visualization-books/?fbclid=IwAR1Ib77vZR3Sx4NX0Dua6bzyZaCctIfNbFUTS7jHOAzLBcPGtvY_rsQpgS0
 - [Alberto Cairo](#)
 - [Stephen Few](#)
 - [Donald Miller](#)
 - [Edward R. Tufte](#)
 - [Cole Nussbaumer Knaflitz](#)
 - [Steve Wexler](#)

References

- <https://viz.wtf/>
- <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/>

References

- <https://www.smashingmagazine.com/2014/03/design-principles-visual-perception-and-the-principles-of-gestalt/>
- <https://www.usertesting.com/blog/gestalt-principles>
- <https://practicalpie.com/gestalt-principles/>
<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/>
- Colormind.io - <http://colormind.io/>
- ColorBrewer - <https://colorbrewer2.org/>
- Colours from an image - <https://html-color-codes.info/colors-from-image/#>
- Canva - <https://www.canva.com/color-palette/#>
- Dribbble colors - <https://dribbble.com/colors/e8e230?percent=30>
- Colours co - <https://colors.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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