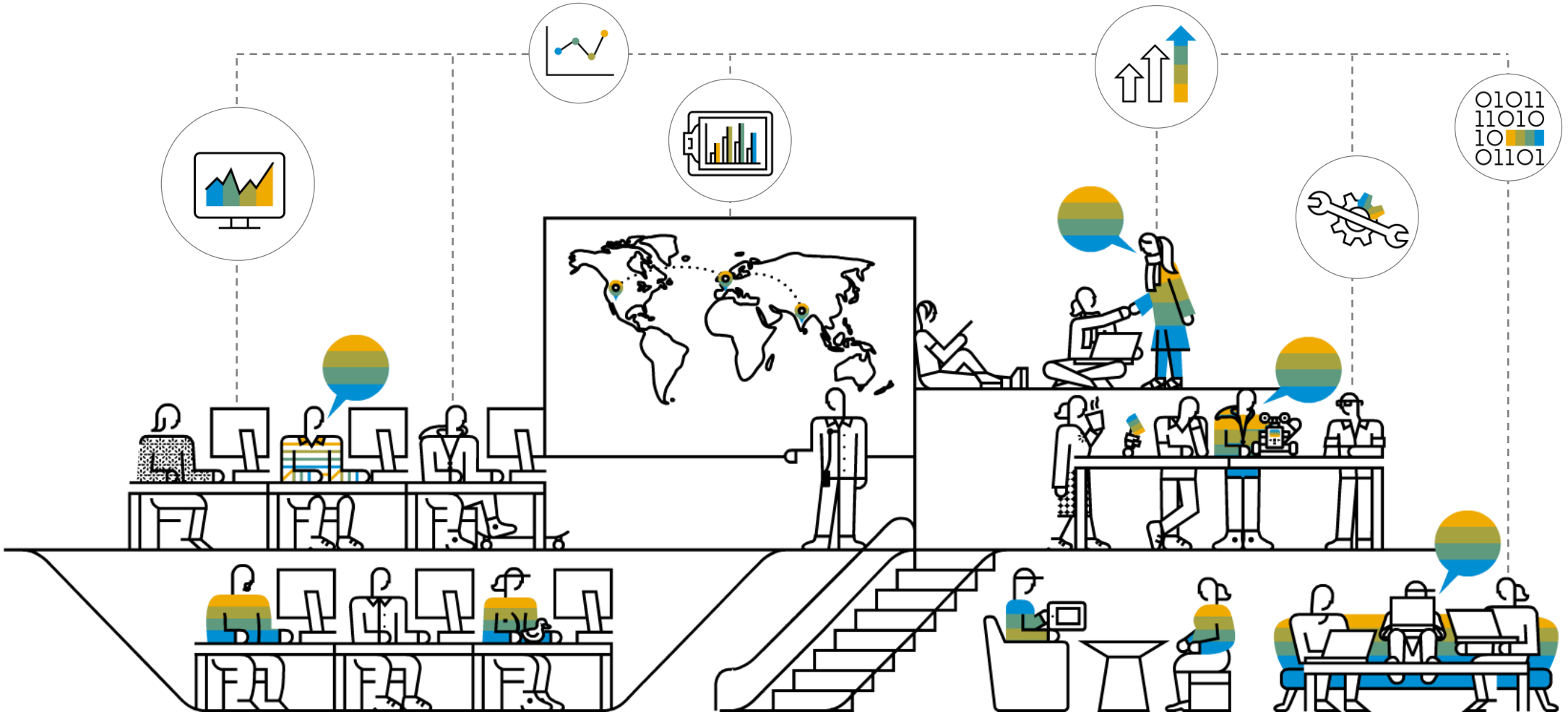
Week 2: Descriptive Statistics

Unit 7: Distorting the Truth Using Descriptive Statistics

Introduction



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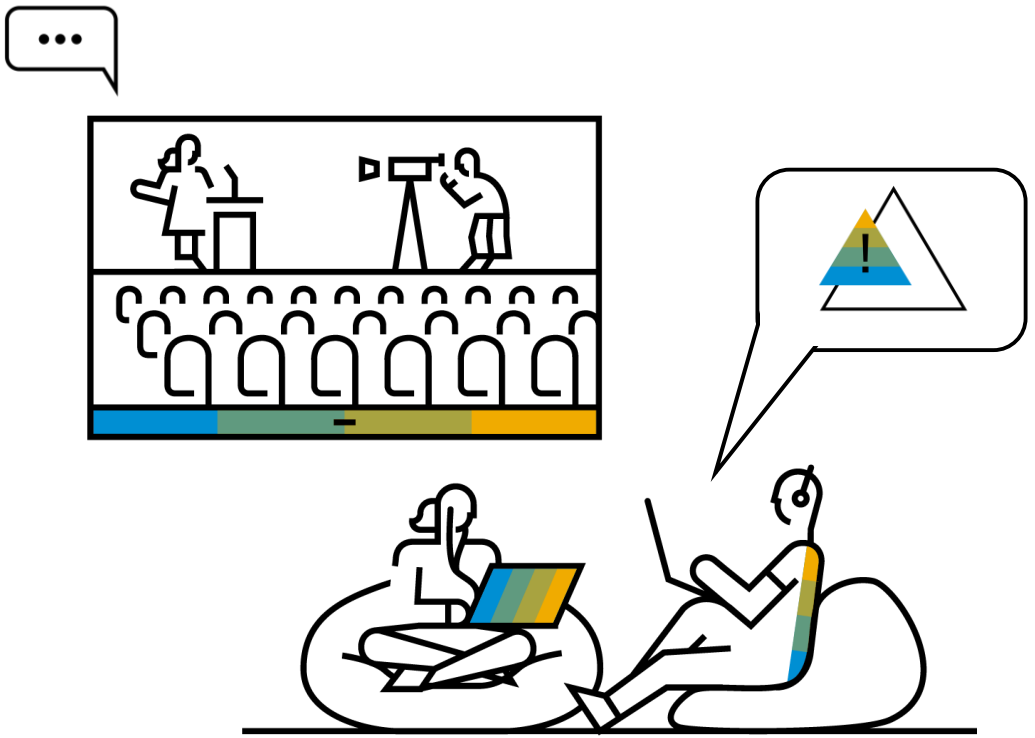
Errors in presenting data

- There are a number of ways the media and unscrupulous politicians present data and distort the truth.



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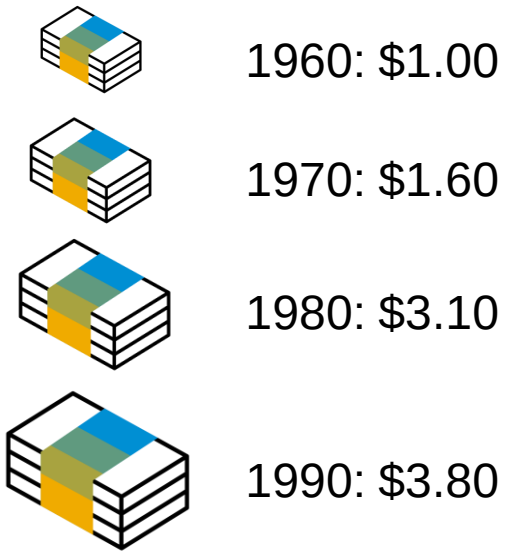
Use area to equate to value

