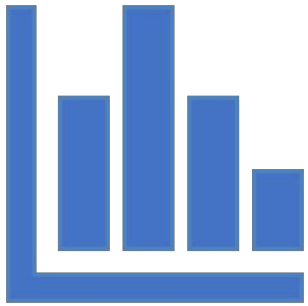
Introduction to Data and Information Visualization



Introduction

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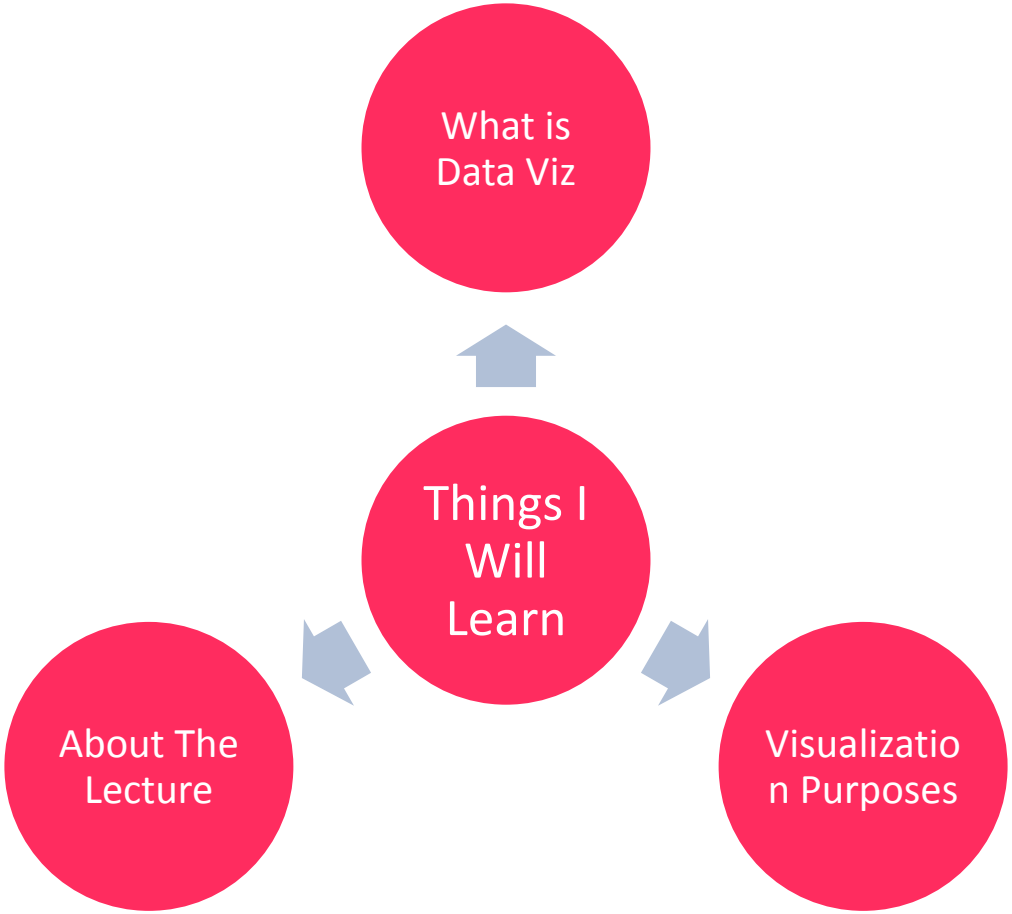
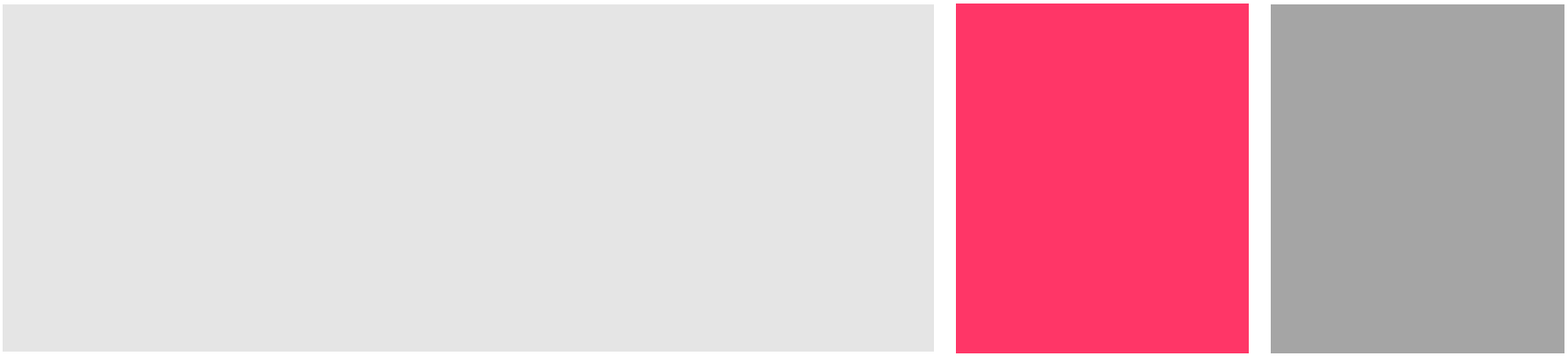
Learning Purpose

- Memberikan wawasan mengenai prinsip dan peranan visualisasi dalam interaksi manusia dengan informasi, serta memberikan panduan pengembangan aplikasi visualisasi interaktif sehingga mahasiswa dapat menerapkan pengetahuan yang ada di dalam kelas ke dalam kehidupan sehari-hari.
- Kuliah ini bersifat multidisiplin yang mencakup aspek data, psikologi komunikasi visual, dan teknologi informasi.


