Data Visualization

Presentation by Maheshkumar Paik

Course objectives

- Understand basic to advanced concepts and best practices in effective data visualization
- Learn how to apply data visualization in everyday business problems and scenarios
- Learn how to make use of data visualization in business decision-making
- Experience designing and implementing end-to-end data visualization solutions using SSRS
- Become familiar with other data visualization tools on the market: Excel PivotCharts, PowerBI, Tableau

The age of “big data”

4.6 Billion people online

5.1 Billion mobile phone users

2 Billion online shoppers

3.7 Billion social media users

World data is predicted to reach **175 ZB** by 2025.

So much data would take one person 1.8 billion years to download at the current internet speeds!

What happens in ONE minute online?

200 Million emails sent

4.7 Million videos viewed

4.2 Million search queries

480,000 tweets posted

60,000 images uploaded

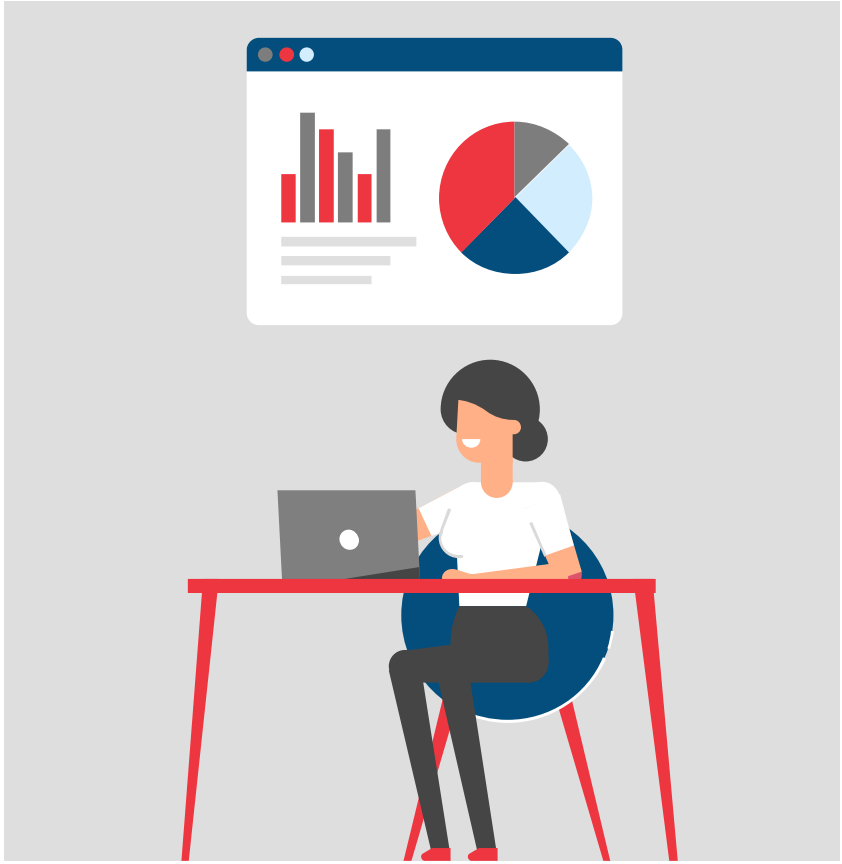
400 new users

What is happening in the market

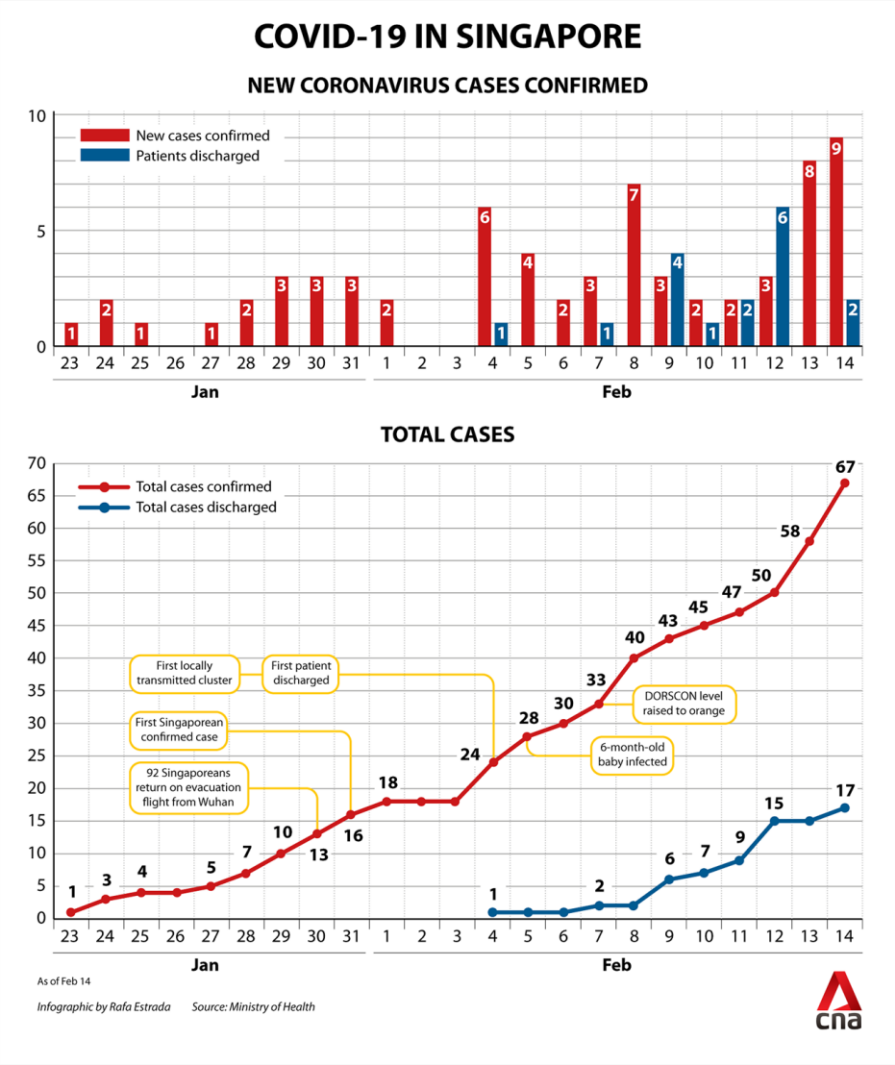
1. Data strategy is business strategy
2. “Democratization” of data
3. Artificial intelligence
4. To upskill or not to upskill is no longer a question

What is data visualization?

- **Graphical presentation of data and information**
- An easily accessible way to understand patterns and trends in data