Bad Presentation

Minimum Wage



1960: $1.00

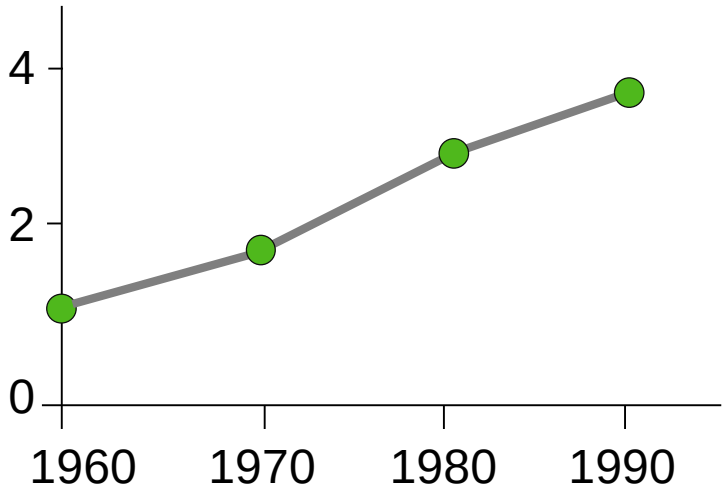
1970: $1.60

1980: $3.10

1990: $3.80

Good Presentation

Minimum Wage



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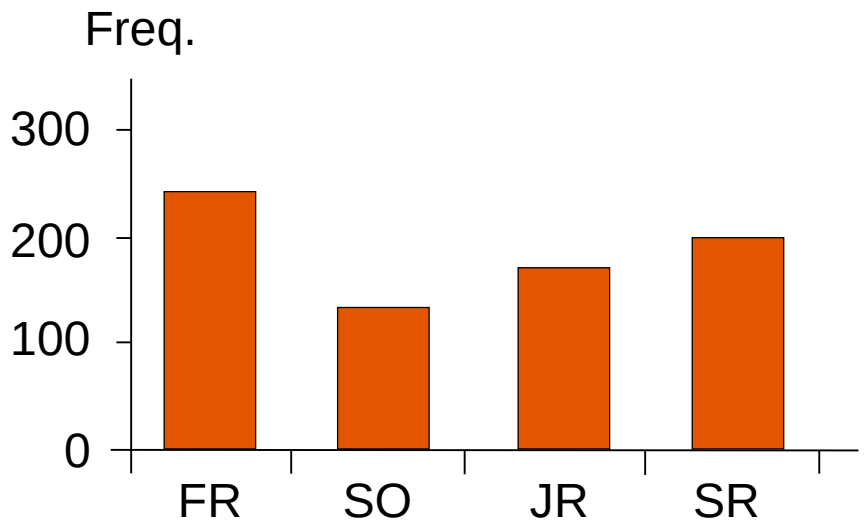
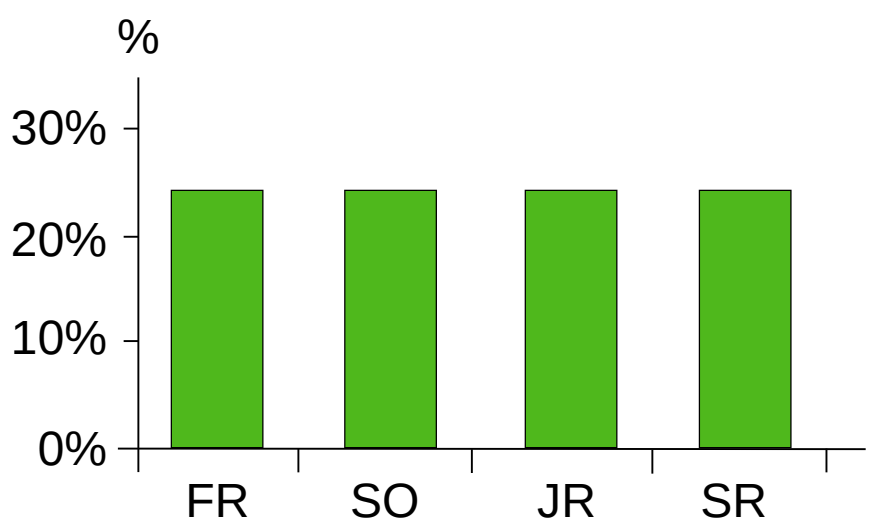
No relative basis to compare data

Bad Presentation



Good Presentation



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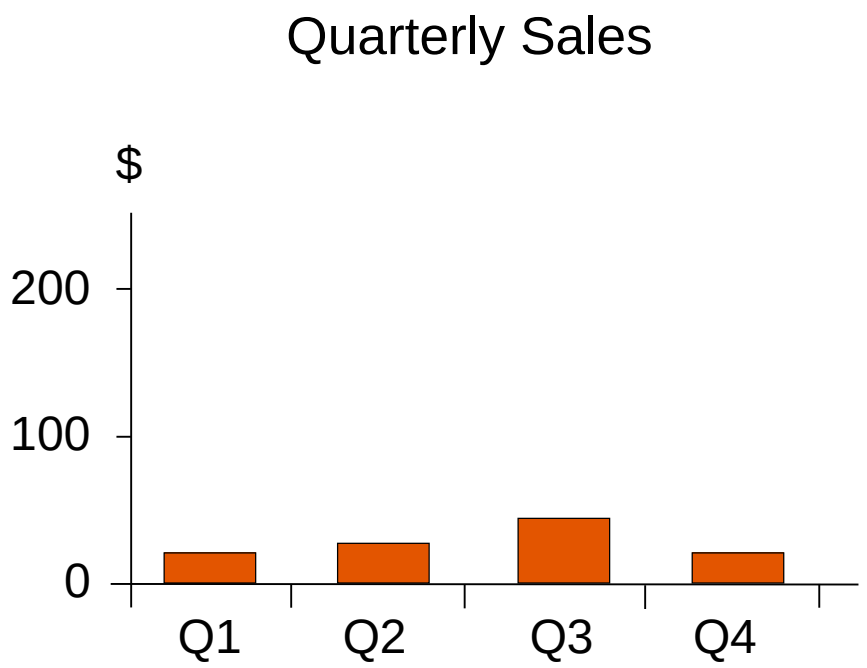
Compress the vertical axis

Bad Presentation



Good Presentation

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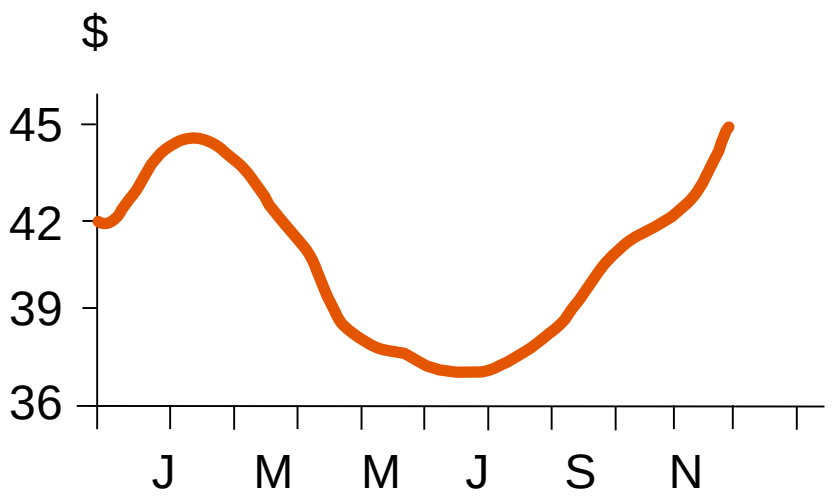
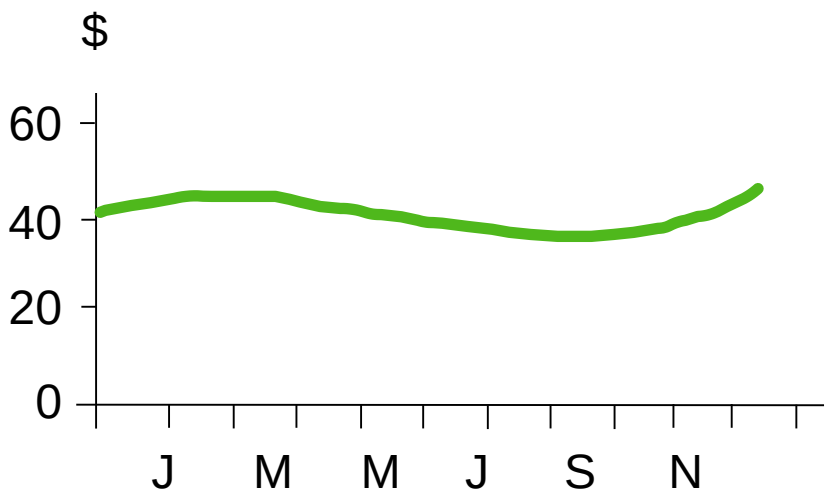
No zero point on the vertical axis

