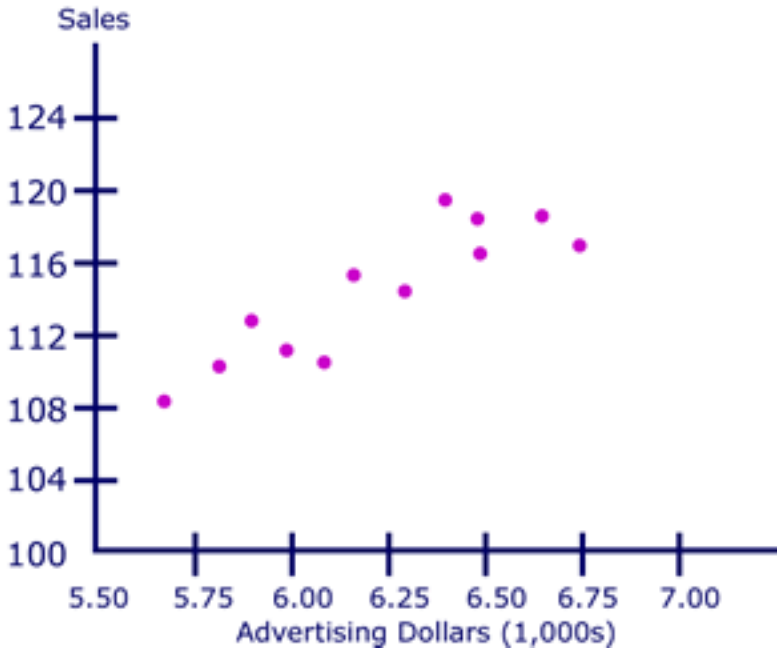
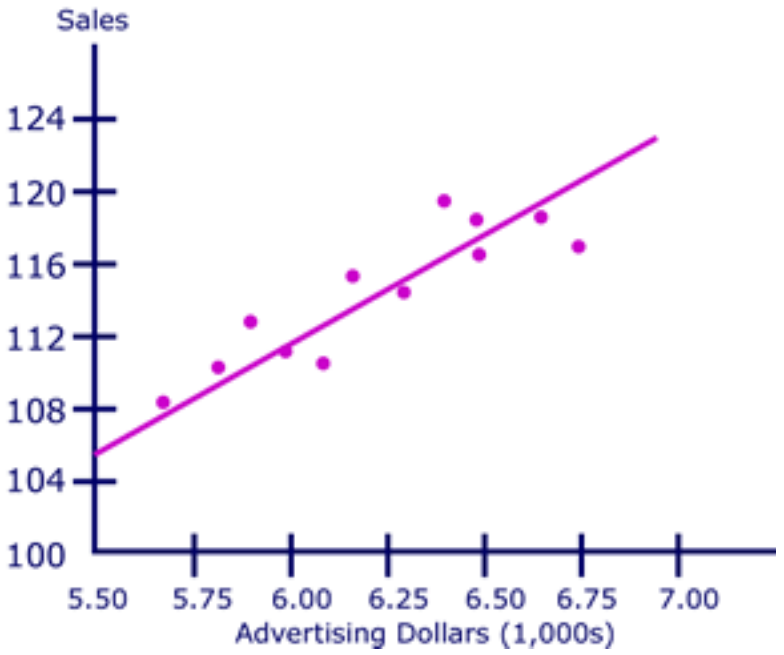
Some Remarks about Correlation vs Causality Example 1: Sales vs Advertising

- People love to say, „This causes that,“ whether we know it to be a fact or not. Here is a positive relationship between sales and advertising.



