

Introduction to Data Visualization Terminology

Jan 4, 2023

Lesson Objectives

- By the end of this lesson students should be able to:
 - utilize a common vocabulary for discussing data visualizations

What is data visualization?

Data visualization
is the graphical
representation of
data

Here's When We Expect Omicron to Peak

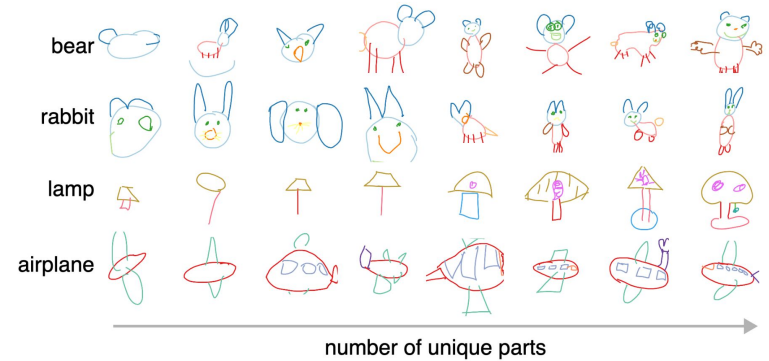
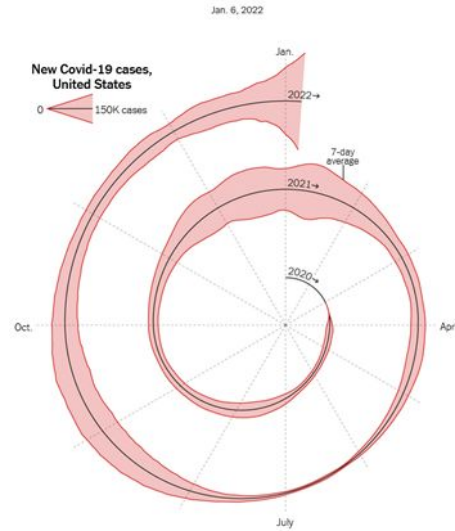


Figure 1: Example drawings across children from four object categories, increasing in the number of drawn unique parts. Colors added for illustrative purpose to show each part annotation attributed to drawings.

What are the goals of data visualizations?

Exploratory

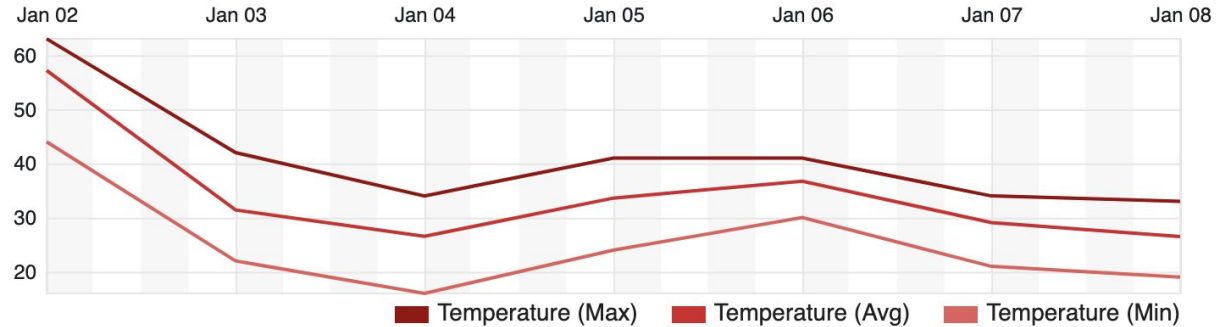
- help identify patterns and trends in the data to help people perceive certain information faster or more easily
- help you to understand the data and to find the story

Explanatory

- help explain findings to a wider audience
- might simplify your charts by excluding irrelevant data and you might use styling features to highlight the key message