Some recent examples



Source: Channel News Asia

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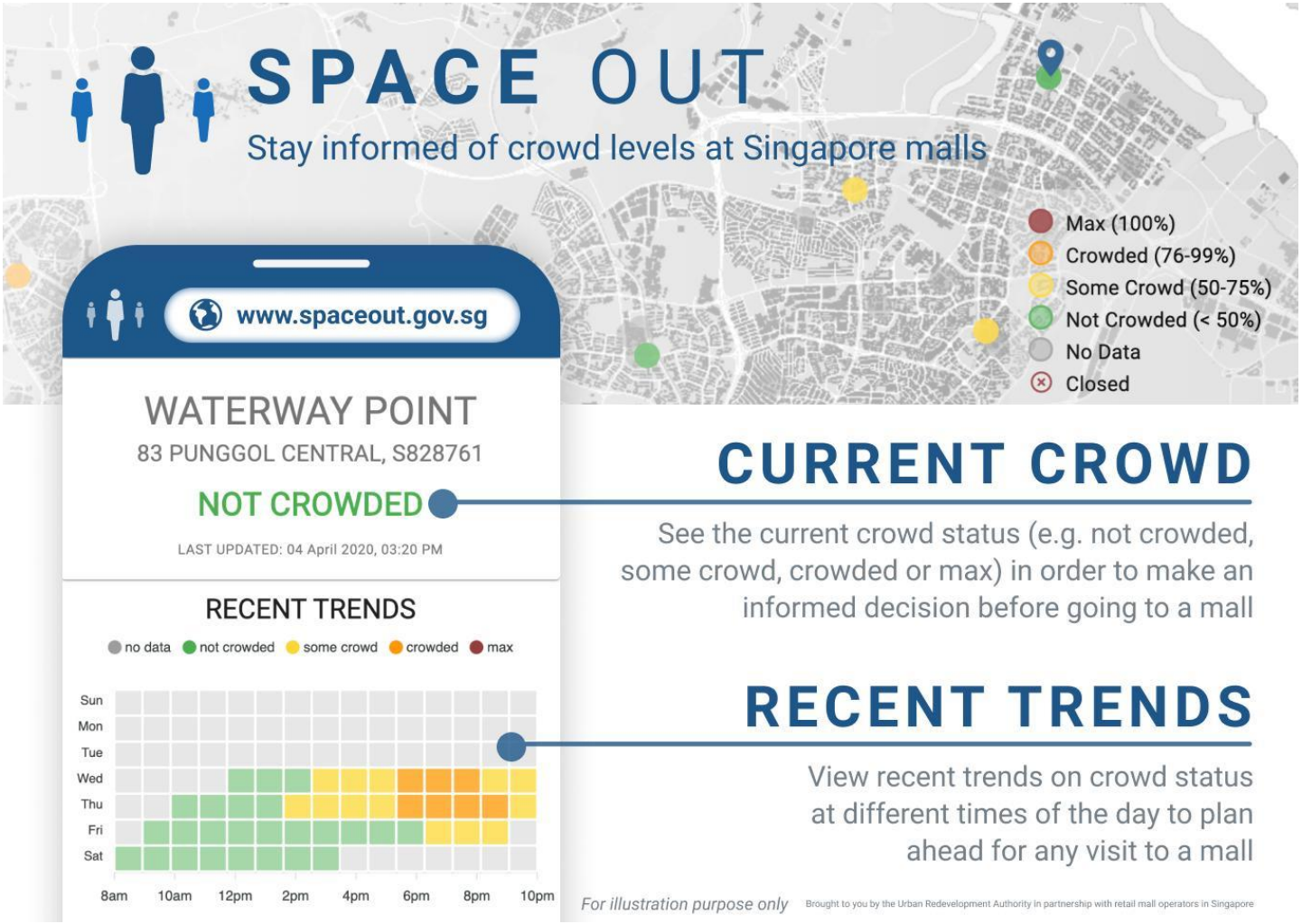
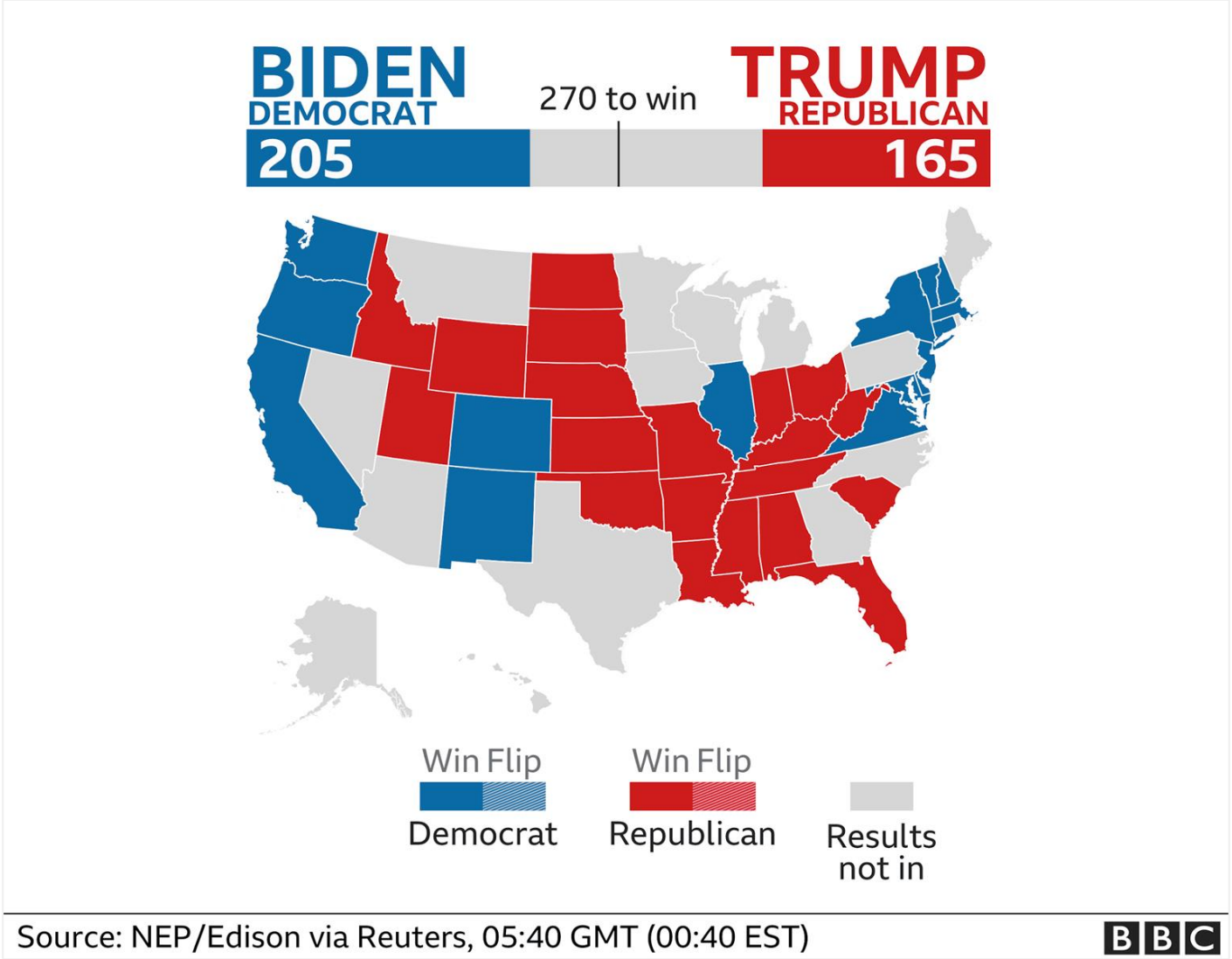


Source: spaceout.gov.sg

Some recent examples



Source: BBC

Why do it?

90% of information transmitted to the brain is visual.

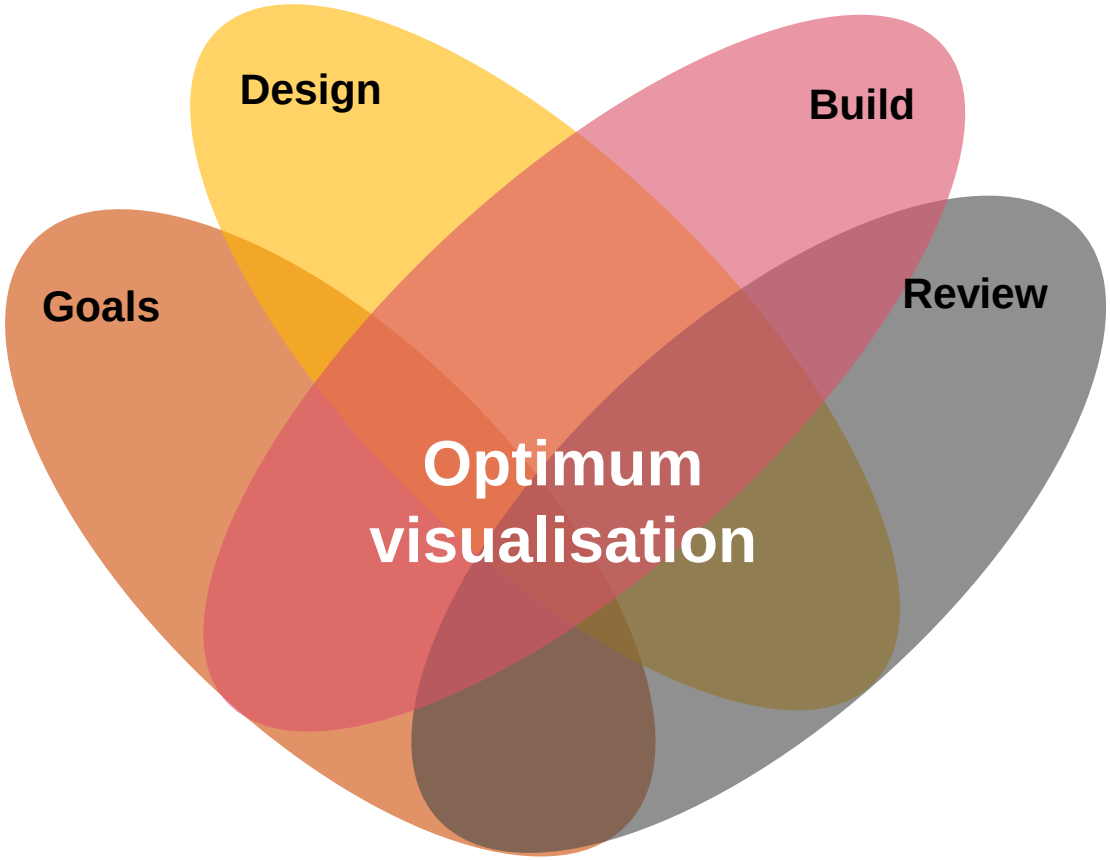
The human brain can process an image in just **13 milliseconds**

We process visuals **60,000 times faster** than words and numbers.