What is Data Viz
Things I Will Learn
About The Lecture
Visualizatio n Purposes

1. What is Data/Information Visualization?



Data Visualization

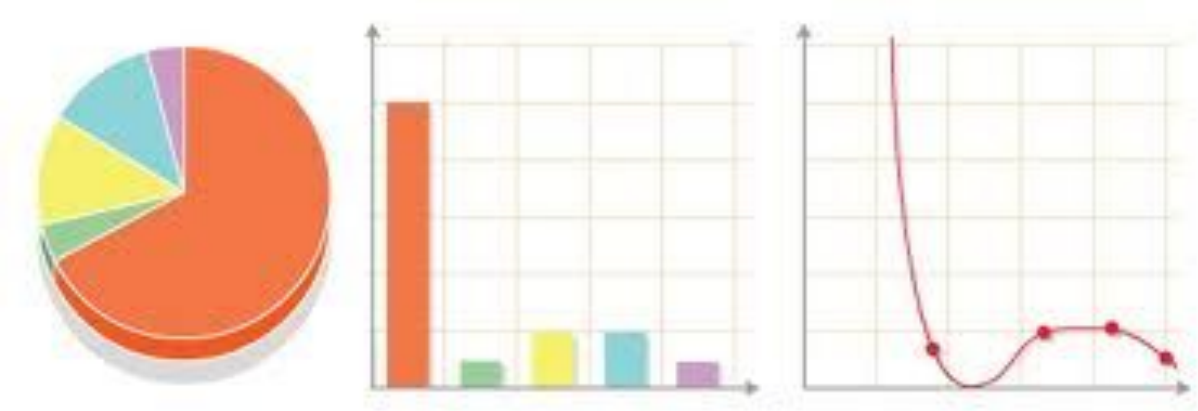
- Representation and presentation of data
- Exploits our visual perception abilities
- To amplify cognition

Data vs Information Visualization

- Data Visualization: The use of computer-supported, interactive visual representations of **data** to amplify cognition.
- Information Visualization: The use of computer-supported, interactive visual representations of **abstract data** to amplify cognition.

Representation

- The way you decide to depict data through a choice of physical forms.



Taken from bbc.co.uk

- Data as the raw material and create a representation to best portray its attributes.

Presentation

- It goes beyond the representation of data
- Concerns how you integrate your data representation into the overall communicated work

Including:

- Choice of colors
- Annotations
- Layout
- Interactive features

Amplify Cognition

- Maximizing how efficiently and effectively we are able to process information into thought, insights, and knowledge.
  - Faster
  - Easier
  - Memorable

"a picture is worth a thousand words" - often more –

but only when the story is best told graphically rather than verbally and the picture is well designed.

Art or Science?

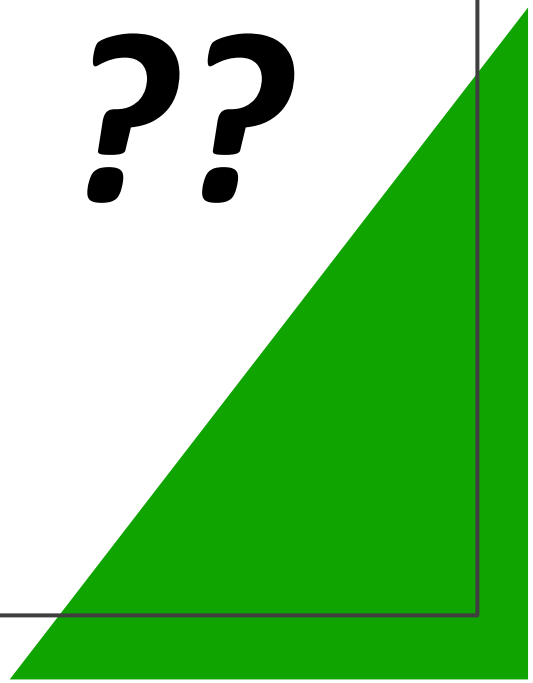
- it requires a deep and broad knowledge across several subjects:
  - Cognitive science
  - Statistics
  - Graphic design
  - Cartography
  - and computer science

Bad or Good Visualization

*“Getting visualization right is much more a science than an art, which we can only achieve by studying **human perception**.”*

Stephen Few

Now, How Do You Design ??