Example of Exploratory Visualization

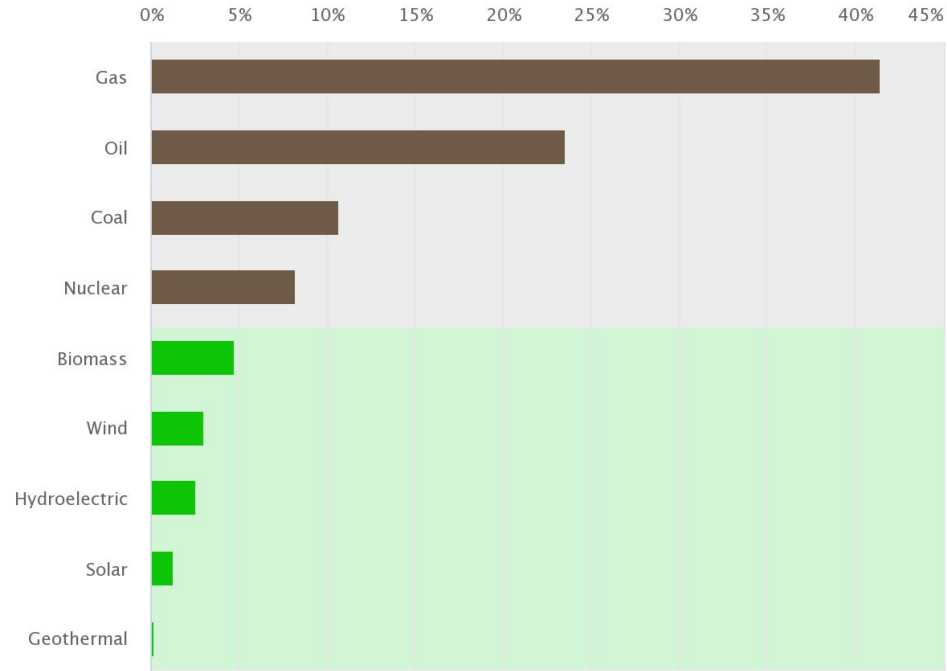
Time	Temperature (°F)		
Jan	Max	Avg	Min
2	63	57.2	44
3	42	31.4	22
4	34	26.5	16
5	41	33.6	24
6	41	36.7	30
7	34	29.1	21
8	33	26.5	19



Example of Explanatory Visualization

The USA is still heavily reliant on fossil fuels in 2020

Only 11.7% of energy was produced from renewable sources



Source: U.S Energy Information Administration

How can we design visualization to have salience?

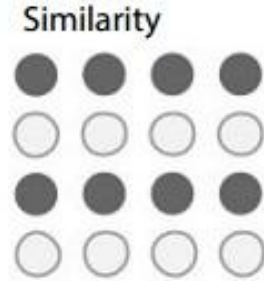
Salience (in data visualization) is how the viewer's eye is drawn to what is important in the data visualization. A good data visualization enhances saliency e.g. improves viewer understanding of the data.

Gestalt Principles

Gestalt Principles are laws of human perception that describe how humans group similar elements, recognize patterns and simplify complex images when we perceive objects.

Four Gestalt Principles applicable to data visualization

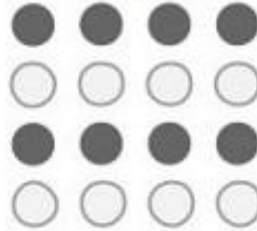
- **Similarity:** Items alike in their properties (size, shape, color, and so on) tend to be perceived as being a related group.



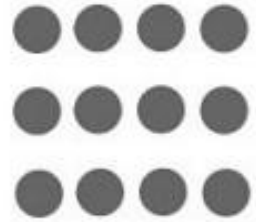
Four Gestalt Principles applicable to data visualization

- **Similarity:** Items alike in their properties (size, shape, color, and so on) tend to be perceived as being a related group.
- **Proximity:** Items are near each other tend to be perceived as being a related group.

Similarity



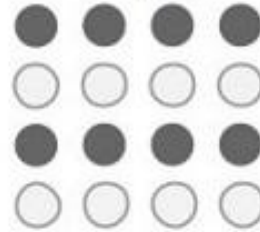
Proximity



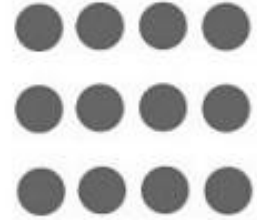
Four Gestalt Principles applicable to data visualization

- **Similarity:** Items alike in their properties (size, shape, color, and so on) tend to be perceived as being a related group.
- **Proximity:** Items are near each other tend to be perceived as being a related group.
- **Enclosure:** Items surrounded by something such as a line or an object tend to be perceived as being a group.