Data visualisation is able to:

- Make large data sets engaging and easily digestible
- Identify trends and outliers within a set of values
- Reveal the bigger story found within the data
- Predict upcoming movements

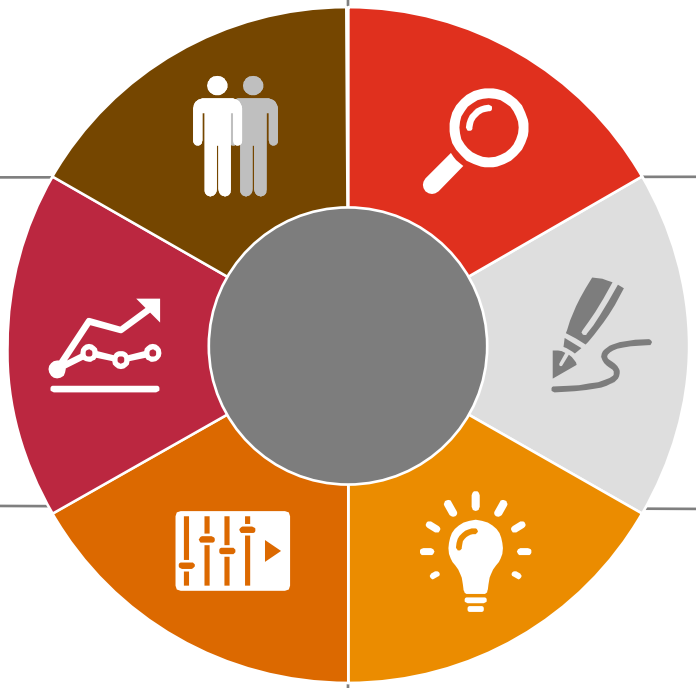
Data visualization projects



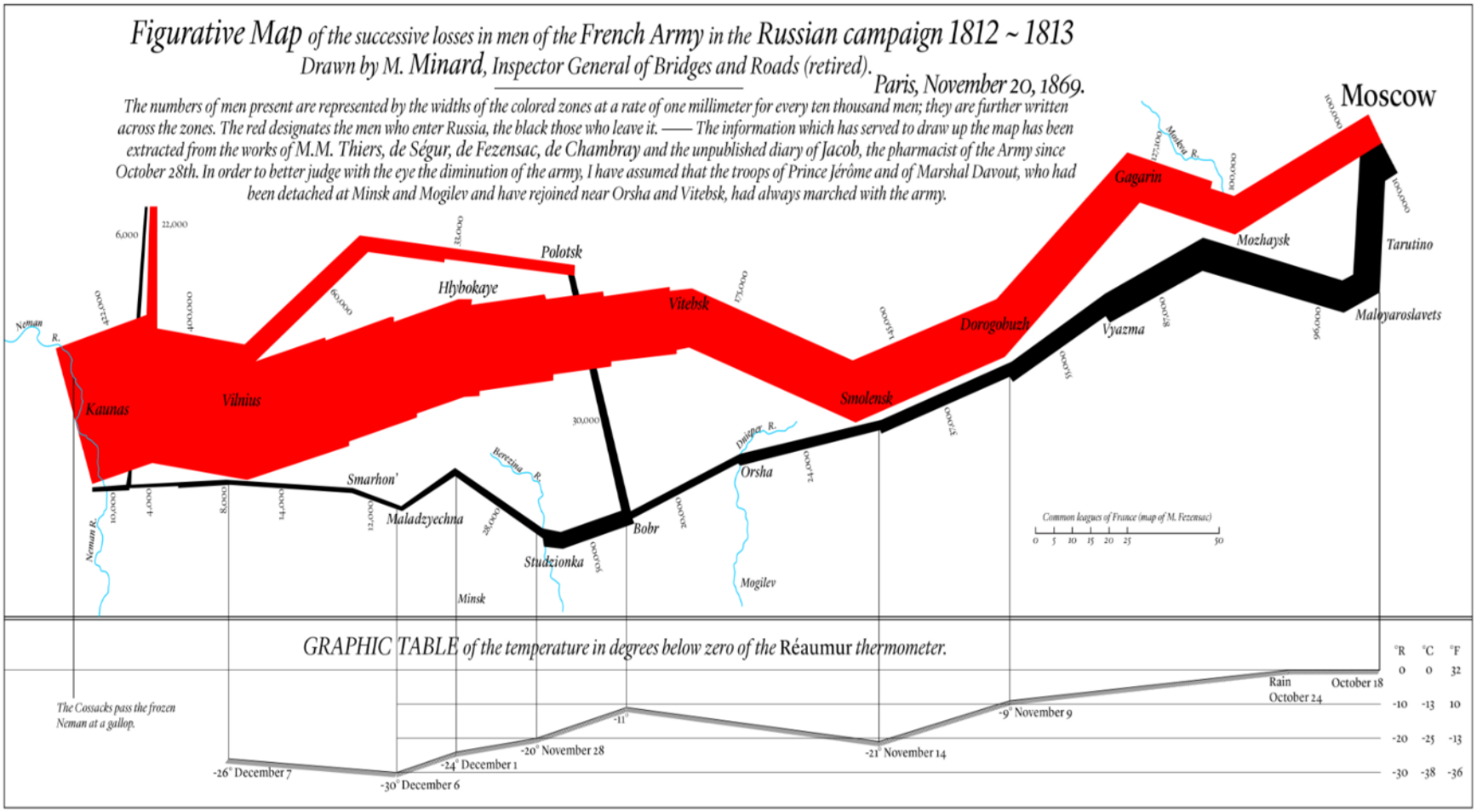
Visualization principles

Edward Tufte's six fundamental principles of design

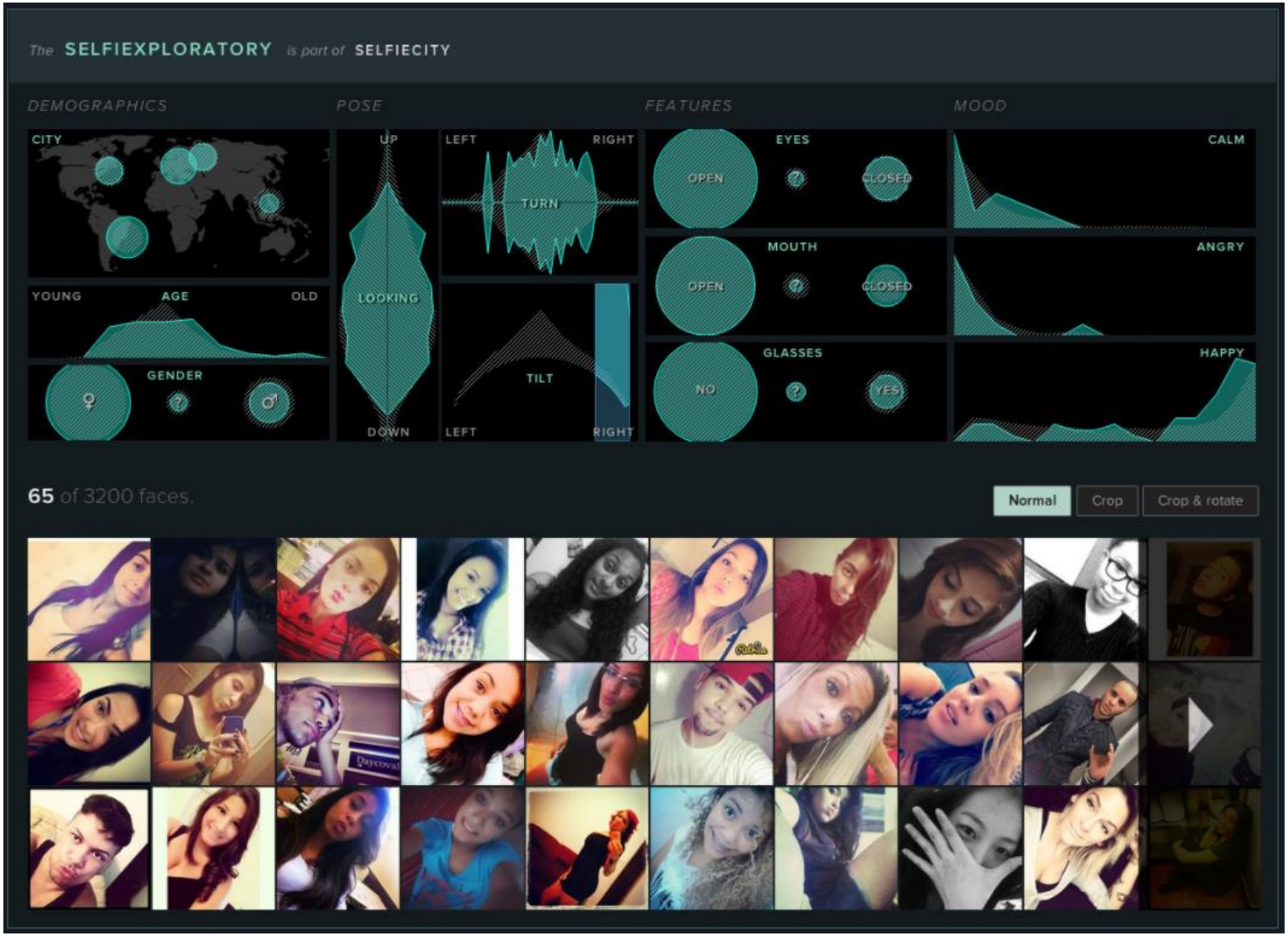
1. Comparisons
2. Causality
3. Multivariate Analysis
4. Integration of Evidence
5. Documentation
6. Content