Bad Presentation



Good Presentation



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No zero point on the vertical axis

Look at https://www.mediamatters.org/

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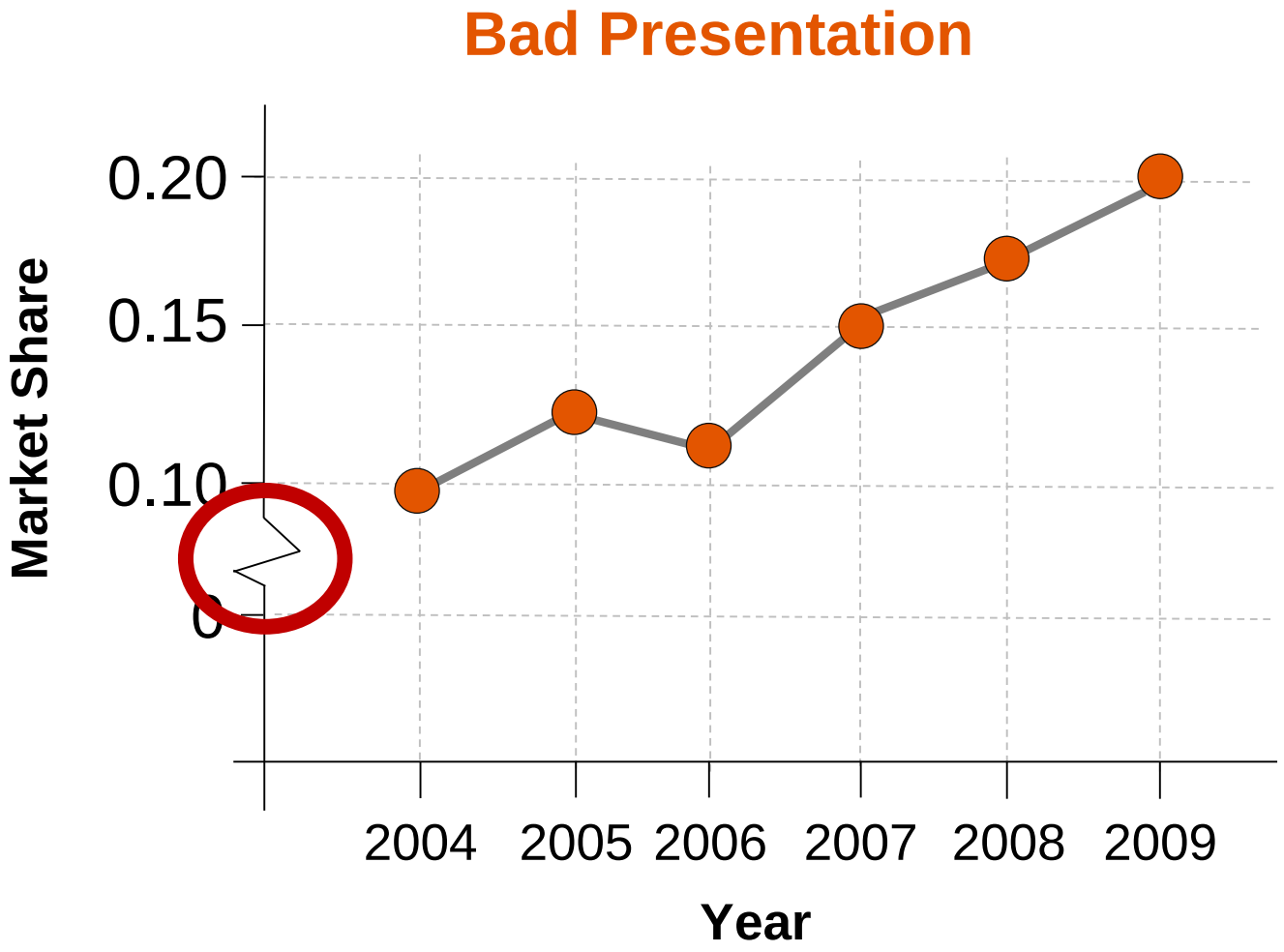
Gap in the vertical axis



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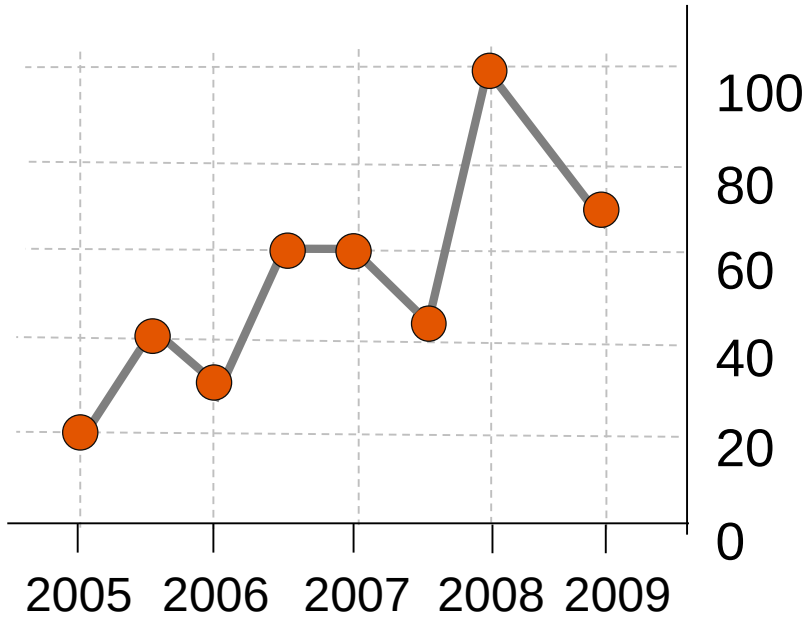
Use of misleading wording

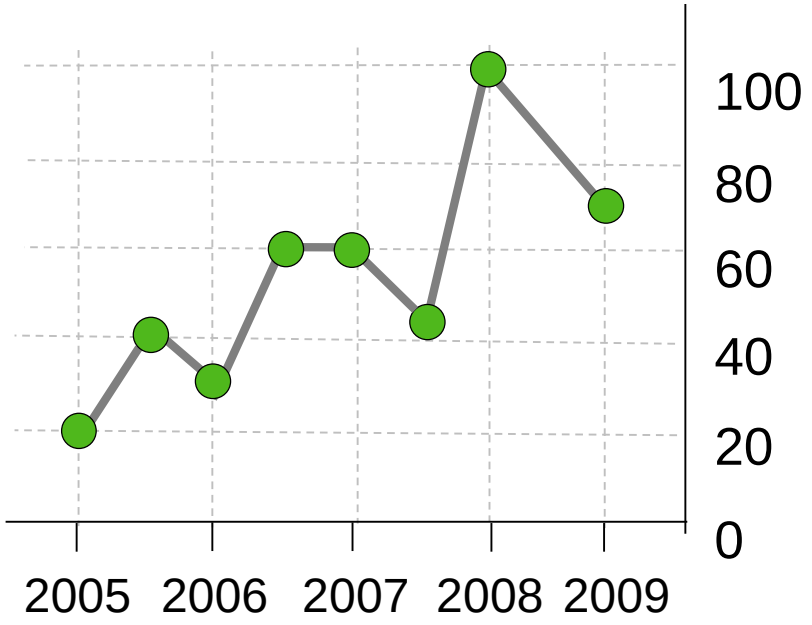
We're not doing so well

Production declines again



Still in prime years!