Now, How Do You Design ??

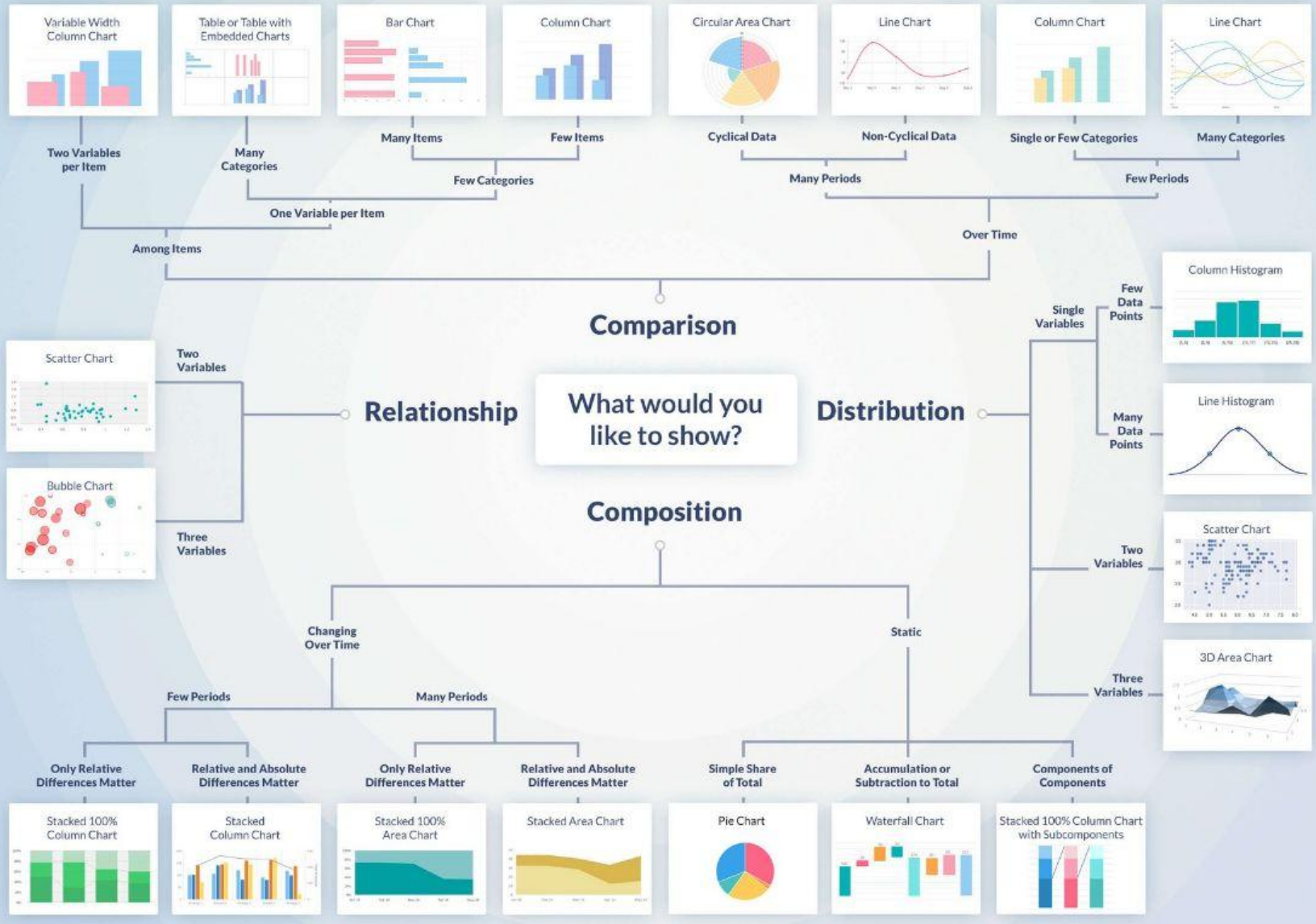
- You have a certain design style based on personal taste

- You just play around until something emerges that you instinctively like the look of
- You trust software defaults and don't go beyond that in terms of modifying the design
- You have limited software capabilities, so you don't know how to modify a design
- You just do as the boss tells you—can you do me some fancy charts

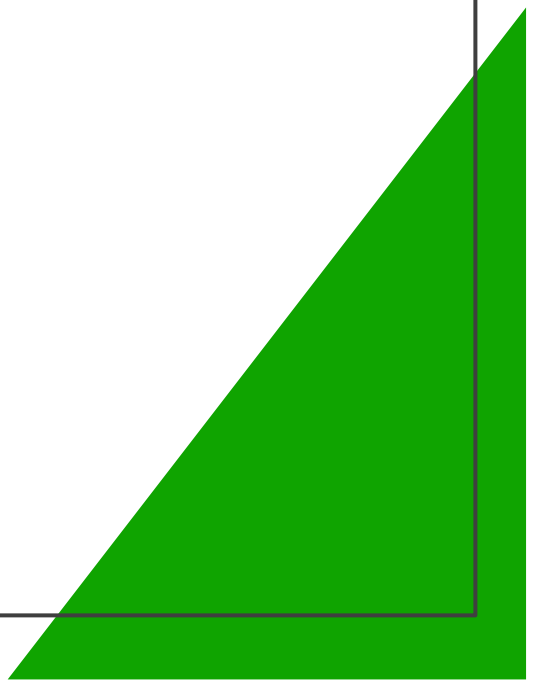
How to Make Good Visualization?

