

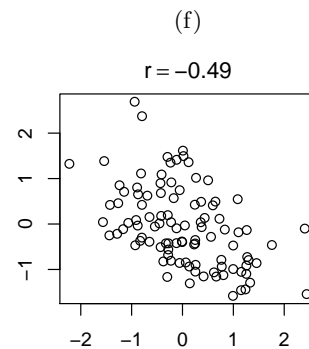
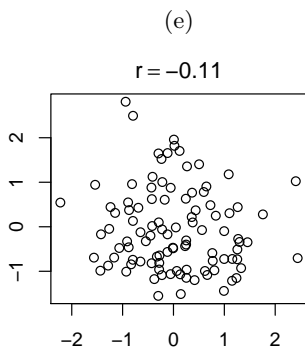
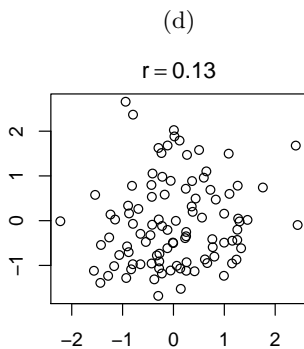
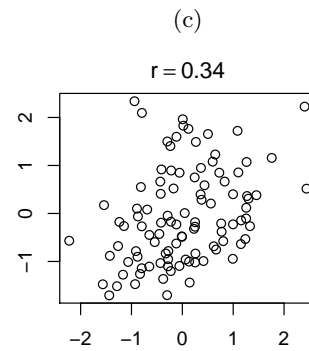
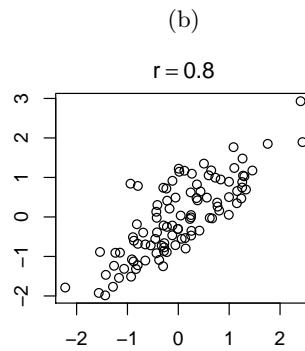
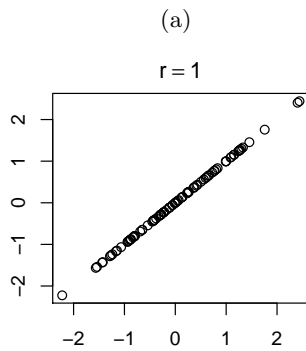
Association and Correlation

- Let us consider a test of children's ability to write French text correctly from dictation. For simplicity we may assume that the spoken French is standardized by using a tape recorder, that the scoring has been made uniform, and that the scorers can decipher all the handwritings involved. Let

y = the score on this dictation test,
 x = the weight of the child.

What is the relation between y and x ?

- Consider two variables, x and y . In the scenarios below, we have collected $n = 100$ measurements of (x, y) pairs. There is a scatterplot of the 100 points, along with the computed correlation between the two variables. Is there an apparent association between the two variables? Is the relationship positive or negative? Weak or strong?



Causation

3. Which of the three requirements for causation (consistency, responsiveness, and a mechanism) apply to the relation between weight and performance in French dictation?

4. Consider a general x and y . How might one confirm the three requirements for causation?
 - (a) Consistency?

 - (b) Responsiveness?

 - (c) A mechanism?

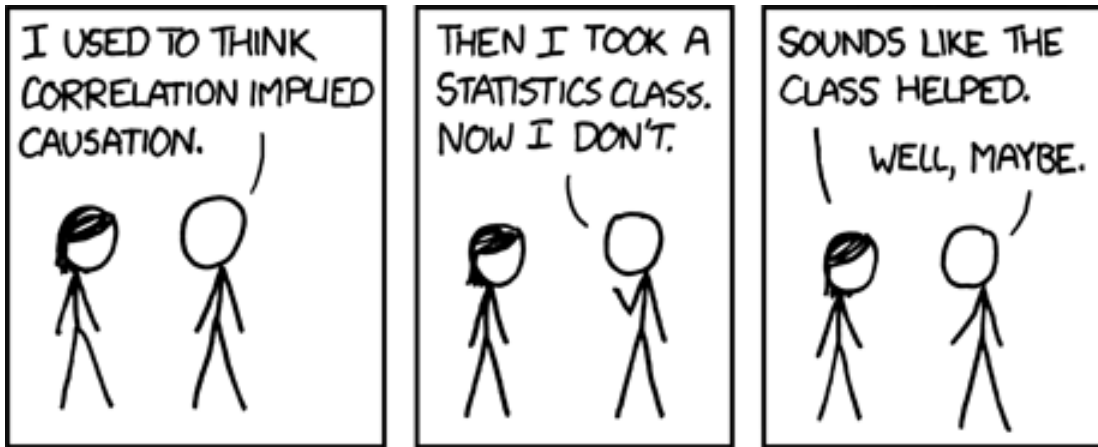
5. Interest rates and prices tend to be positively associated. Why might there not be a causal relationship between the two?

6. During the industrial revolution in the United States (1750–1850), there was a strong positive association between the amount of scotch whisky imported into New York and the number of ministers there as well. Why might not there have been a causal relationship?

7. There is a positive association between High school seniors' GPAs and their SAT scores. Why might not there be a causal relationship between the two?

8. By now it has been established that smoking causes lung cancer, but establishing this took a long time. People knew that there was a positive association between the two, but this was not enough to establish causation. What are some potential common causes of both? Why is the other direction of the causality implausible?

9. Many people remain unconvinced that there is a causal relationship between global temperature and air pollution. Why do some people dispute that there is a causal relationship?



<http://xkcd.com/552>