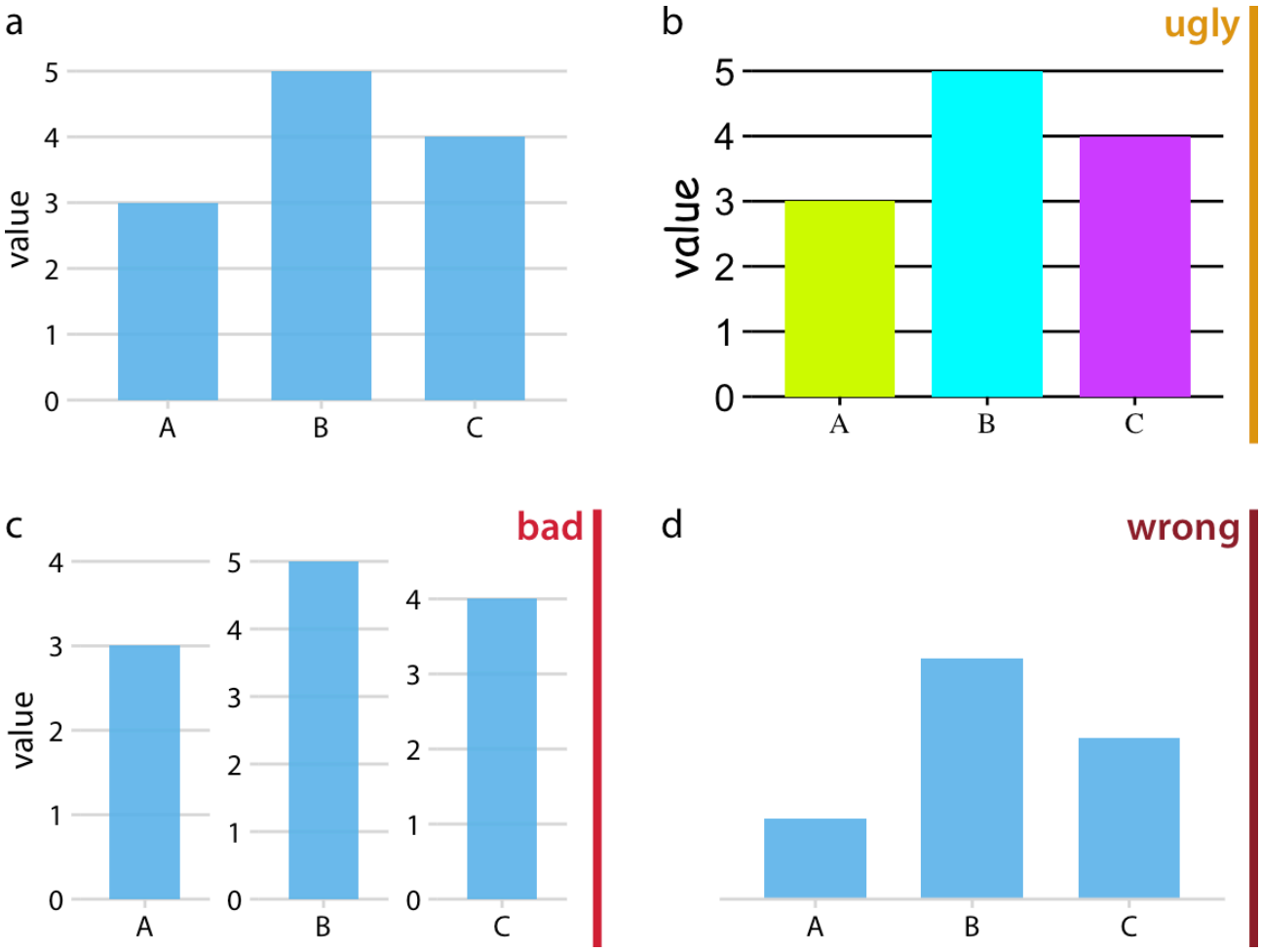
Ugly, bad, and wrong figures -

ugly - A figure that has aesthetic problems but clear and informative
bad - A figure that has problems related to perception, it may be unclear, confusing, over complicated.
wrong - A figure that has problems related to mathematics, it is objectively incorrect.