- Required us to understand:
  1. Properties of the data and information
  2. Properties of pictures
  3. Rules to map data into pictures

Guided Visualizations for Charts and Graphs

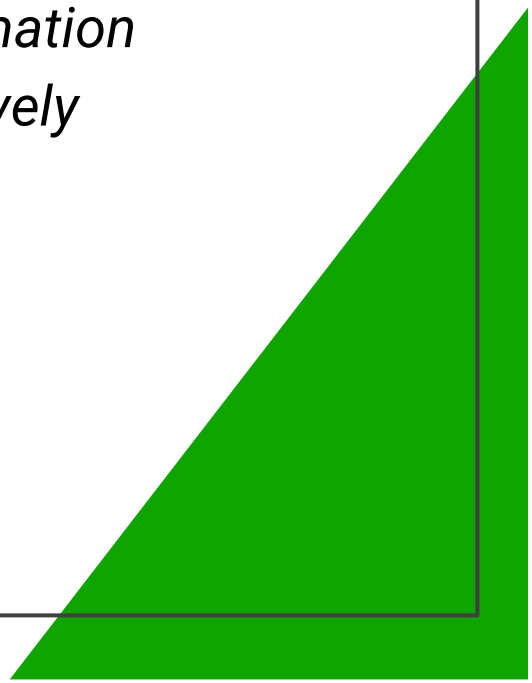


2. Purpose of Data Visualization



Data Viz Purpose

1. Data Analysis
    - *To understand data*
    - *To take information*
    - *Comprehensively*



Visualization as a Discovery Tool

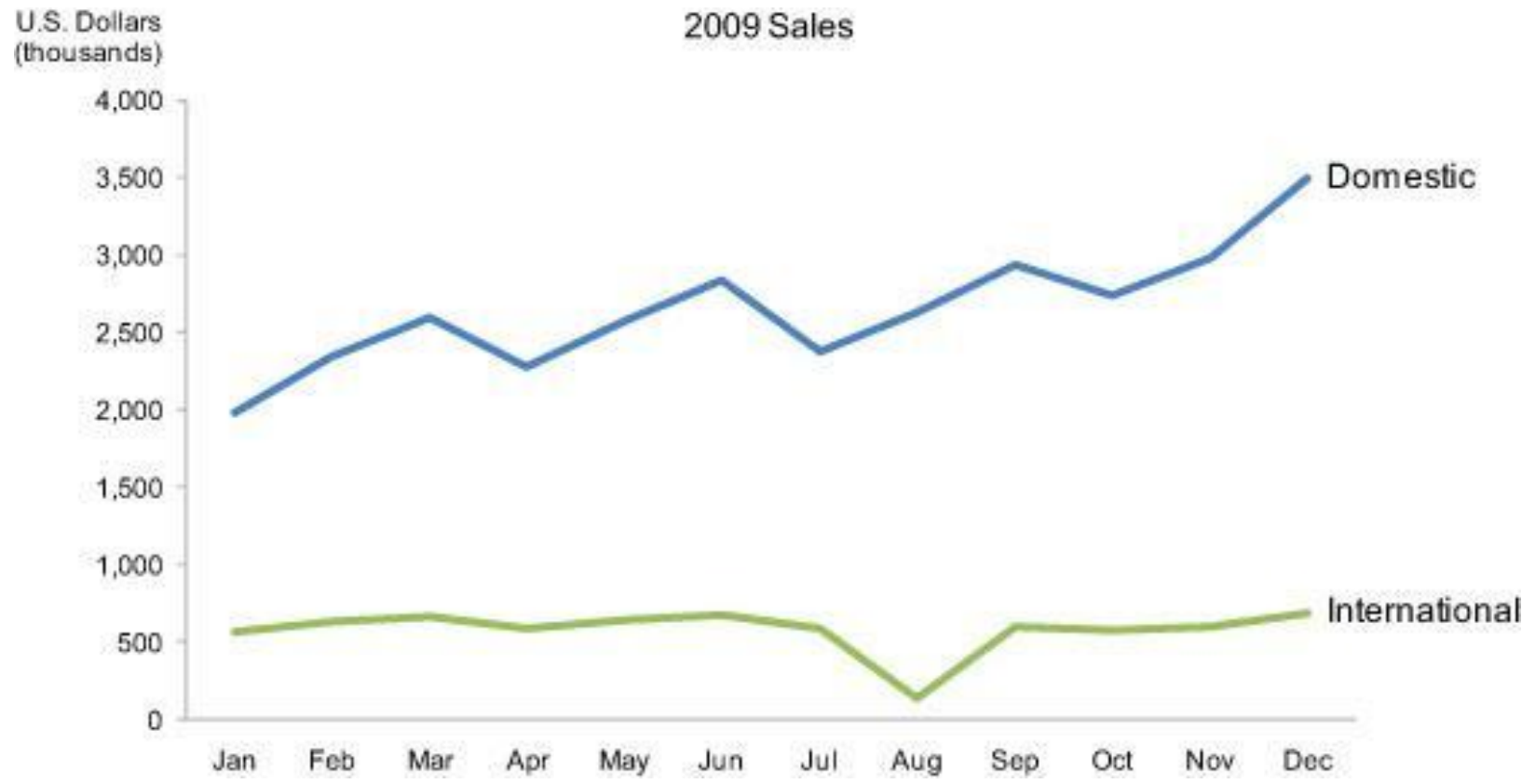
"The greatest value of a picture is when it forces us to notice what we never expected to see"
John W Tukey (*Exploratory Data Analysis*).