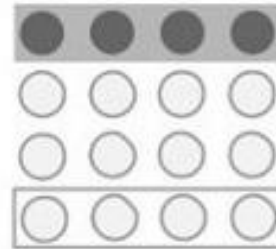
Similarity



Proximity



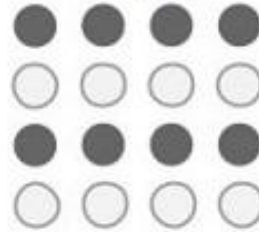
Enclosure



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- **Enclosure:** Items surrounded by something such as a line or an object tend to be perceived as being a group.
- **Continuity:** Elements tend to be perceived as smooth groups or continuous lines rather than sharp broken lines.

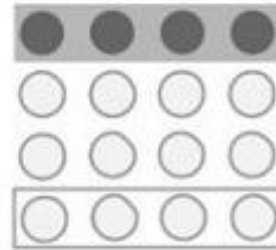
Similarity



Proximity



Enclosure

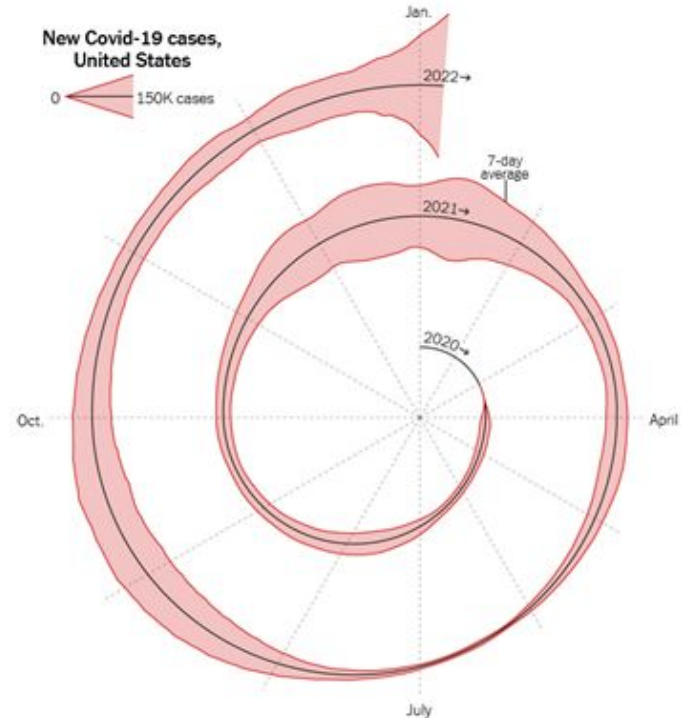


Continuity



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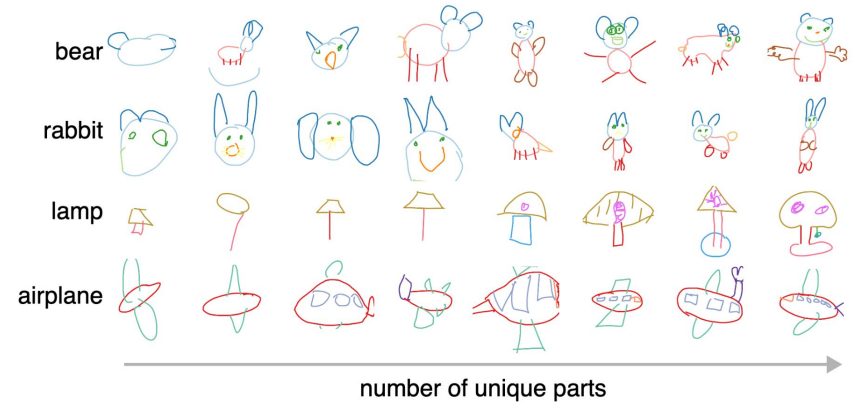


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How do we encode data into visual representations?