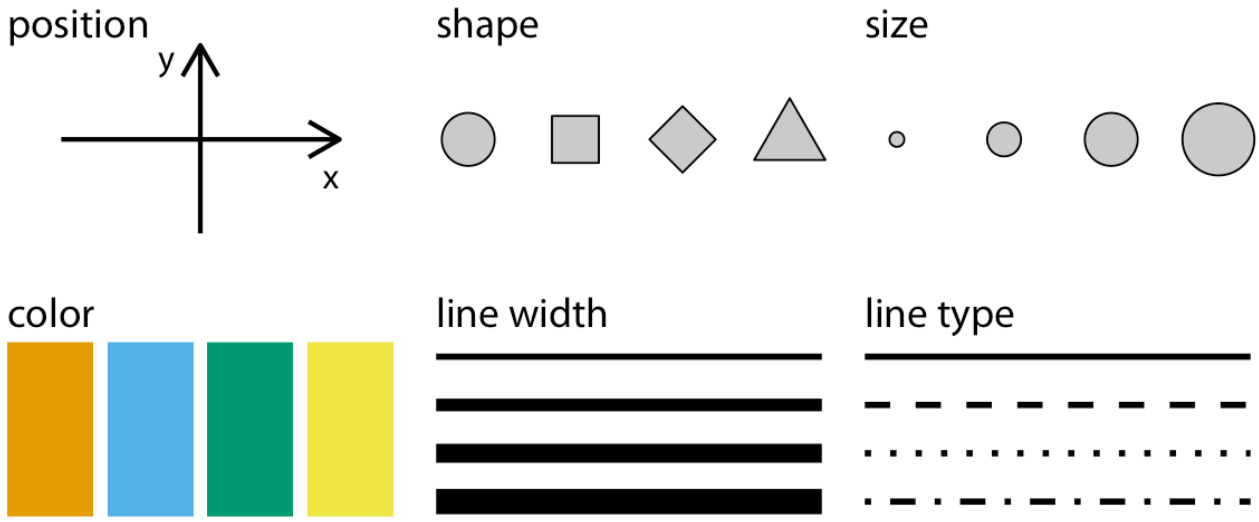


Visualize data: Mapping data onto aestheetics. -

in Data visualization all the quantifiable data values are mapped in aesthetic for better understanding.

Aesthetic and types of data -

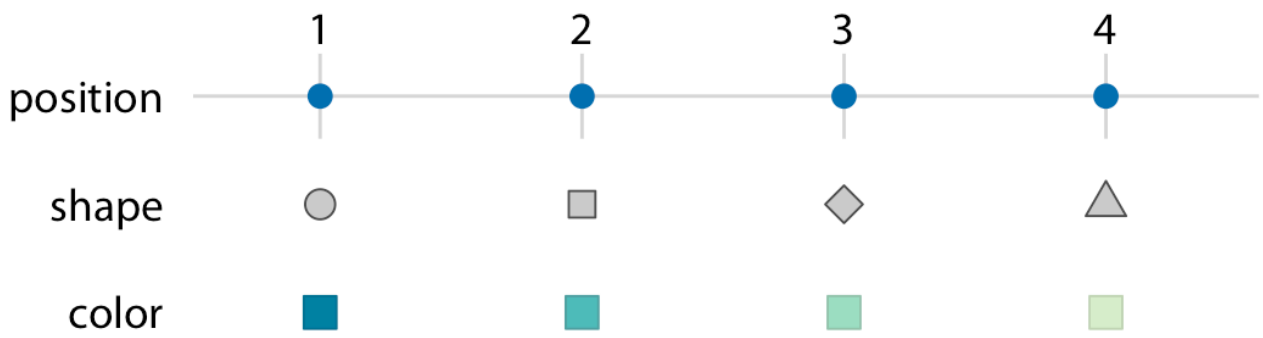
A critical component of every graphical is of course its position, which describes where the element ids located. in standard 2d graphics we describe position by an x and y value. all graphical elements have a shape, a size, and a colour. for distinguish the value we use different line types like solid, dash-dot, and dashed lines. for example if we want to display text, we have to specify font family, font face if objects are overlap, we may have to describe their transparency.