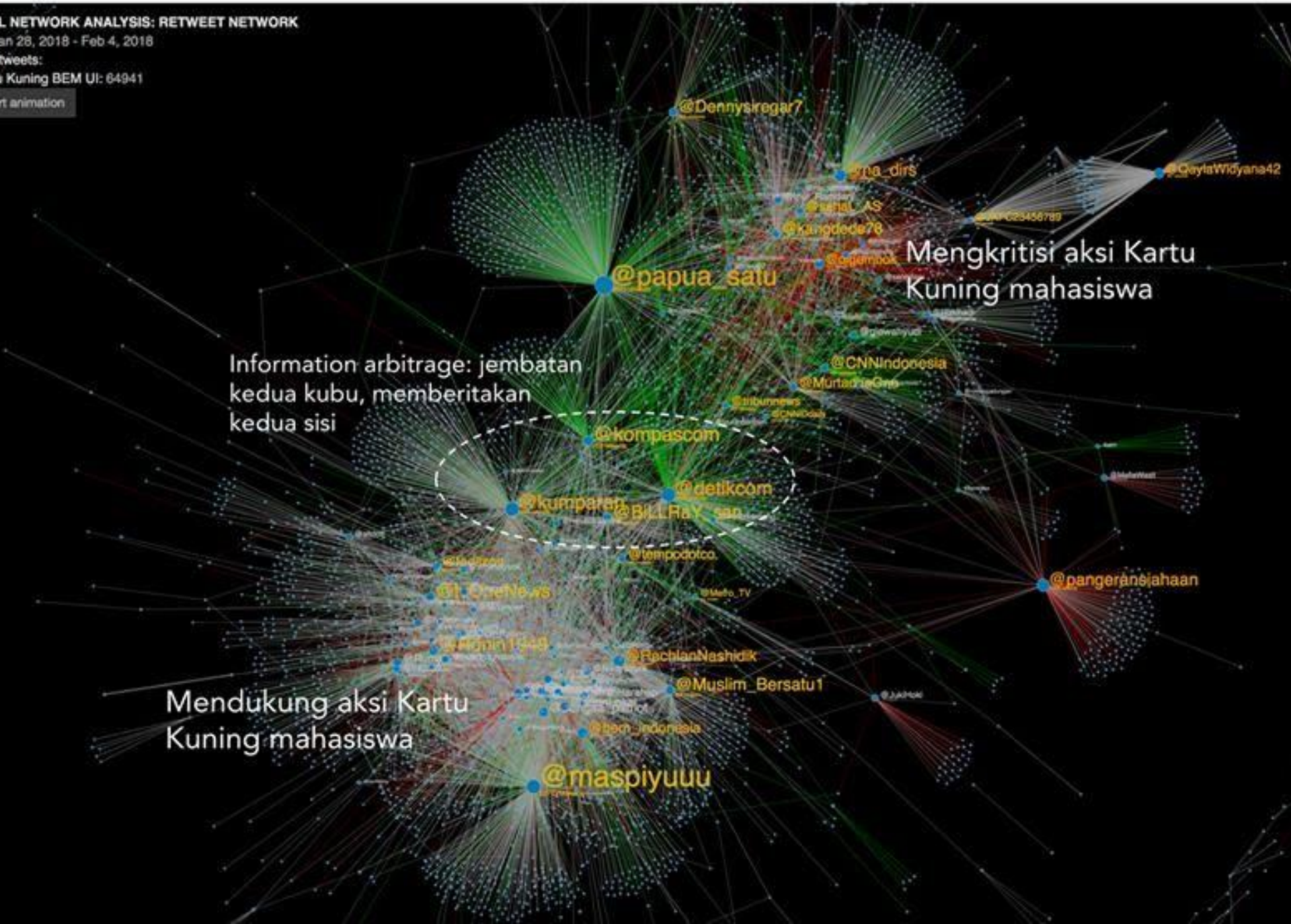
A picture is worth 10,000 words
(anonymous)