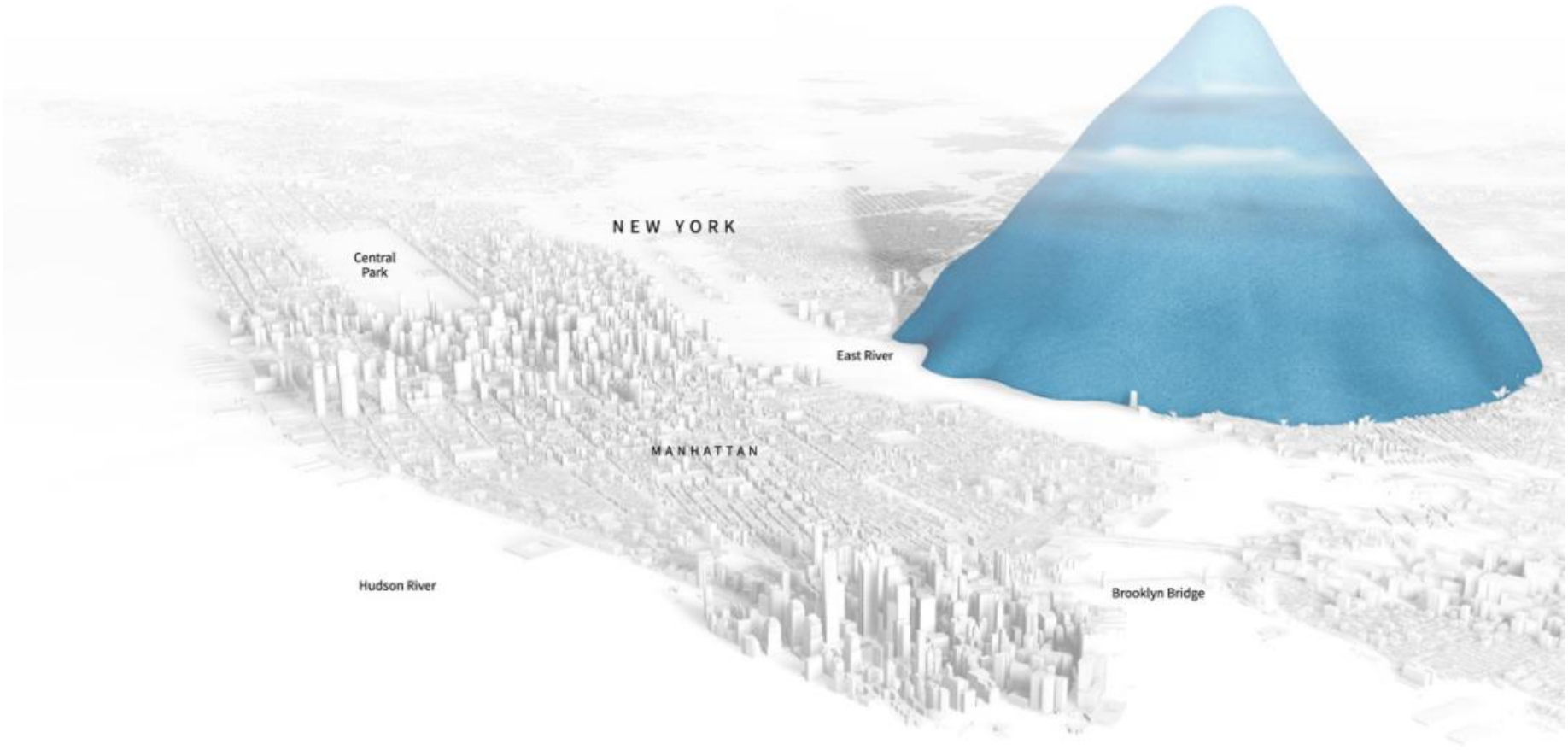
Example: Napoleon's invasion of Russia



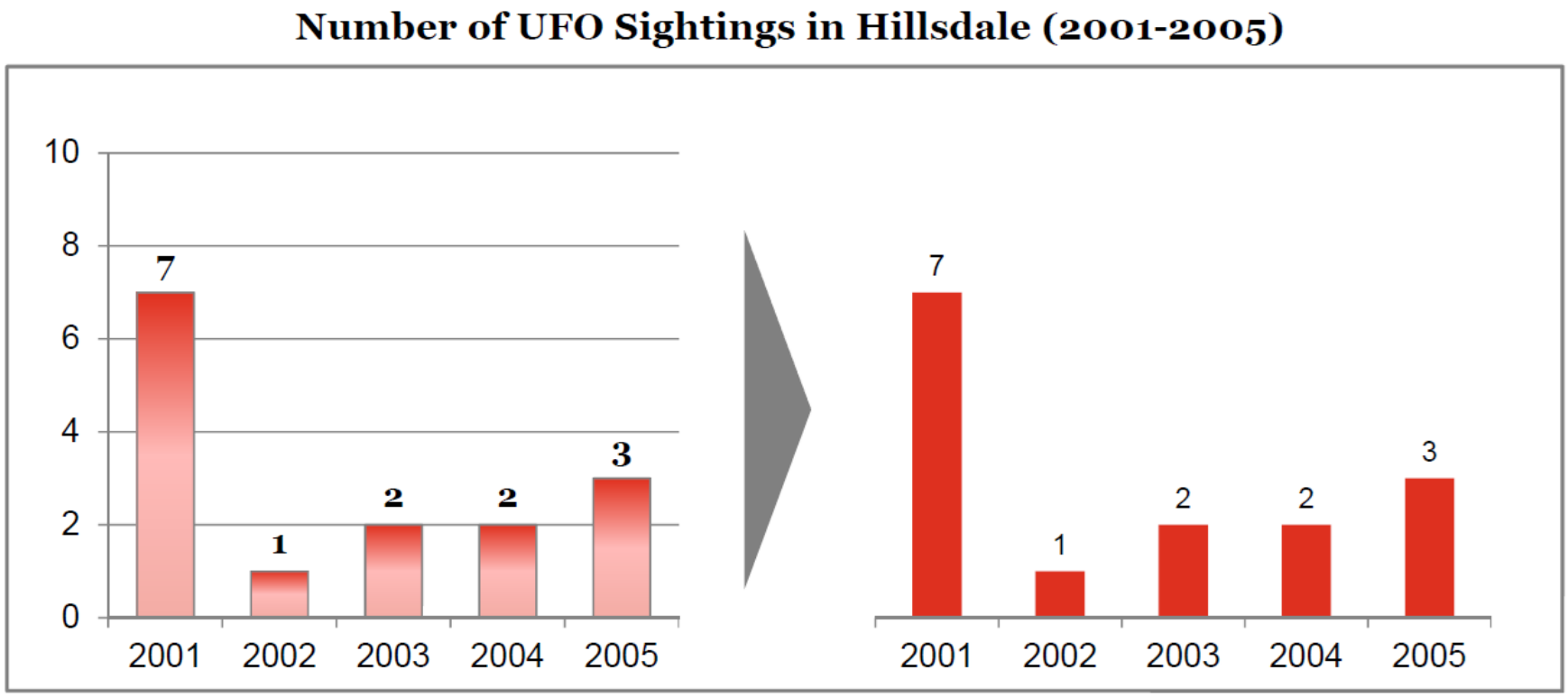
Example: Selfiecity



Example: Drowning in plastic

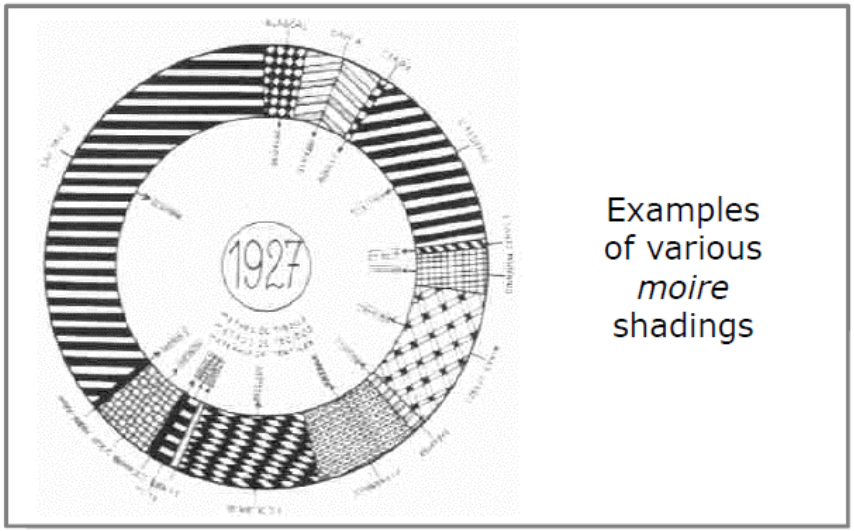


Tip: Maximize “data-ink” ratio



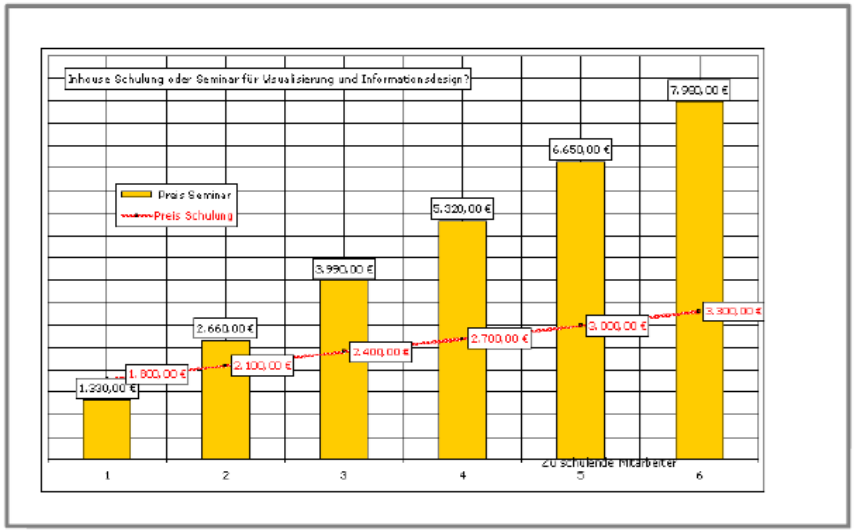
Tip: Leave out “chartjunk”