- **Geometric primitives** are the simplest graphical markings
- 1D data visualizations use

points



lines

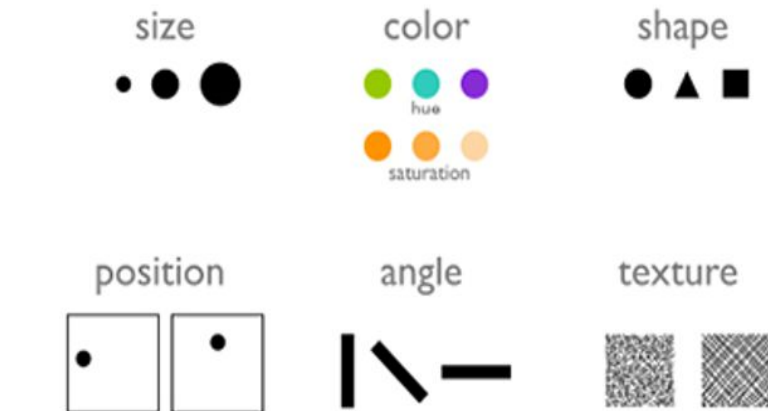


areas



How do we encode data into visual representations?

- **Geometric primitives** are the simplest graphical markings
- 1D data visualizations use
- **Visual channels** are attributes that describe the appearance of graphical markings



points



lines



areas



size



color



shape



position



angle

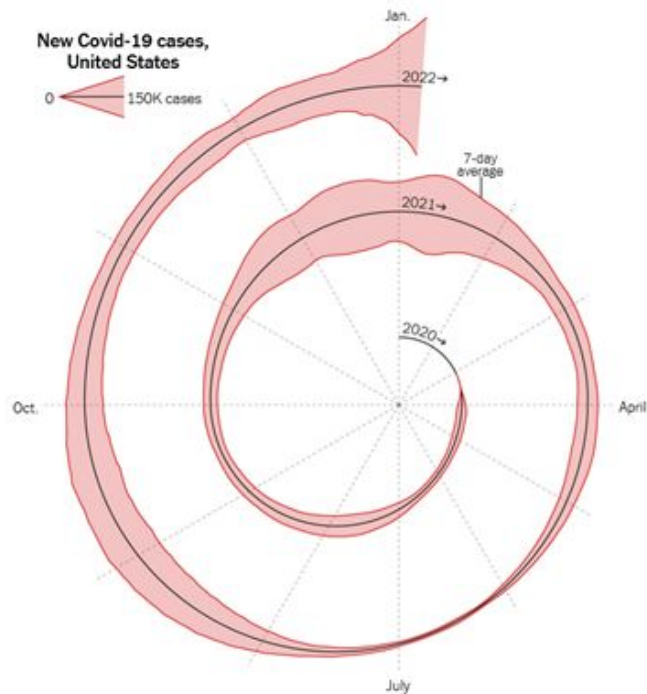


texture



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points



lines



areas



size



color



shape



position



angle



texture

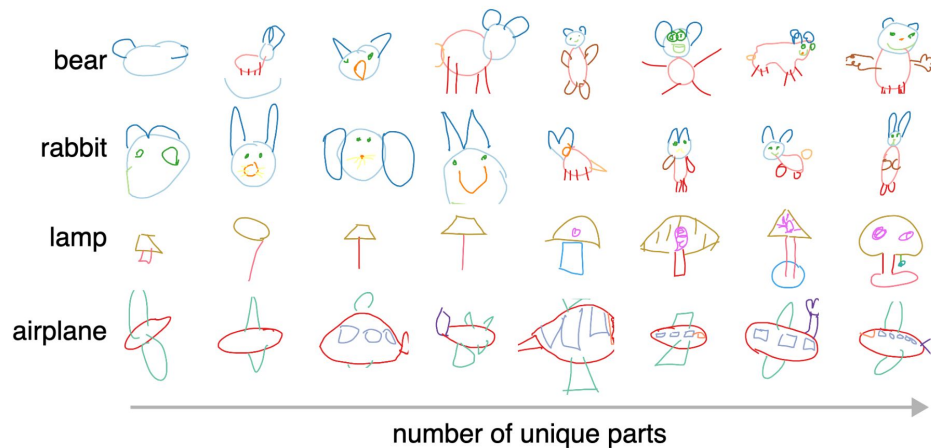
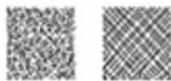


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