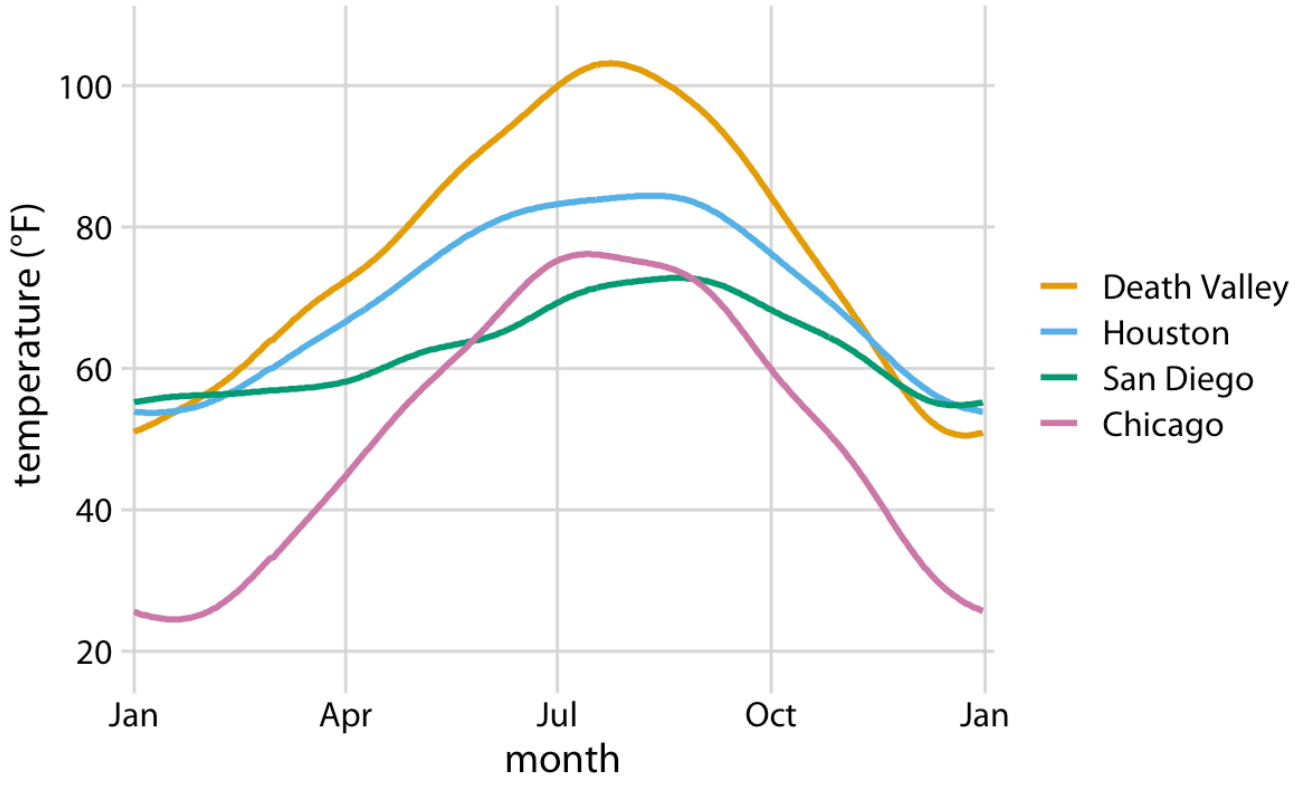
Type of variable	Examples	Appropriate scale	Description
quantitative/numerical continuous	1.3, 5.7, 83, $1.5x10^{-2}$	continuous	Arbitrary numerical values. These can be integers, rational numbers, or real numbers.
quantitative/numerical discrete	1, 2, 3, 4	discrete	Numbers in discrete units. These are most commonly but not necessarily integers. For example, the numbers 0.5, 1.0, 1.5 could also be treated as discrete if intermediate values cannot exist in the given dataset.
qualitative/categorical unordered	dog, cat, fish	discrete	Categories without order. These are discrete and unique categories that have no inherent order. These variables are also called *factors*.
qualitative/categorical ordered	good, fair, poor	discrete	Categories with order. These are discrete and unique categories with an order. For example, “fair” always lies between “good” and “poor”. These variables are also called *ordered factors*.
date or time	Jan. 5 2018, 8:03am	continuous or discrete	Specific days and/or times. Also generic dates, such as July 4 or Dec. 25 (without year).
text	The quick brown fox jumps over the lazy dog.	none, or discrete	Free-form text. Can be treated as categorical if needed.

Scale map data values onto aesthetics -

To map data values onto aesthetics we need to specify which data values corresponds to which specific aesthetics values. for example, if our graphic has an x axis, then we need to specify which data values are represented by particular shapes or colours and also specify position along x axis. this mapping between aesthetics values and data values is created via scales.
importantly a scale must be one-to-one, such that for each specific data value there is exactly one aesthetic value and vice versa.



In this figure data(temperature) is vary according to x-axis(month) specified by different aesthetic values(different colour for different Region) .



In figure, instead of mapping temperature onto the y axis and location onto colour, we can do the opposite. Because now the key variable of interest (temperature) is shown as colour, we need to show sufficiently large coloured areas for the colour to convey useful information.