Moire Shadings



Examples of various *moire* shadings

Gridlines



Tip: “Ducks” are a type of chartjunk; limit their use

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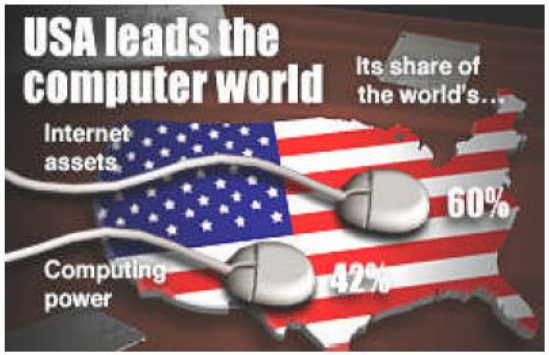
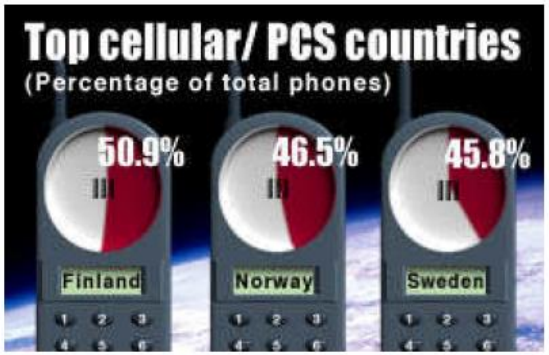
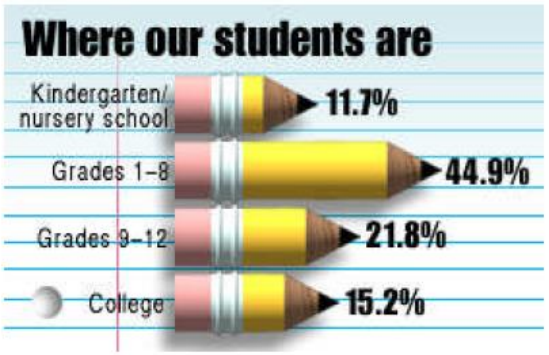
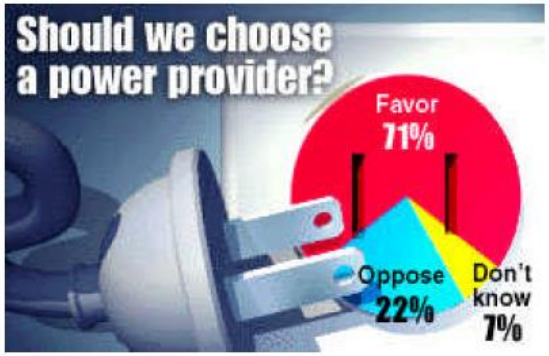
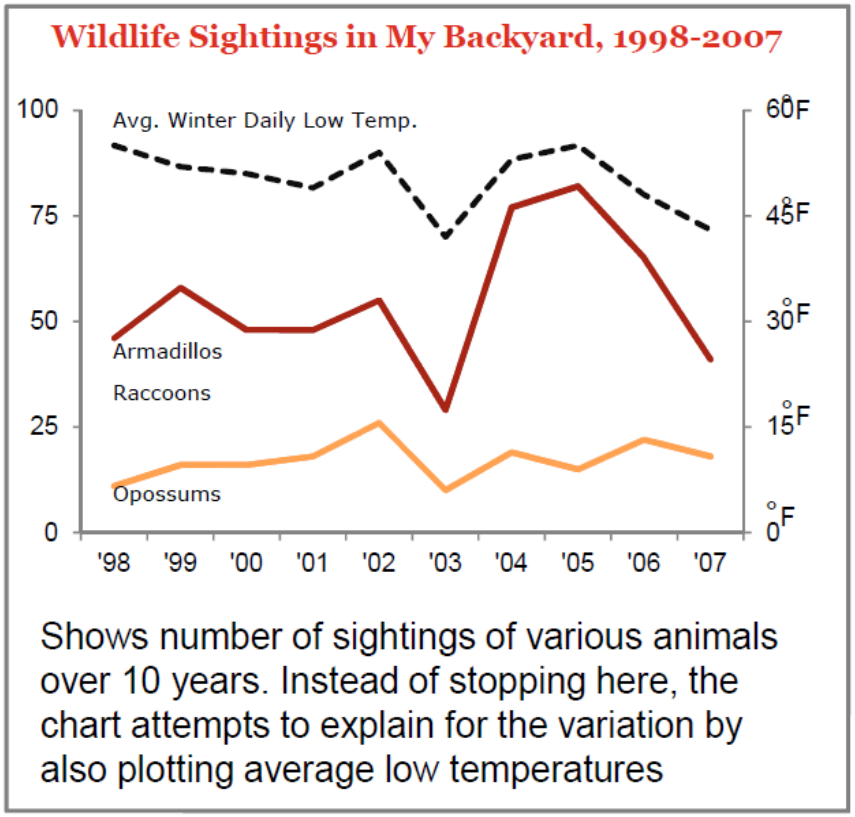




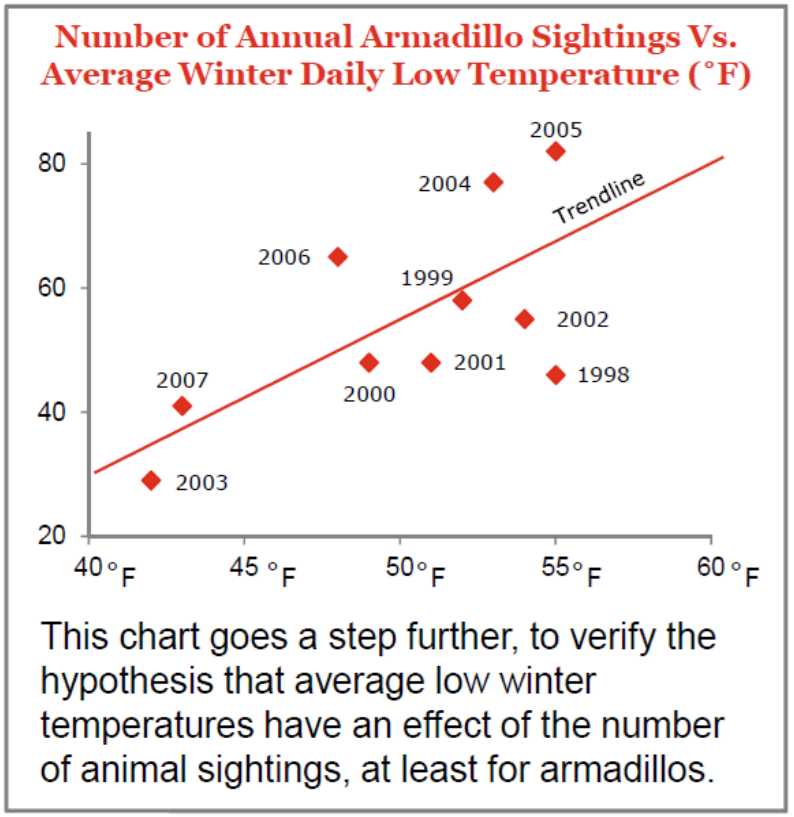




Tip: Embrace multivariate charts



Shows number of sightings of various animals over 10 years. Instead of stopping here, the chart attempts to explain for the variation by also plotting average low temperatures

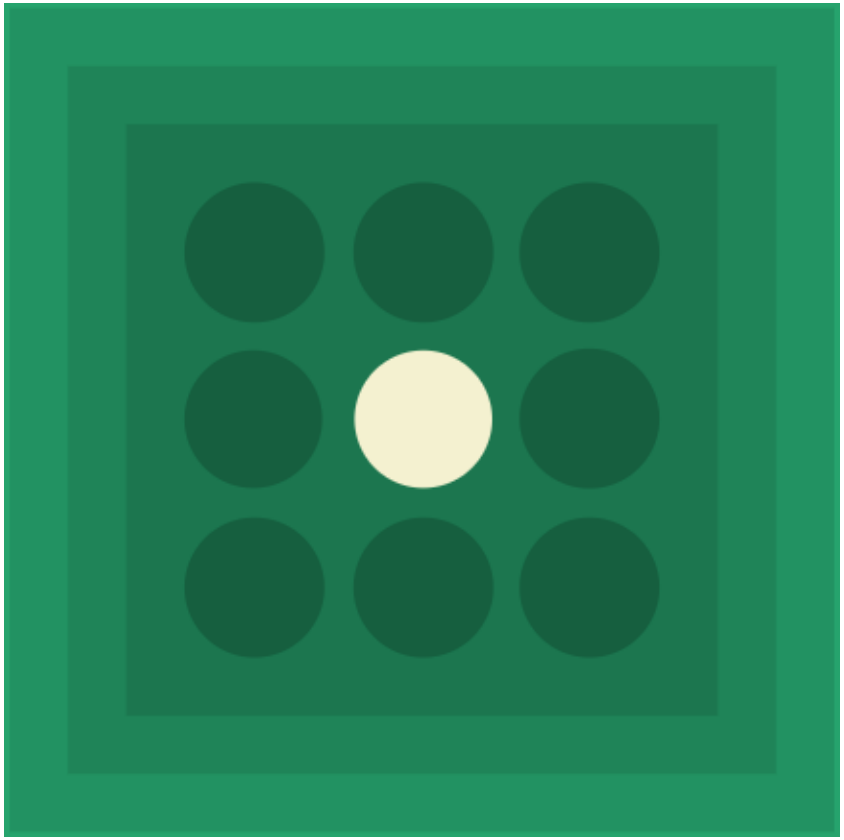


This chart goes a step further, to verify the hypothesis that average low winter temperatures have an effect of the number of animal sightings, at least for armadillos.