2009: 2nd best year for production



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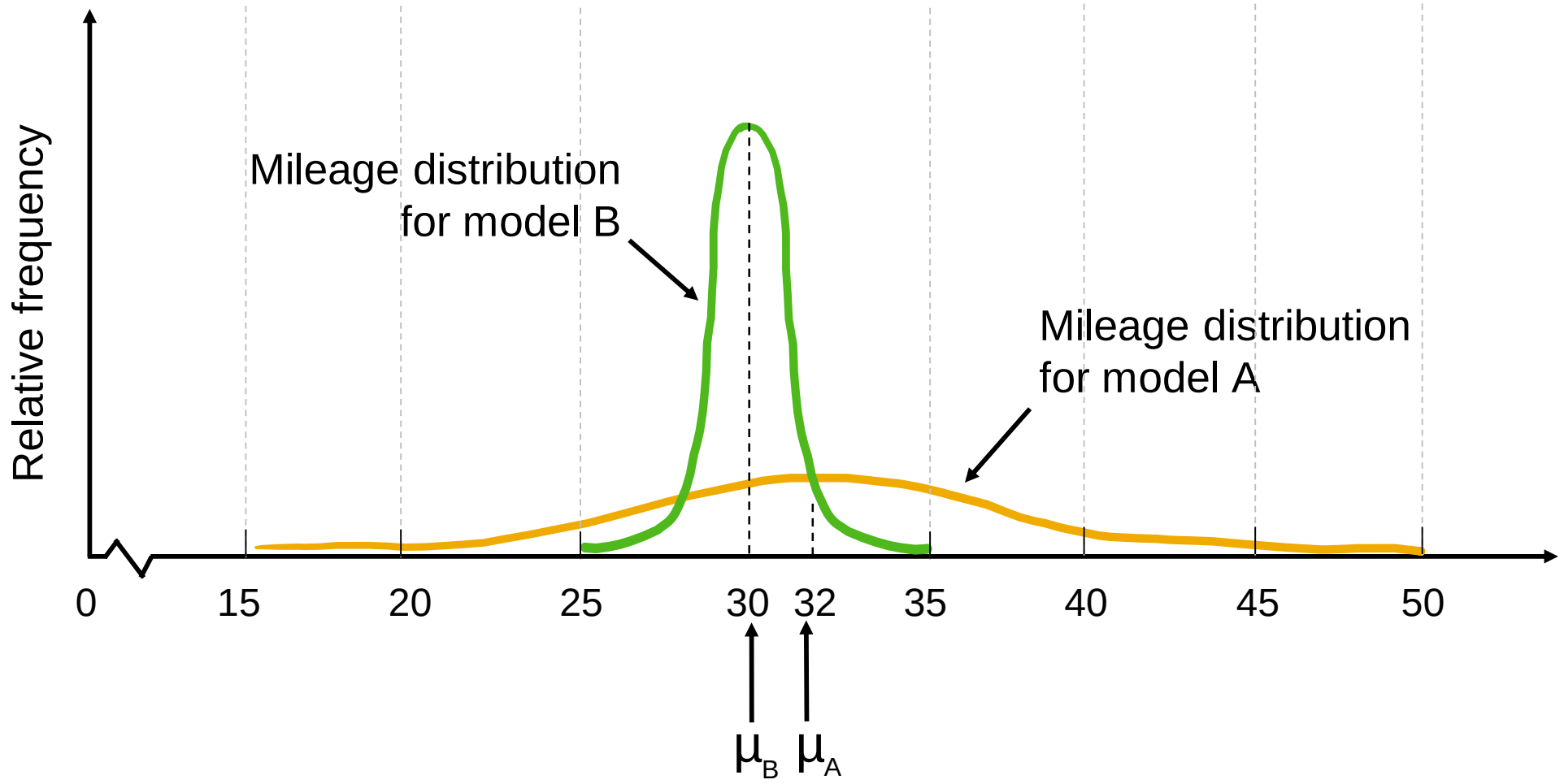
Knowing central tendency without knowing variability



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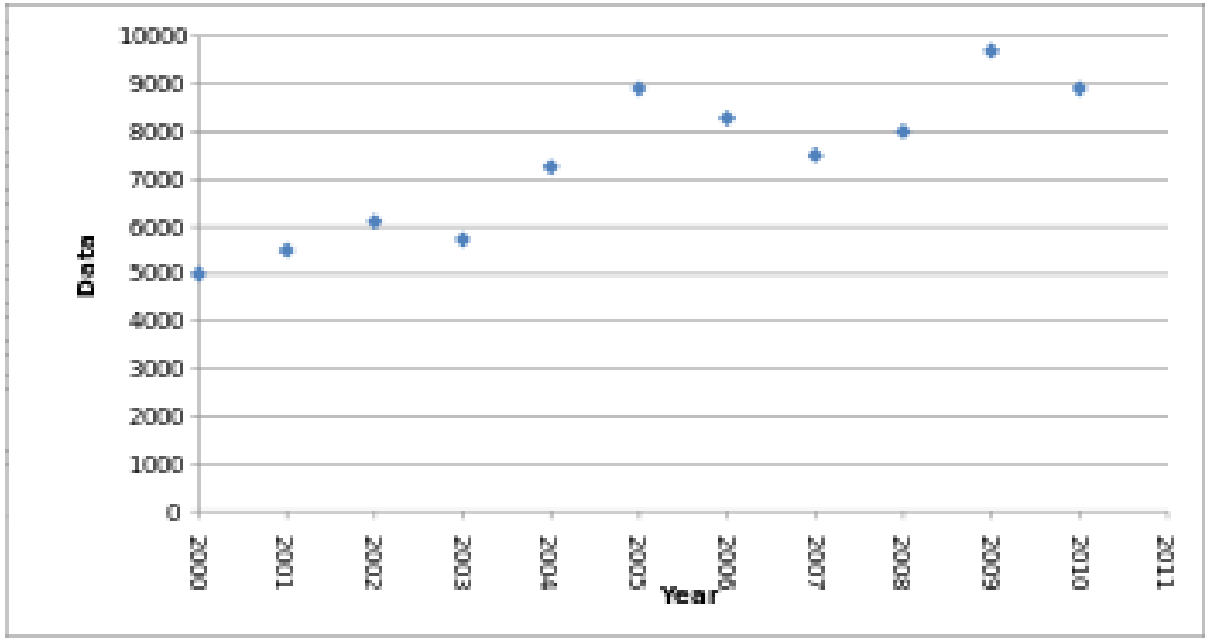
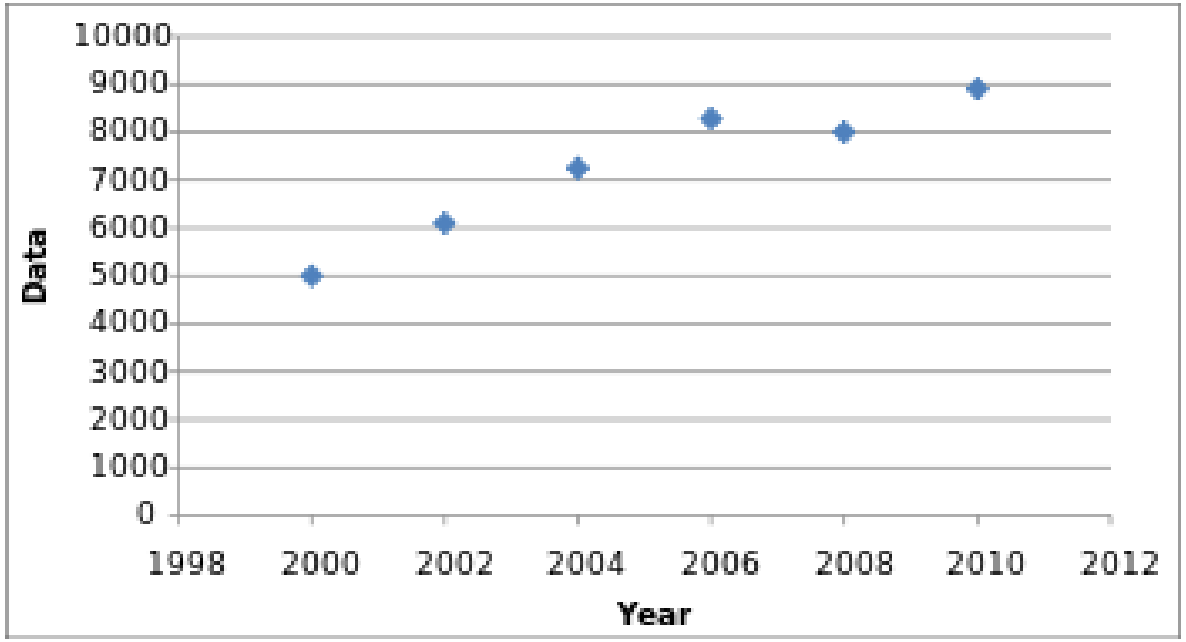
Distorting the Truth Using Descriptive Statistics