Example

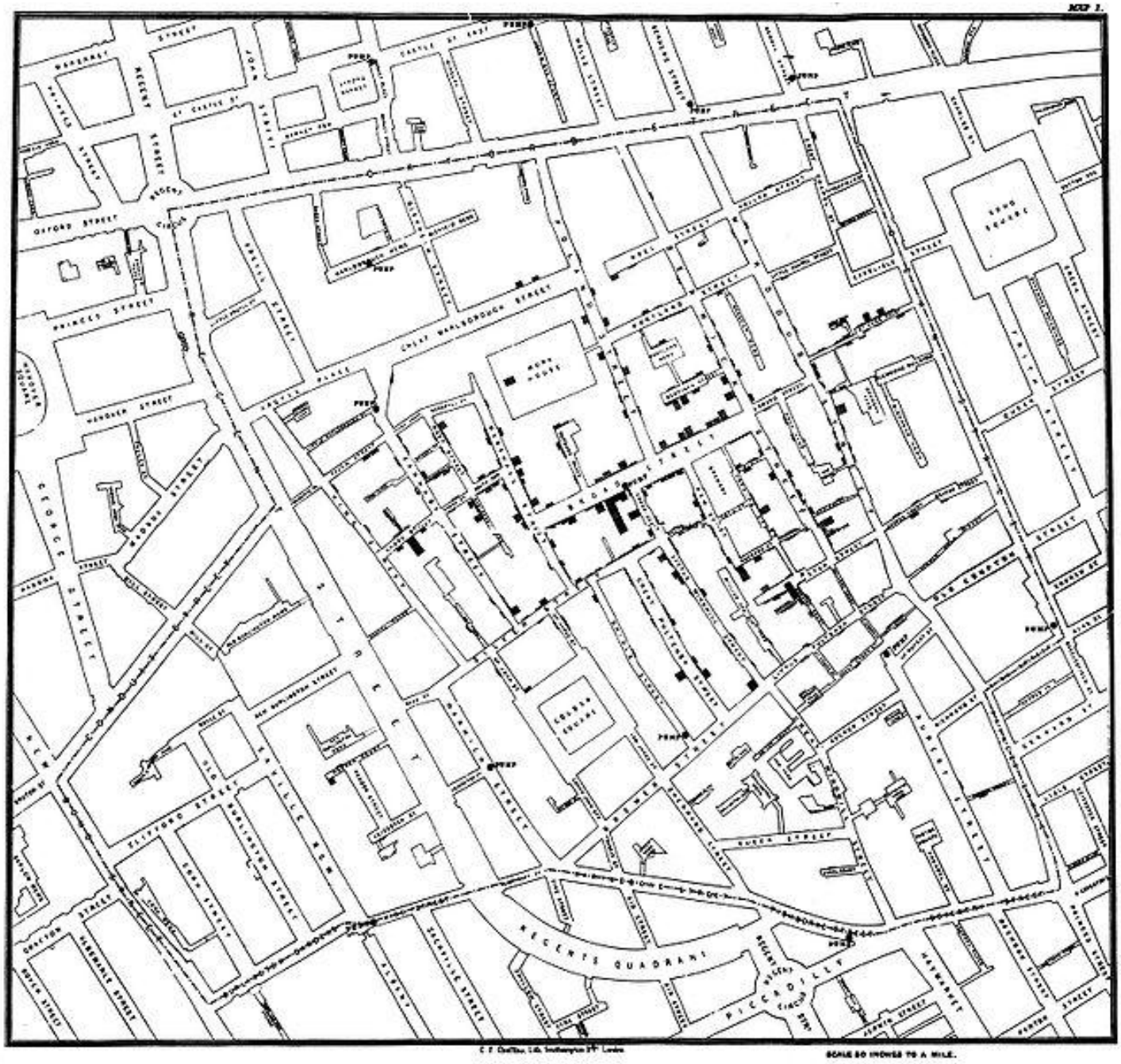
2009 Sales (thousands of U.S. $)

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Domestic	1,983	2,343	2,593	2,283	2,574	2,838	2,382	2,634	2,938	2,739	2,983	3,493	31,783
International	574	636	673	593	644	679	593	139	599	583	602	690	7,005
Total	2,557	2,979	3,266	2,876	3,218	3,517	2,975	2,773	3,537	3,322	3,585	4,183	38,788




L NETWORK ANALYSIS: RETWEET NETWORK
an 28, 2018 - Feb 4, 2018
tweets:
Kuning BEM UI: 64941
t animation
@Dennysiregar7
@papua_satu
@CeylaWidyana42
Mengkritisi aksi Kartu Kuning mahasiswa
Information arbitrage: jembatan kedua kubu, memberitakan kedua sisi
@CNNIndonesia
@kompascom
@detikcom
@tempodotco
@pangeranejahaan
@RachlanNashidik
@Muslim_Bersatu1
Mendukung aksi Kartu Kuning mahasiswa
@maspiyuuu