The human brain and visuals

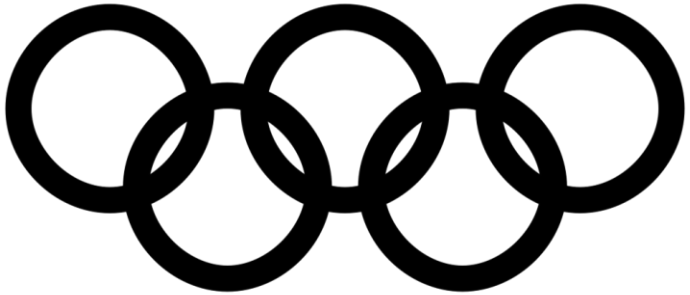
Law of Common Region

Elements tend to be perceived into groups if they are sharing an area with a clearly defined boundary

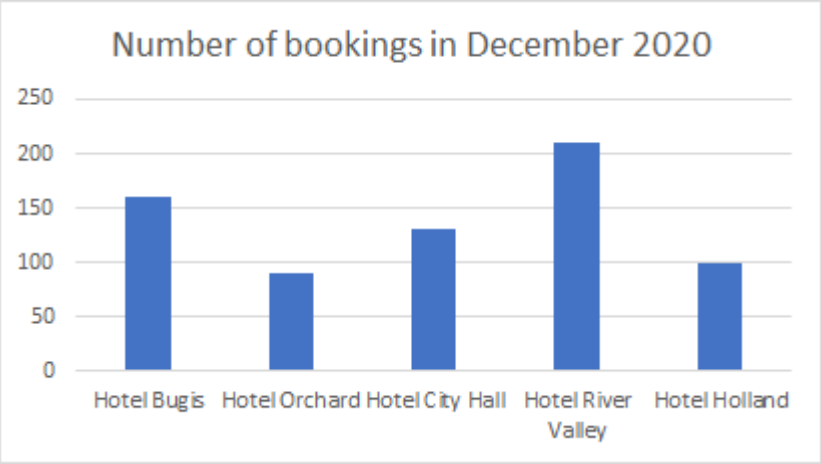


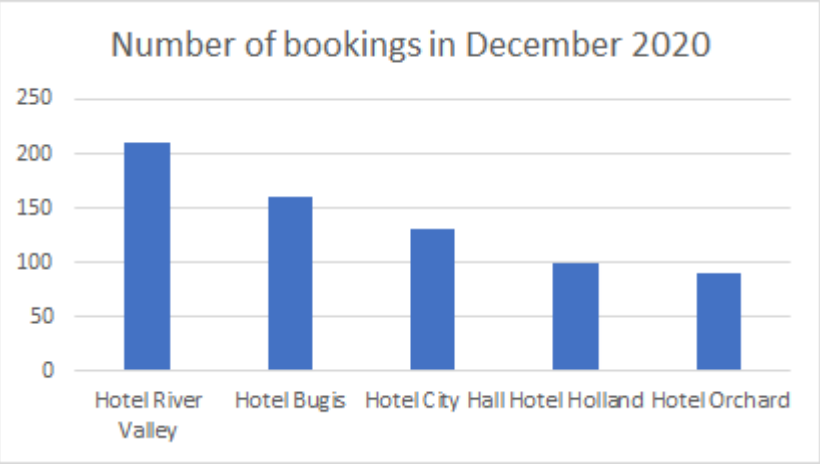
Law of Prägnanz

People will perceive and interpret ambiguous or complex images as the simplest form possible, because it is the interpretation that requires the least cognitive effort