Omitting data





See https://cogentlegal.com/2014/04/graphics-go-beyond-advocacy-to-misleading/

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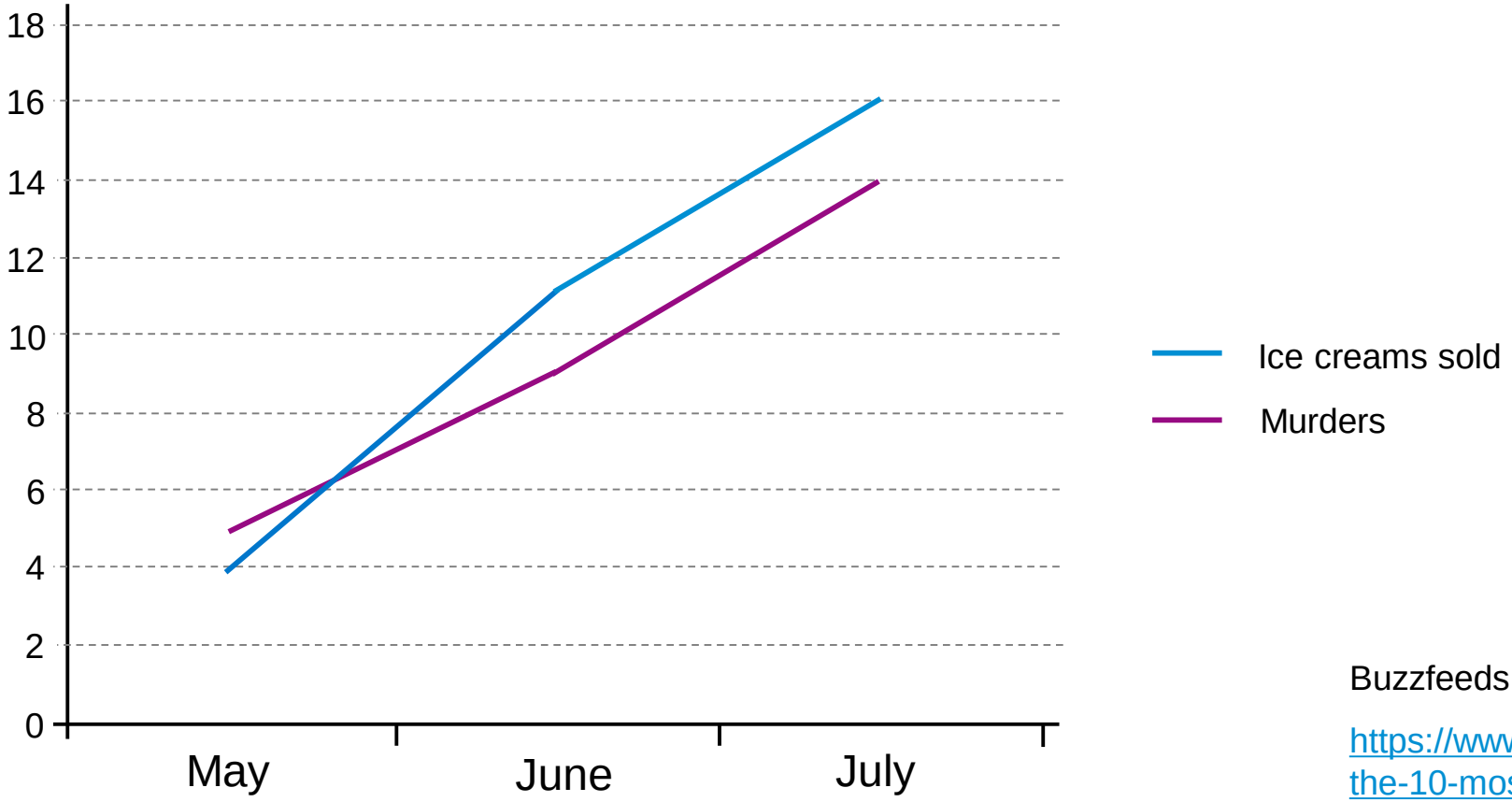
Correlation and causation

Ice cream consumption leads to murder



Buzzfeeds 10 Most Bizarre Correlations:

https://www.buzzfeednews.com/article/kjh2110/the-10-most-bizarre-correlations

http://tylervigen.com/page?page=1

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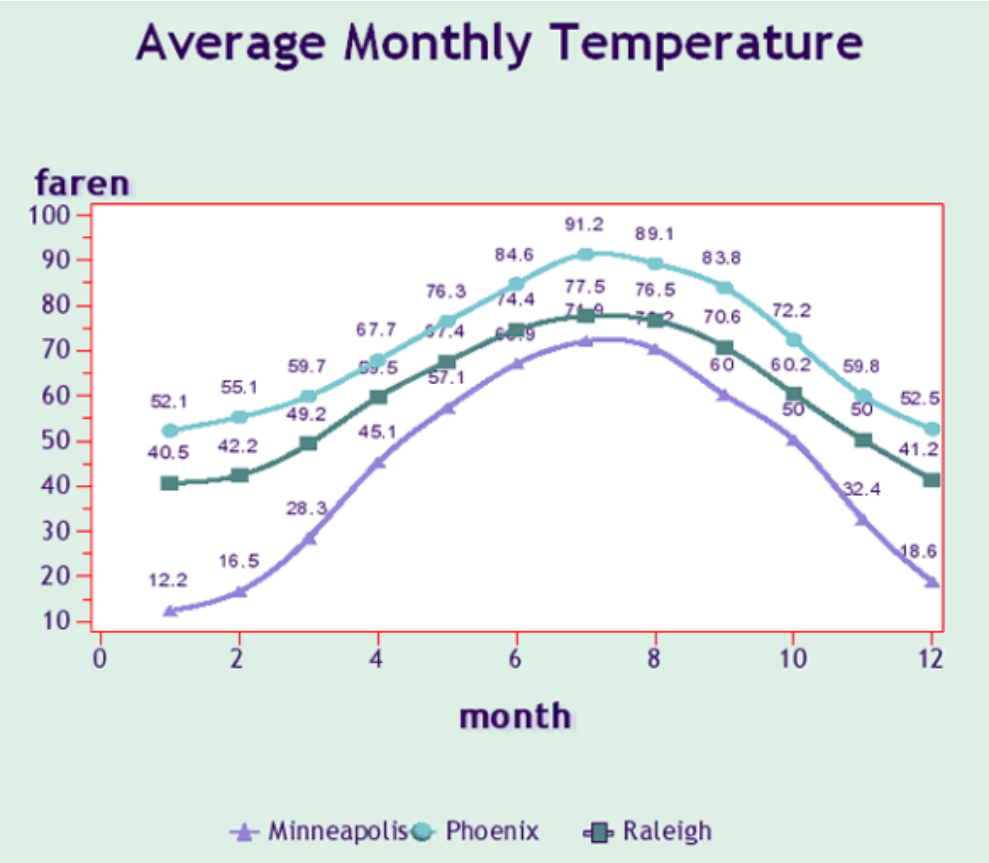
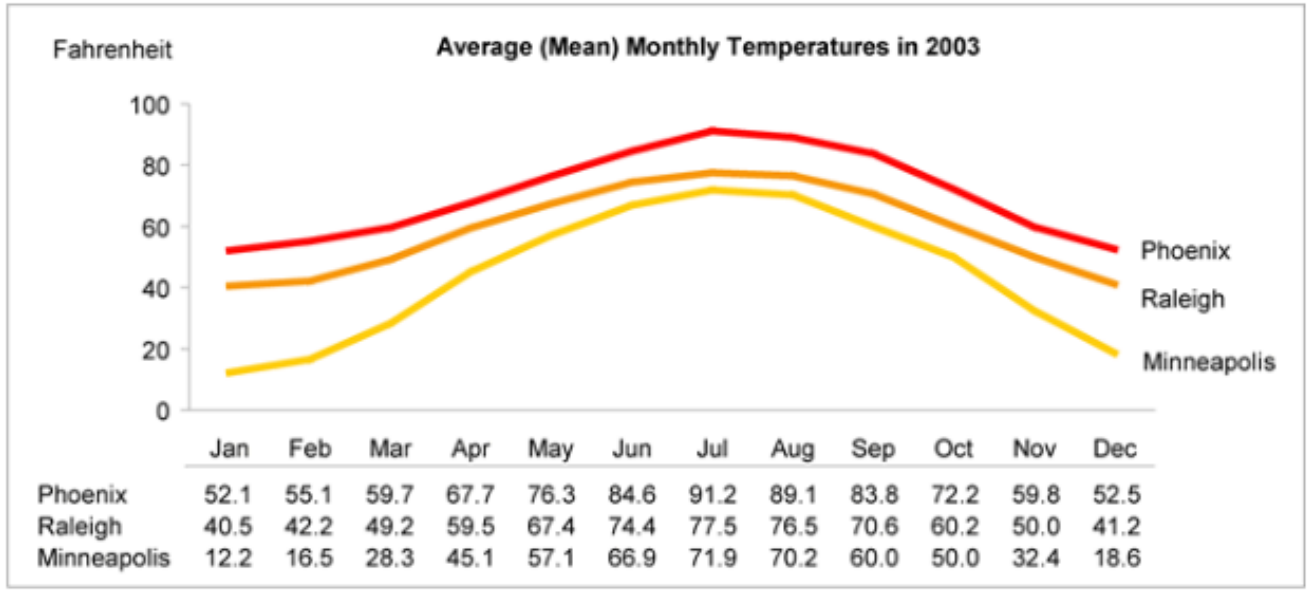
Confused visualization

Bad Presentation



Good Presentation



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phoenix	52.1	55.1	59.7	67.7	76.3	84.6	91.2	89.1	83.8	72.2	59.8	52.5
Raleigh	40.5	42.2	49.2	59.5	67.4	74.4	77.5	76.5	70.6	60.2	50.0	41.2
Minneapolis	12.2	16.5	28.3	45.1	57.1	66.9	71.9	70.2	60.0	50.0	32.4	18.6

https://www.datapine.com/blog/misleading-data-visualization-examples/

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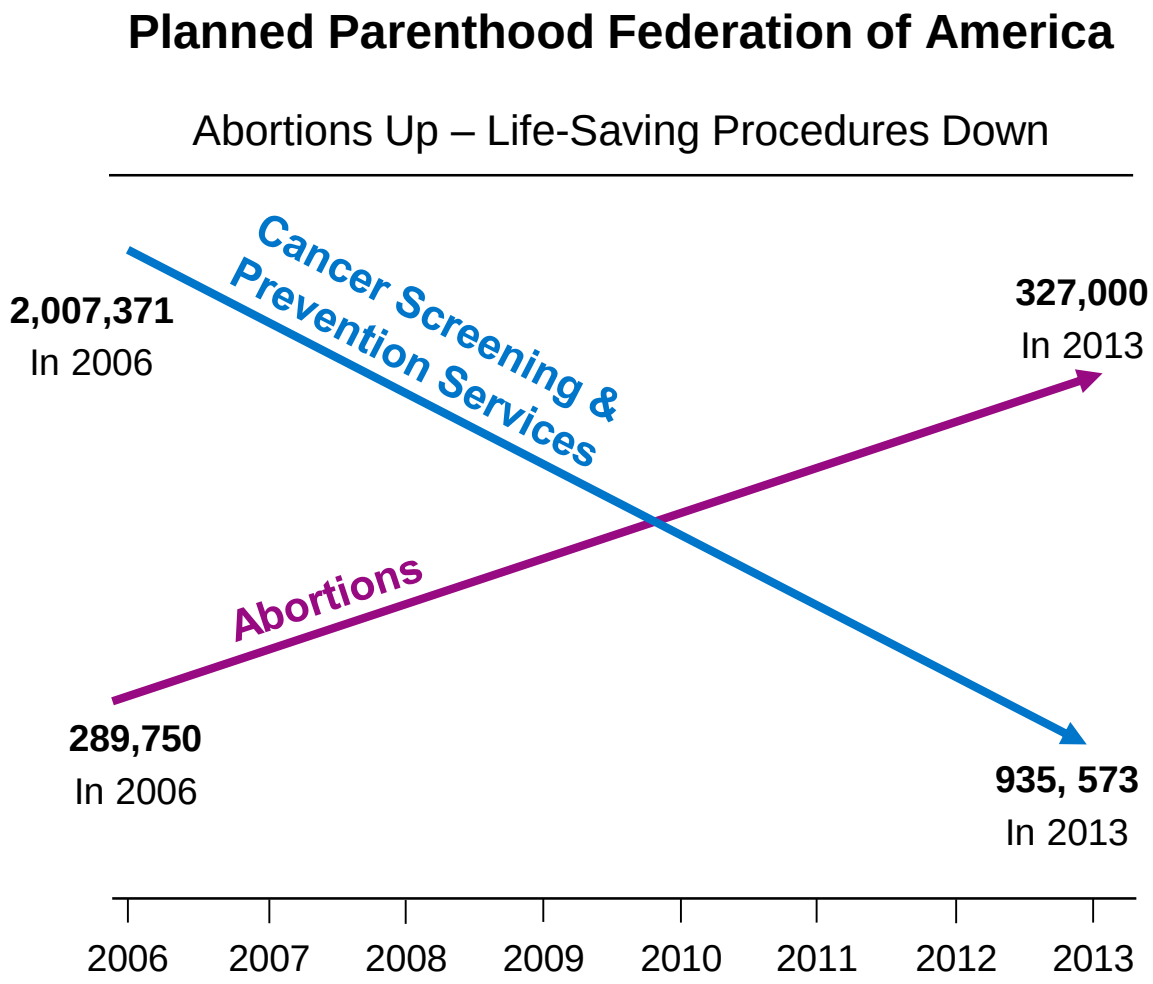
Example – Planned Parenthood Federation of America