Another Famous Example (The John Snow)



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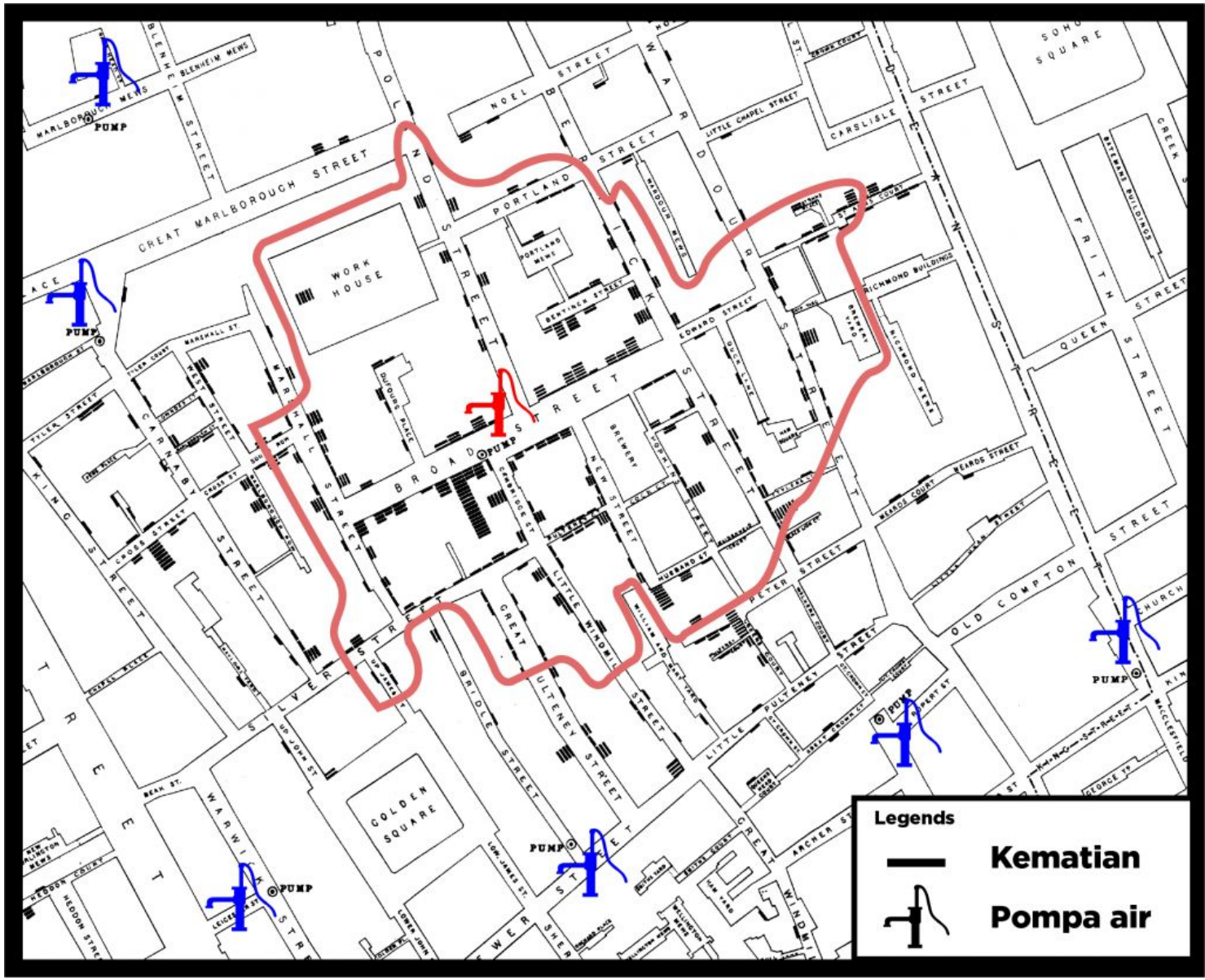


Advantage of Data Analysis using Visualization

- Understand large data (faster)
- Capture important properties of data
- Capture problems
  - Tool for quality control
- Facilitate new hypothesis