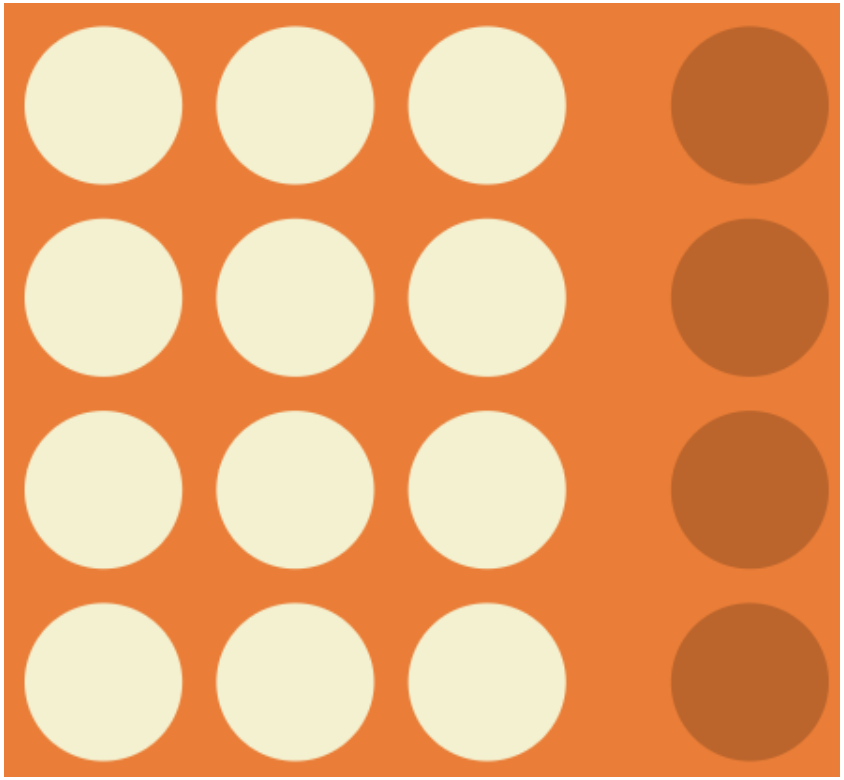
Law of Prägnanz



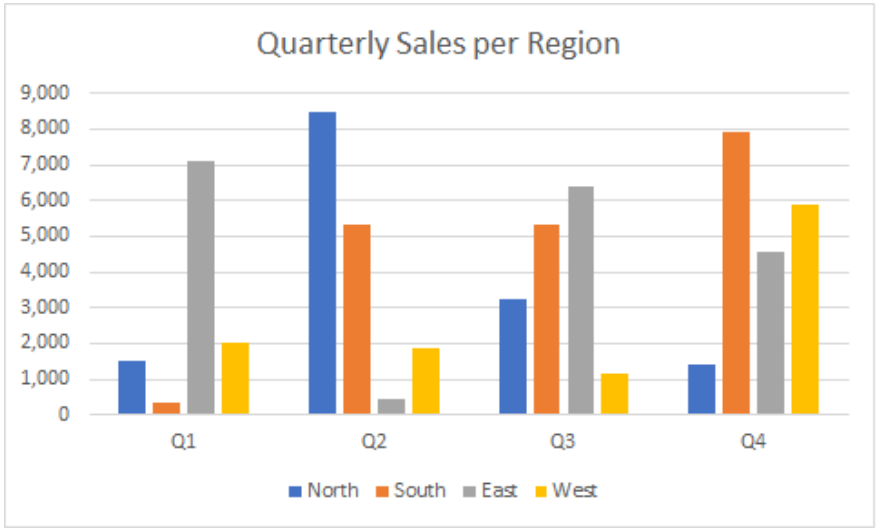


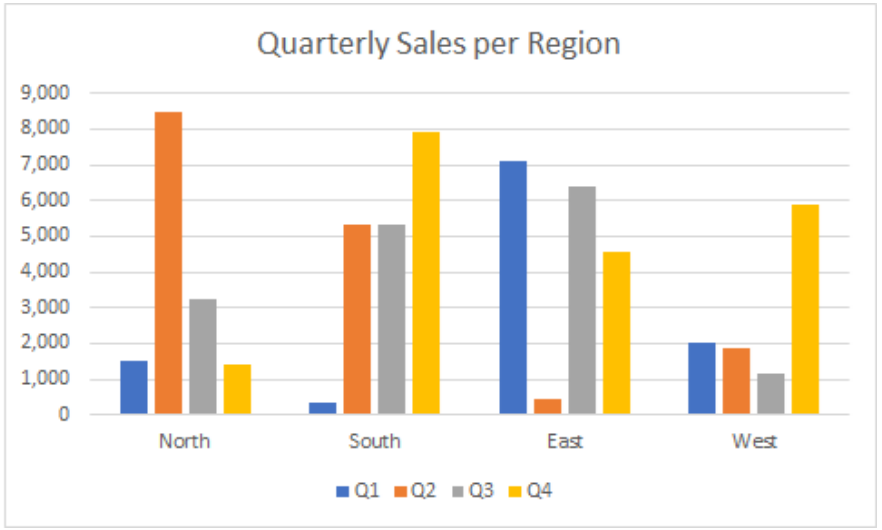
Law of Proximity

Objects that are near, or proximate to each other, tend to be grouped together



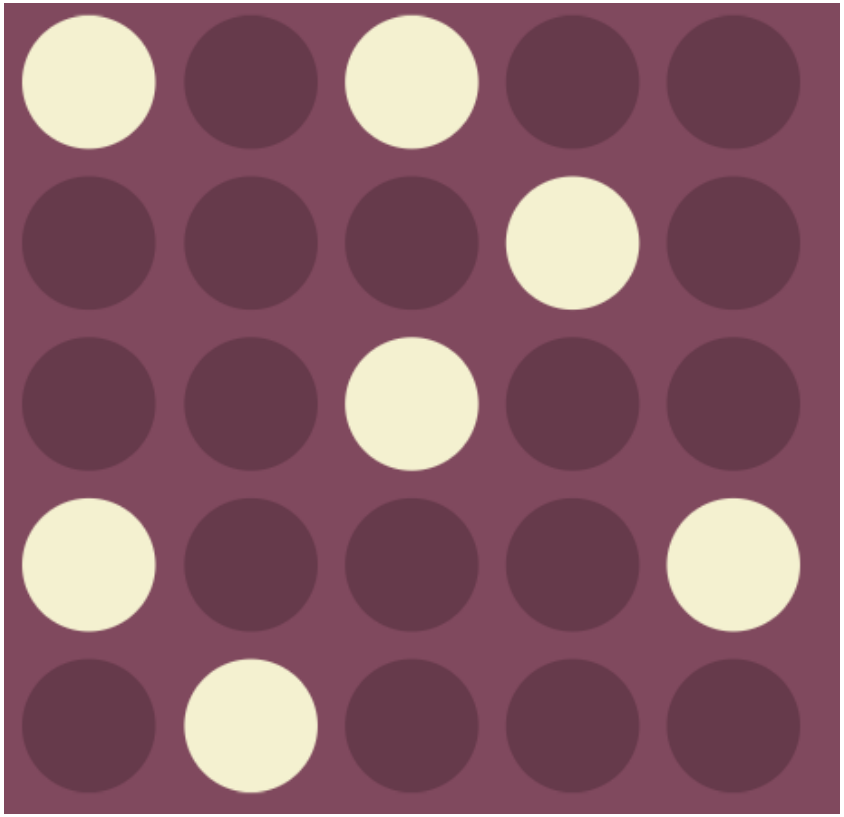
Law of Proximity



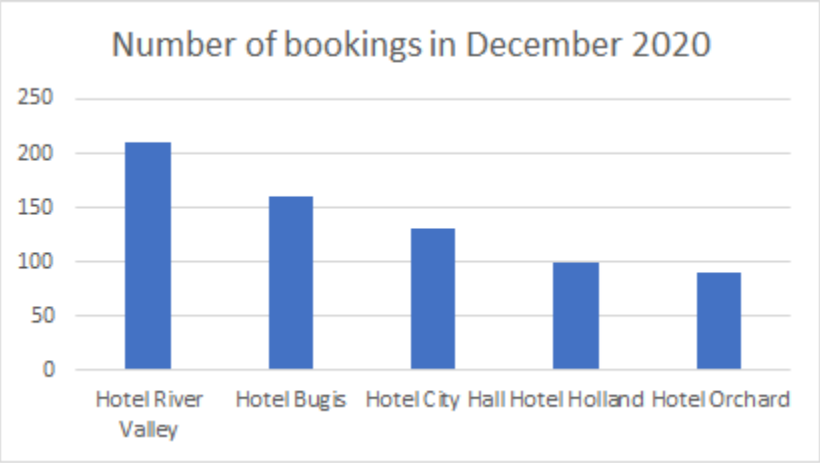


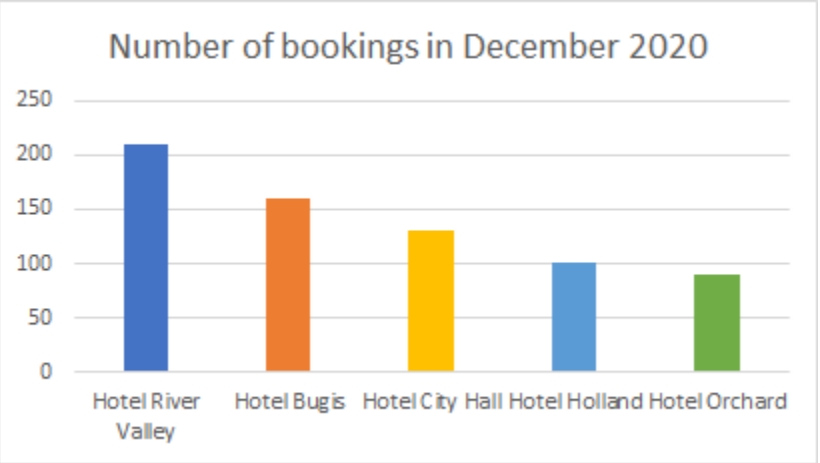
Law of Similarity

The human eye tends to perceive similar elements in a design as a complete picture, shape, or group, even if those elements are separated



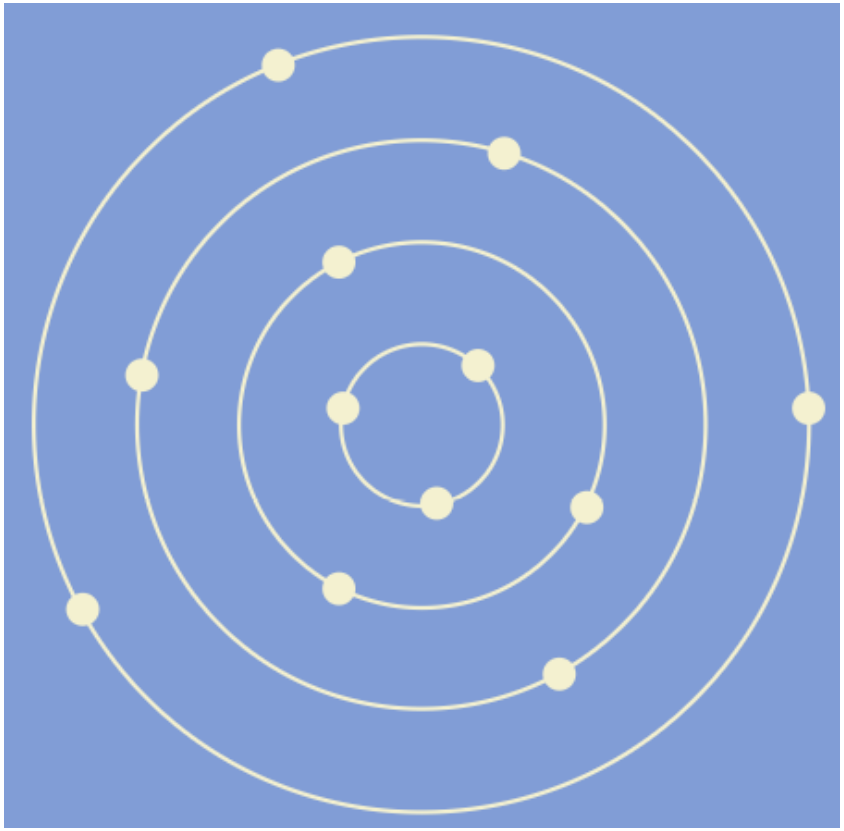
Law of Similarity



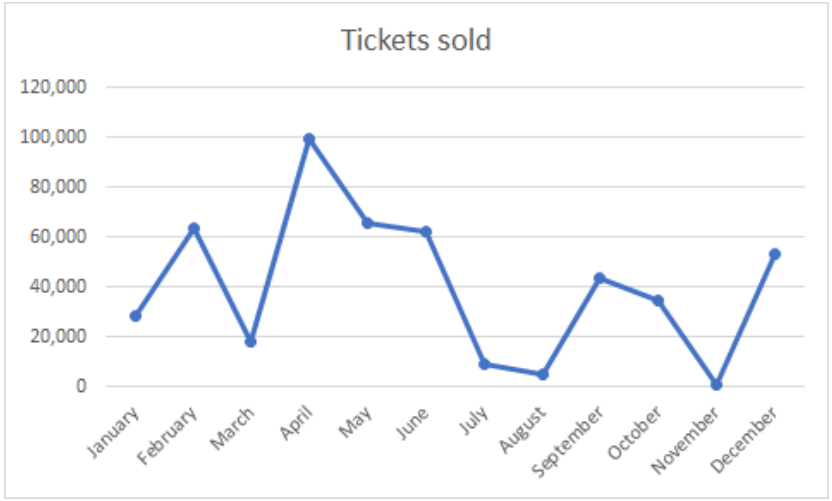


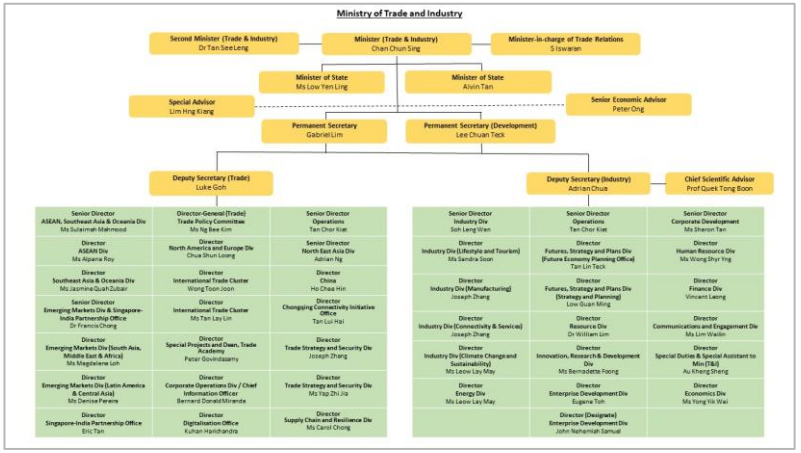
Law of Uniform Connectedness

Elements that are visually connected are perceived as more related than elements with no connection