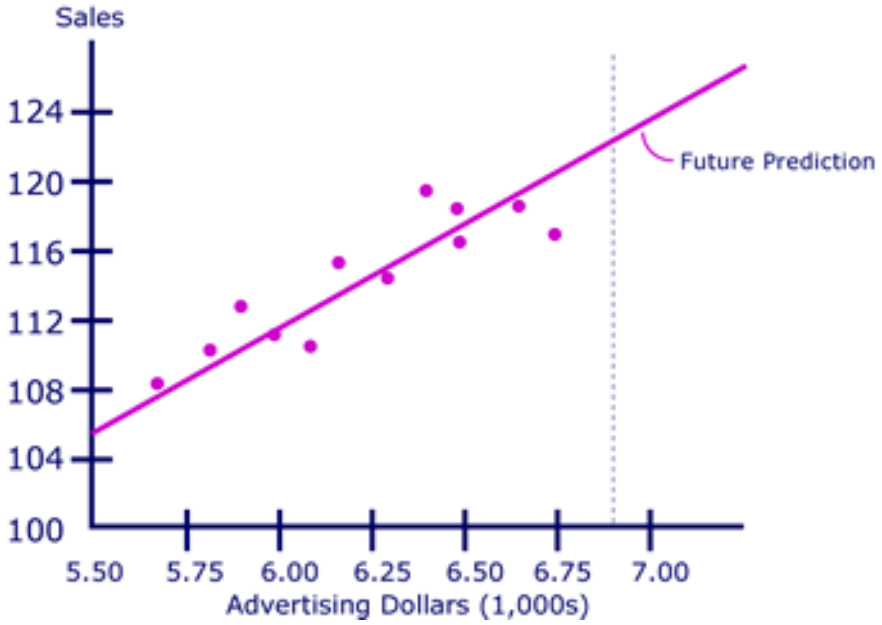
Some Remarks about Correlation vs Causality

- A linear regression line through the data



Some Remarks about Correlation vs Causality

- Prediction of Sales from Advertising. Is this correct?



Some Remarks about Correlation vs Causality

- Take a look at the actual data within a year. There is a pretty large seasonality effect: Consumers bought more products because of the holidays, not necessarily because of the retail ads.

Month	Sales (in 1000s)	Advertising Dollars (1000s)
January	100	5.5
February	110	5.8
March	112	6
April	115	5.9
May	117	6.2
June	116	6.3
July	118	6.5
August	120	6.6
September	121	6.4
October	120	6.5
November	117	6.7
December	123	6.8

Some Remarks about Correlation vs Causality Ex 2: Nobel Prize vs Chocolate

- There was a close, significant linear correlation (r=0.791, P<0.0001) between chocolate consumption per capita and the number of Nobel laureates per 10 million persons in a total of 23 countries. Source: N Engl J Med 2012; 367:1562-1564, October 18, 2012

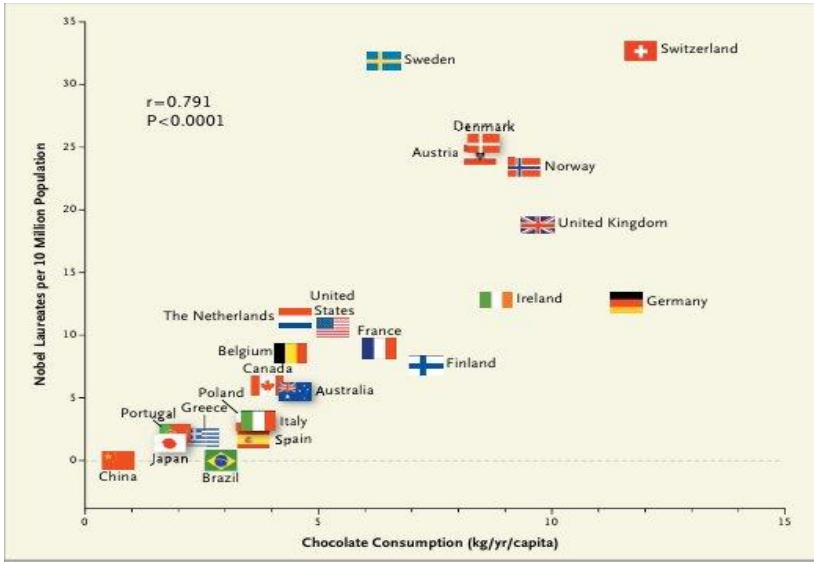


Figure 1. Correlation between Countries' Annual Per Capita Chocolate Consumption and the Number of Nobel Laureates per 10 Million Population.

Some Remarks about Correlation vs Causality Ex 2: Nobel Prize vs Chocolate

- how about Nobel prize winners consume more chocolates? (reverse casaulity).
- Sweden seems to be an „Outlier“.

