DATA 8

Fall 2021

Lecture 29

Correlation

Prediction

Guessing the Future

- Based on incomplete information

- One way of making predictions:
  - To predict an outcome for an individual,
  - find others who are like that individual
  - and whose outcomes you know.
  - Use those outcomes as the basis of your prediction.

(Demo)

Association

Two Numerical Variables

- Trend
  - Positive association
  - Negative association
- Pattern
  - Any discernible “shape” in the scatter
  - Linear
  - Non-linear

Visualize, then quantify

(Demo)

Correlation Coefficient

The Correlation Coefficient *r*

- Measures **linear** association
- Based on standard units
- $-1 \le r \le 1$
  - $r = 1$: scatter is perfect straight line sloping up
  - $r = -1$: scatter is perfect straight line sloping down
- $r = 0$: No linear association; *uncorrelated*

(Demo)

Definition of *r*

Correlation Coefficient (*r*) =

average of	product of	x in standard units	and	y in standard units

Measures how clustered the scatter is around a straight line

Care in Interpretation

Watch Out For ...

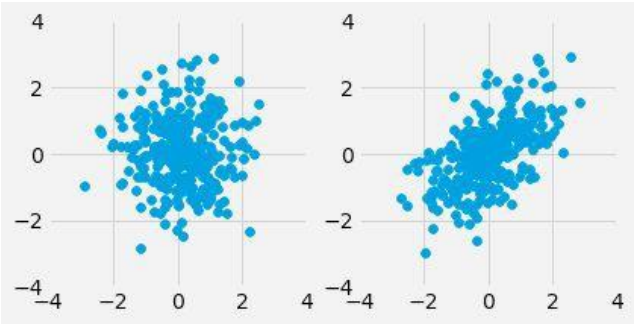
- False conclusions of causation
- Nonlinearity
- Outliers
- Ecological Correlations

(Demo)

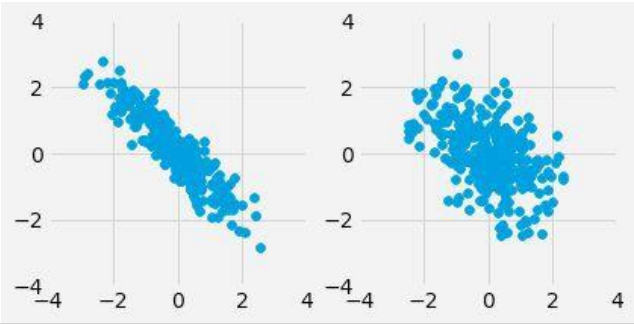
Discussion Question

For each pair, which one will have a higher value of r?

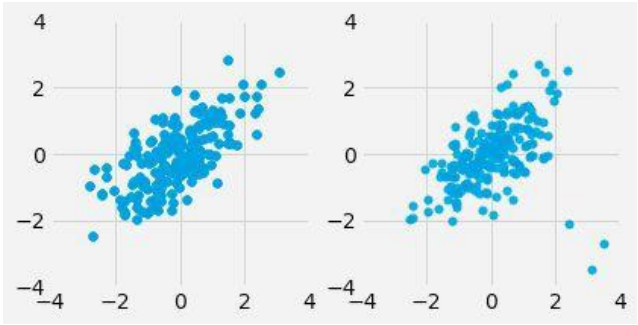
a)



b)



c)



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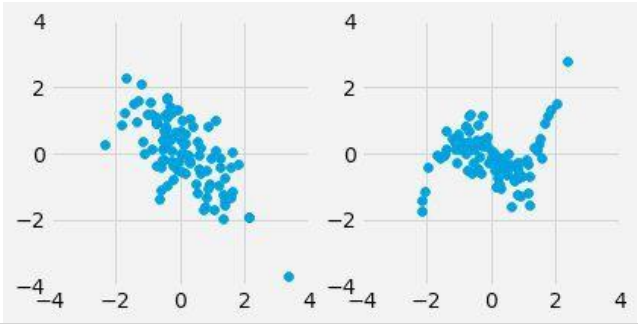

Chocolate and Nobel Prizes

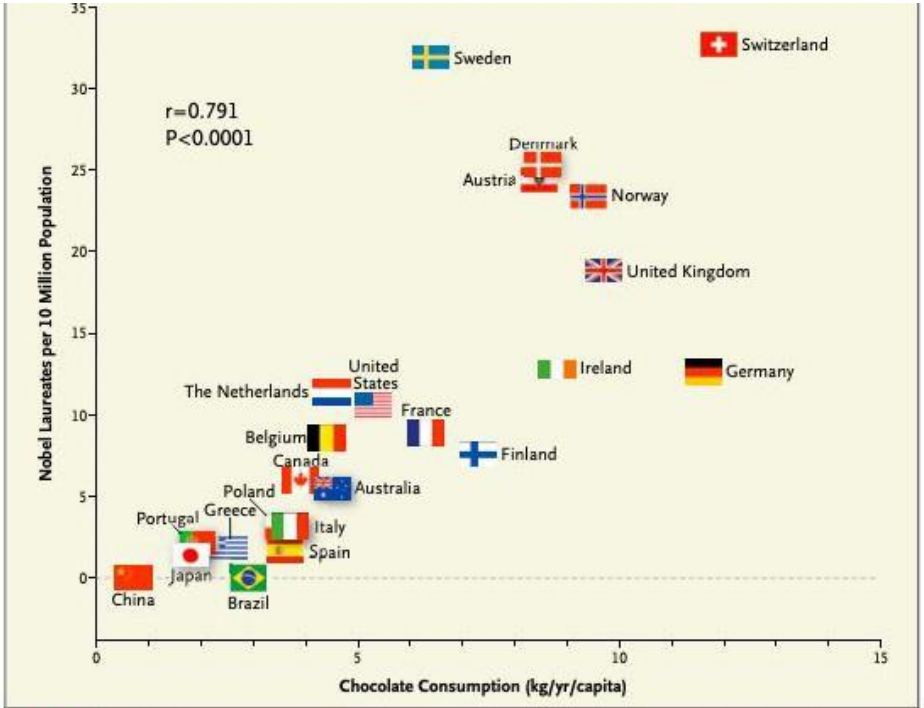

Figure 1. **Correlation between Countries' Annual Per Capita Chocolate Consumption and the Number of Nobel Laureates per 10 Million Population.**