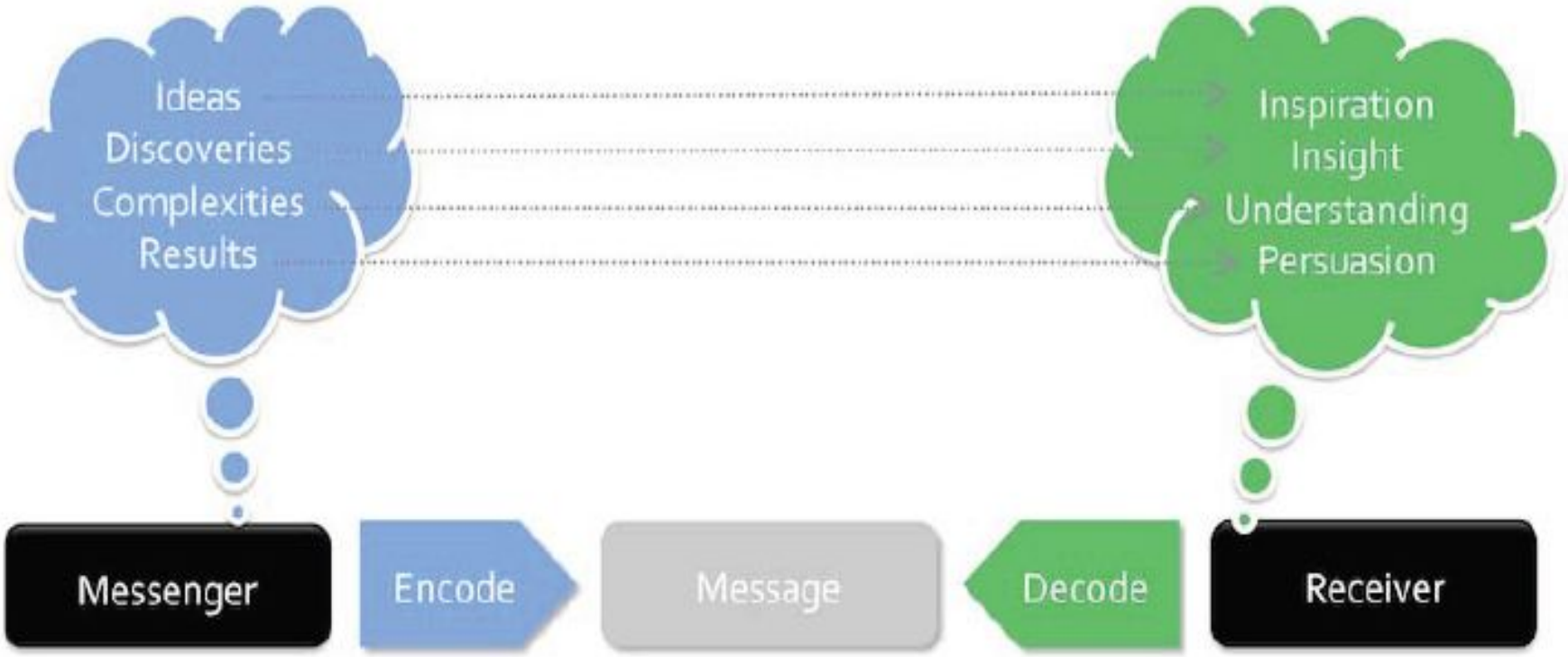
Data Viz Purpose

2. Communication

   To communicate information:

   - Incorporated simplification
   - tonal (feeling)

Communication for Information Transfer



Creating accessibility through intuitive design - Simplification

Overload, clutter, and confusion are not attributes of information, they are failures of design.

Edward Tufte


Rethink Your Drink
Dole
pure apple juice
NESTEA
Coca-Cola
FIVE
Coca-Cola
SUPER BIG GULP
7-11

Working off the calories

Like big soft drinks? Here's how many calories you're getting and what you'll have to do to burn them off.

SIZE

12oz	16oz	20oz	30oz	40oz	50oz	52oz
Can of Coca-Cola	Rockstar Energy Drink Can	Arizona Lemon Ice Tea	7-Eleven Big Gulp filled with Coca-Cola	7-Eleven Super Big Gulp filled with Mountain Dew	7-Eleven Double Gulp filled with Barq's Root Beer	7-Eleven Xtreme Gulp filled with Dr. Pepper

CALORIES

140	248	270	371	568	694	780

AMOUNT OF ACTIVITY IT WILL TAKE TO BURN THE CALORIES

One hour of piloting a plane	An hour of tai chi	An hour of ballroom dancing or bagging leaves and cutting grass	An hour of downhill skiing	It won't be until the sixth mile of your run that your body will start converting the last hundred of these calories.	Walk for four hours straight at 2 mph and you'd burn these calories. (Make that five hours for the 64 oz. Double Gulp, officially discontinued in April but still available in some stores.)	Riding your bicycle from the 7-Eleven on Liberty Avenue, Downtown, to the 7-Eleven in Washington, Pa. – roughly 30 miles – would burn off your Xtreme Gulp.

Sources: 7-Eleven Corporate, the Mayo Clinic and the American College of Sports Medicine. Burned calorie counts are for weights between 160 and 200 pounds

Post-Gazette

Ultimate Goal

To make readers feel like they have become better informed about a subject

Visualization is more effective than another visualization if the information conveyed by one visualization is more readily perceived than the information in the other visualization.

Jock Mackinlay

The ability to take data – to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it —that's going to be a hugely important skill in the next decades

Hal Varian (Google Chief Economists)

References

Most of the contents were taken from:

- Andy Kirk. Data Visualization: A Successful Design Process. Pact Publishing. 2012, chapter 1-2
- Colin Ware. Information Visualization : Perception for Design 2ed. Morgan Kaufmann. 2004, chapter 1
- RRob Kabacoff. Data Visualization with. 2020