Source: Americans United for Life

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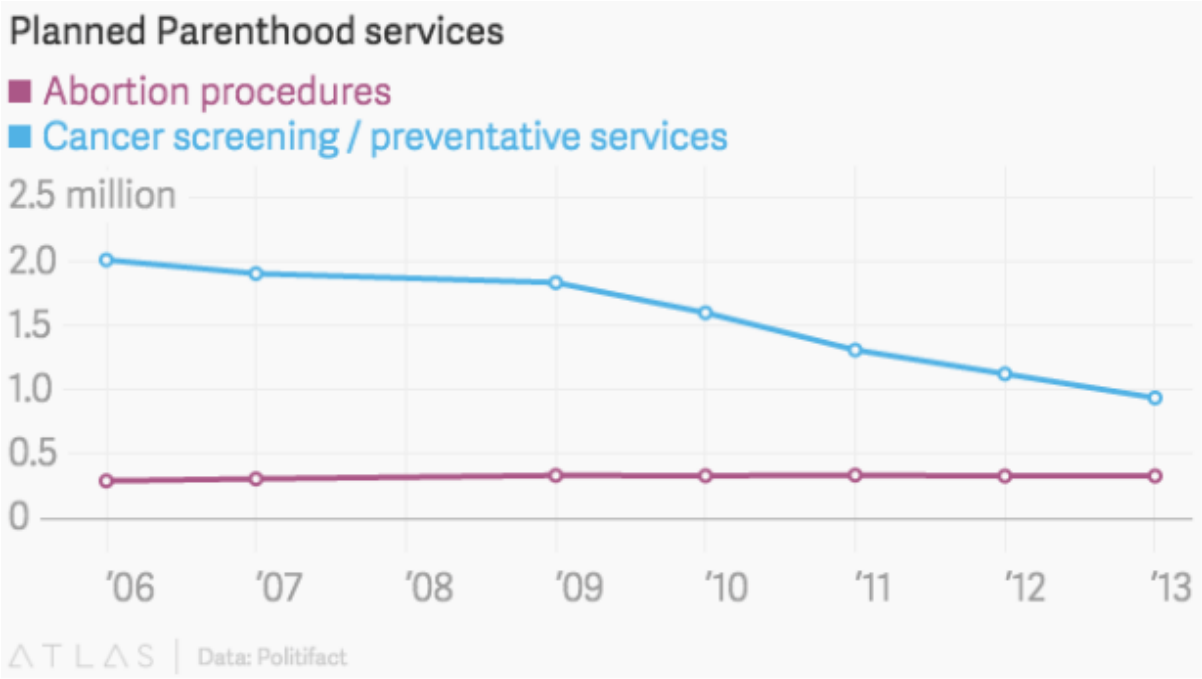
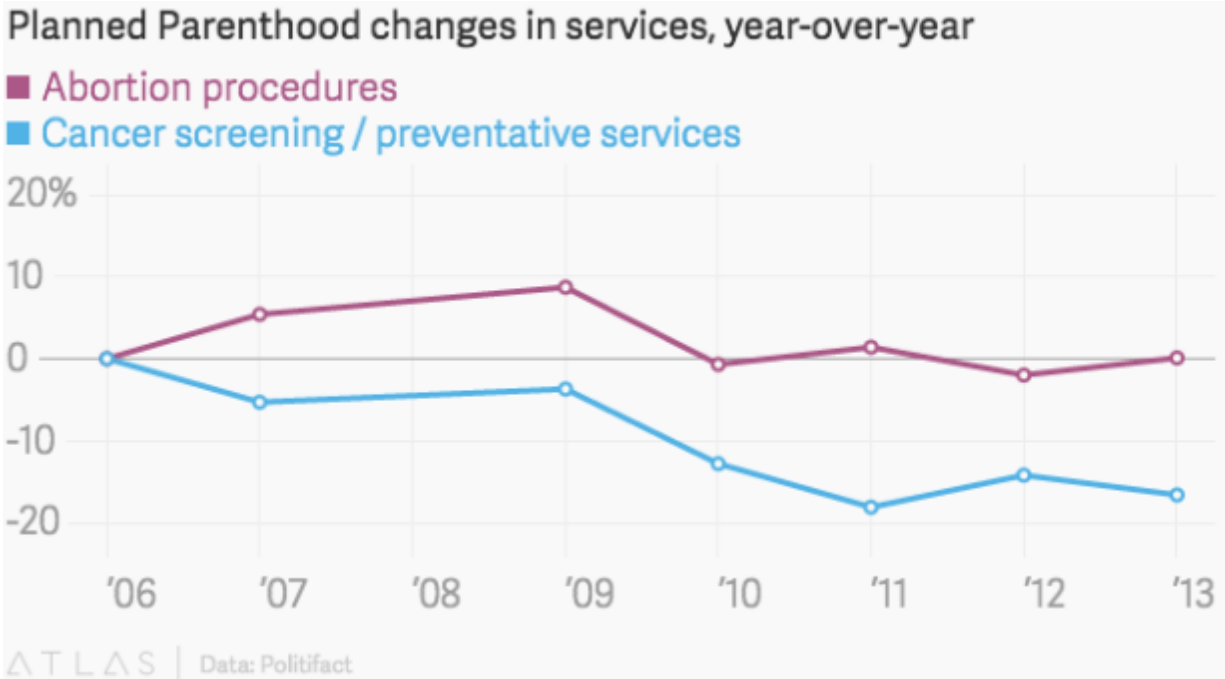
Example – Planned Parenthood Federation of America





Reference:

https://www.politifact.com/

https://www.datapine.com/blog/misleading-statistics-and-data/

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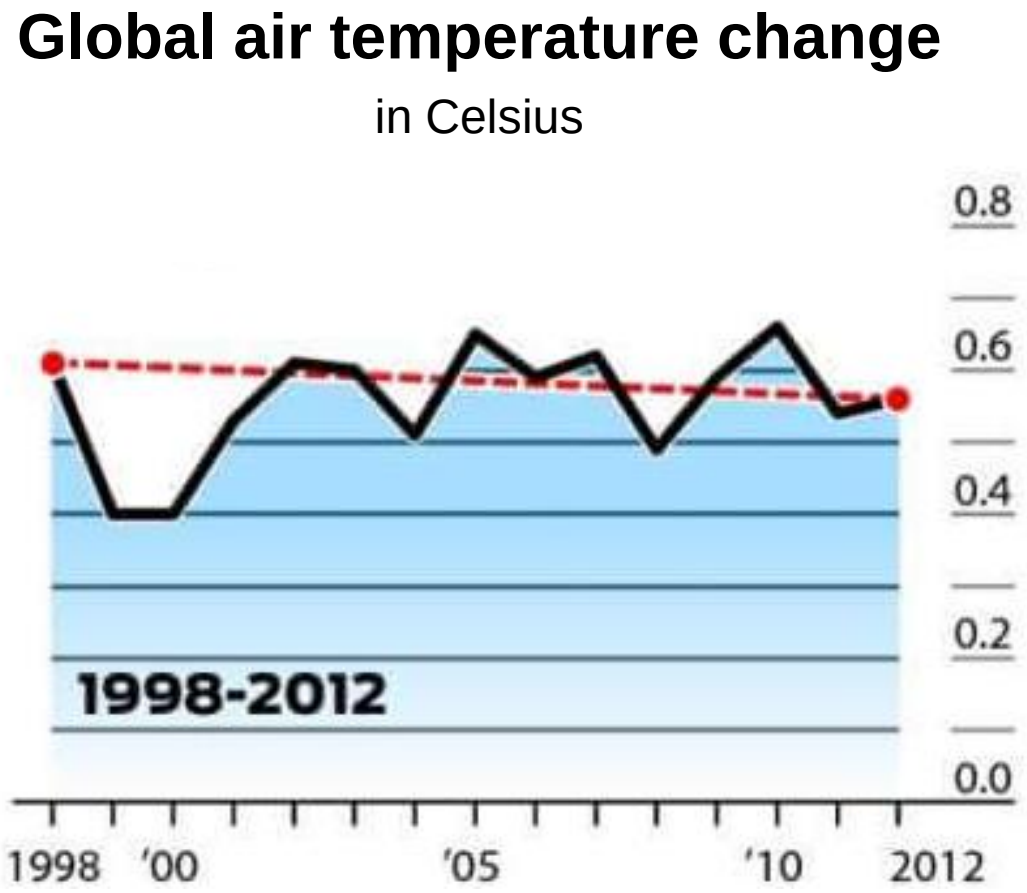
Example – Global warming



Source: NASA

Reference:

https://www.datapine.com/blog/misleading-statistics-and-data/

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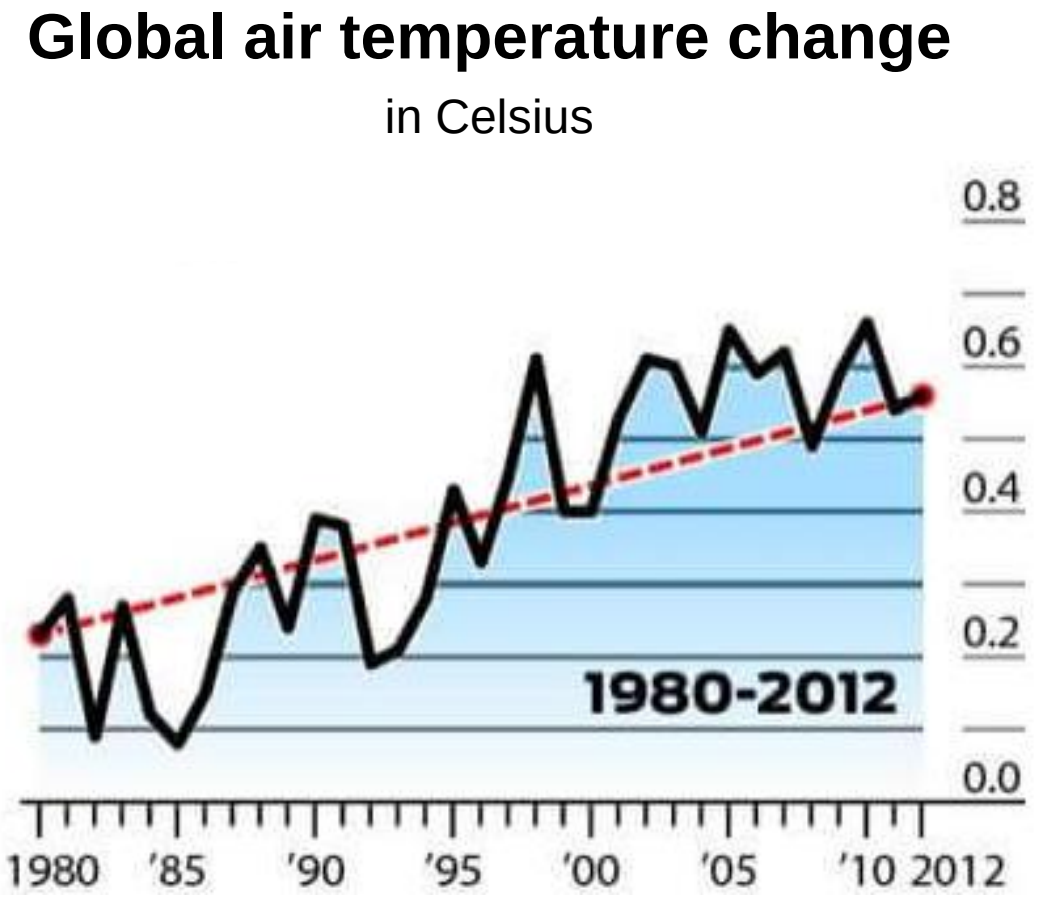
Example – Global warming



Source: NASA

Reference:

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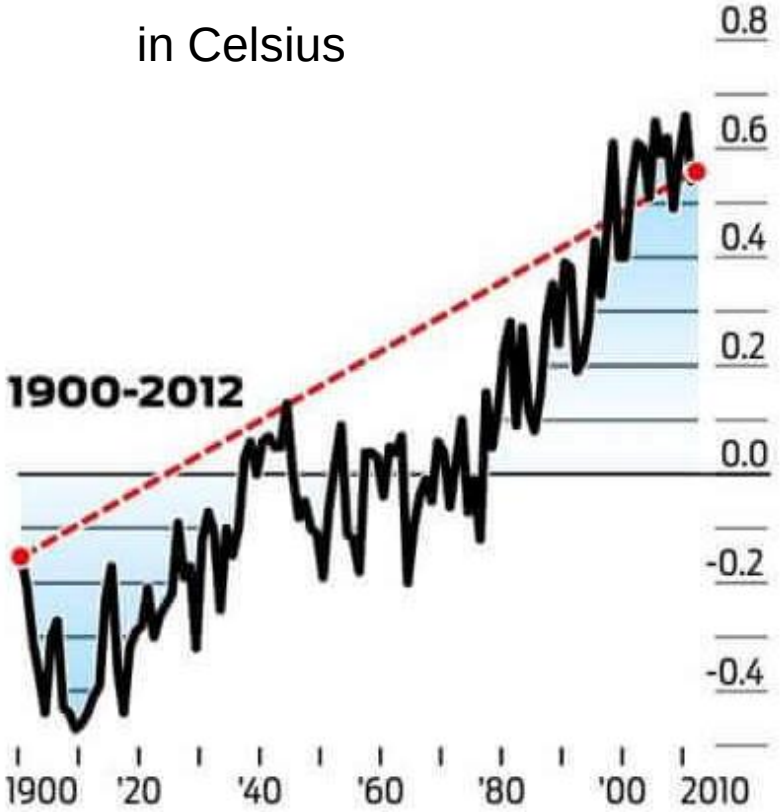
Example – Global warming



The trend from 1900 to 2012

Source: NASA Kpjm Böamcjard / The Chronicle

Reference:
https://www.datapine.com/blog/misleading-statistics-and-data/

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Summary

- Visualization guru Edward Tufte explains “excellence in statistical graphics consists of complex ideas communicated with clarity, precision and efficiency”.
- Because of the variation that inevitably crops up in graphical representations of data, Tufte came up with six principles that are meant to ensure high graphical integrity. These are outlined in his book *The Visual Display of Quantitative Information*.
- These are as follows:
  - Representation of numbers should match the true proportions.
  - Labeling should be clear and detailed.
  - Design should not vary for some ulterior motive.
  - To represent money, well known units are best.
  - The number of dimensions represented should be the same as the number of dimensions in the data.
  - Representations should not imply unintended context.

https://en.wikipedia.org/wiki/Edward_Tufte

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