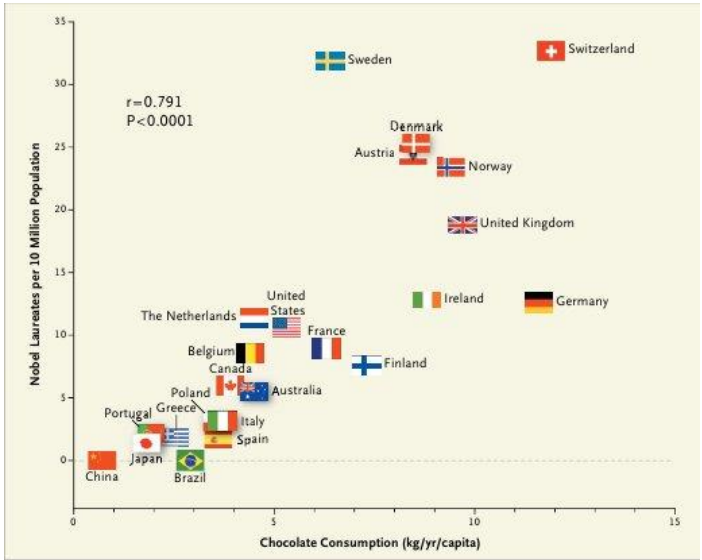
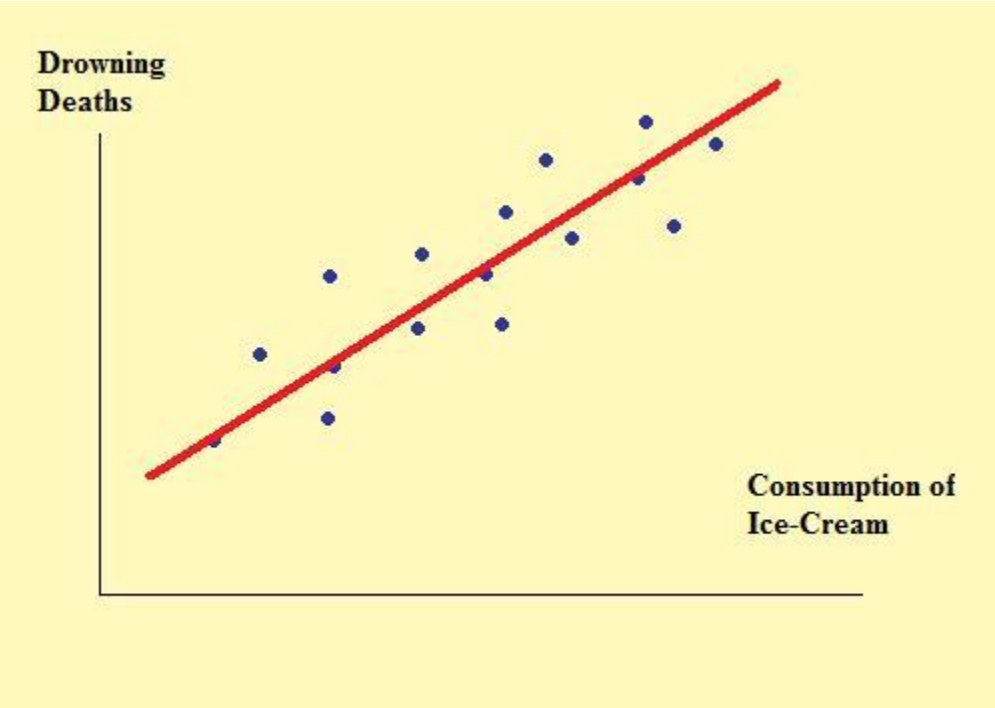


Figure 1. Correlation between Countries' Annual Per Capita Chocolate Consumption and the Number of Nobel Laureates per 10 Million Population.

Some Remarks about Correlation vs Causality Ex 3: Ice Cream Sales and Drownings

- Should parents let their kids eat ice cream near open water?



Some Remarks about Correlation vs Causality Ex 3: Ice Cream Sales and Drownings

- What is the hidden variable lurking in the background here?
- In the summertime, people eat more ice cream AND swim more. More swimming leads to more drownings. Here, swimming causes people to drown, and NOT ice cream.