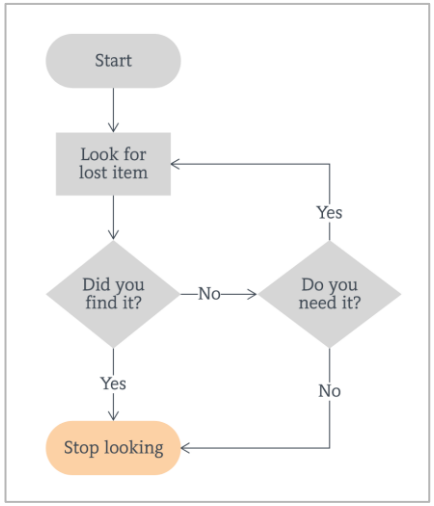


Law of Uniform Connectedness





Source: Ministry of Trade and Industry



Source: Lucidchart

Myth-busting

Data visualization, data storytelling, and business intelligence

Data visualization

Any time you represent data visually using a chart or graph

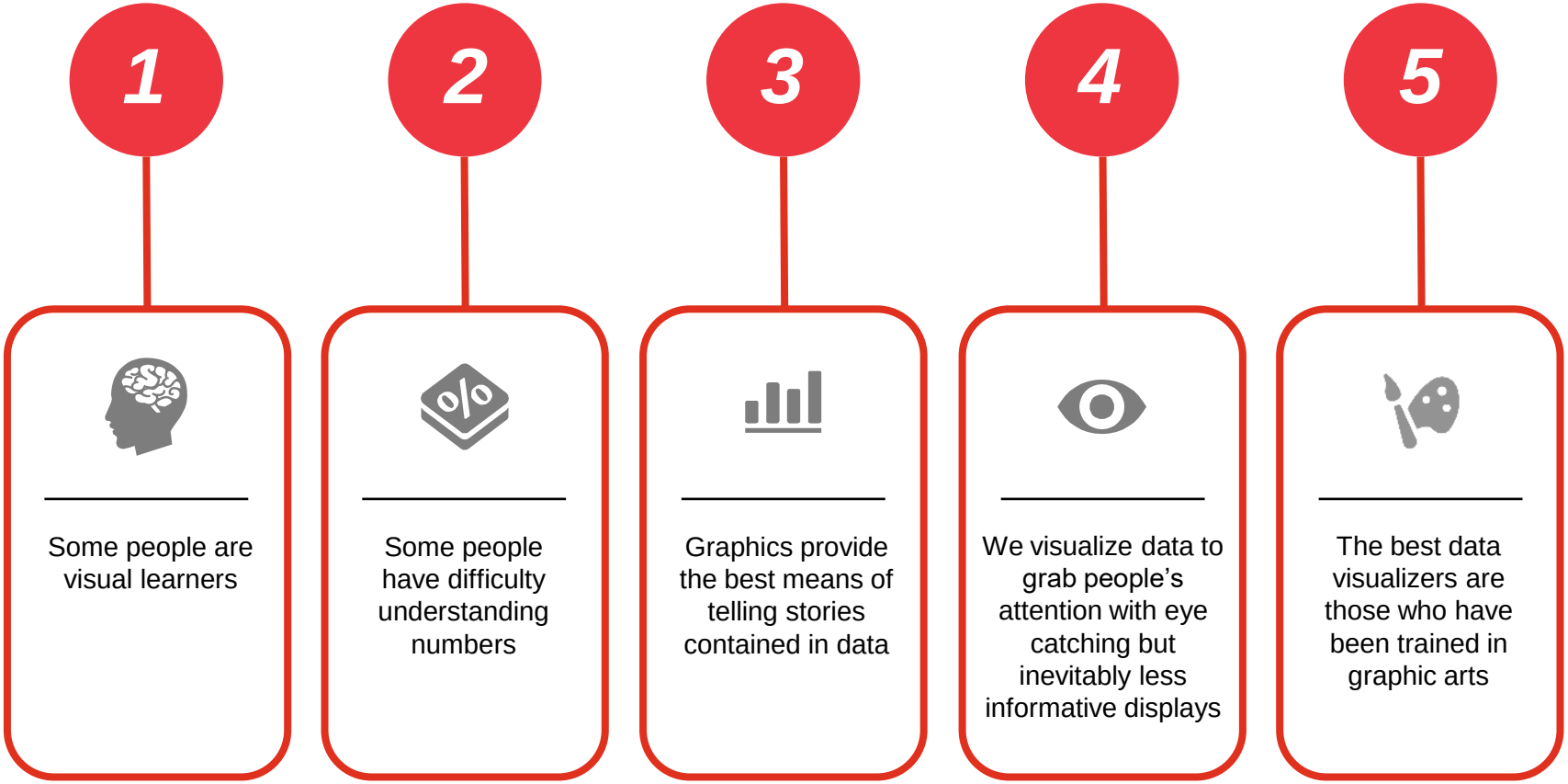
Data storytelling

Making data relevant, creating a narrative, and informing a decision or action

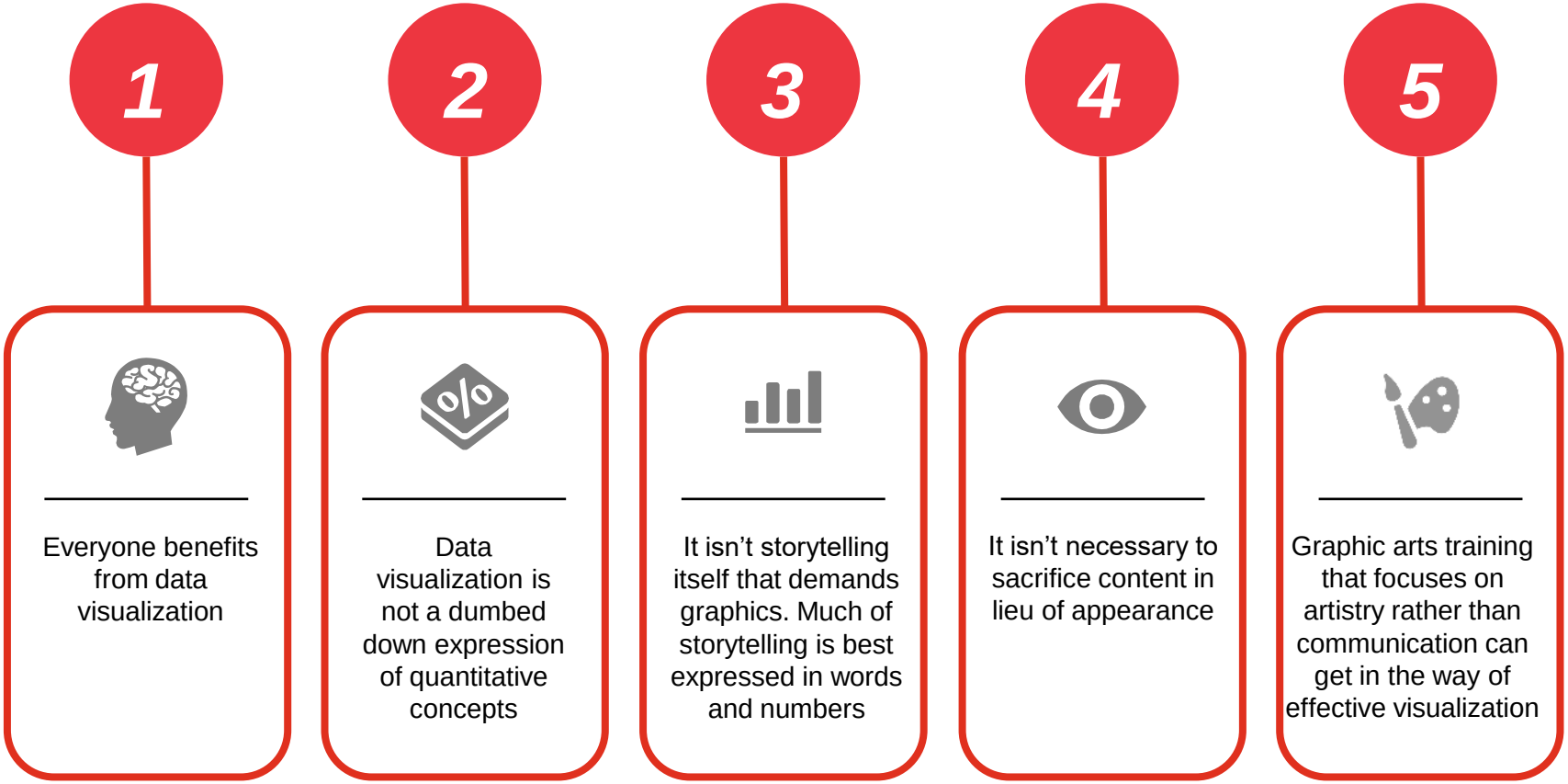
Business intelligence

Aggregation, analysis, and visualization of business operations data

The five myths of data visualization



Busting the five myths



End of Day

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