

## CORRELATION AND CAUSATION

One of the most interesting aspects of correlation is its relationship to causation. Correlation does not (necessarily) imply causation. When two variables X and Y are significantly correlated, there are several possibilities.

1. X causes Y
2. Y causes X
3. X and Y are caused by Z
4. It is a coincidence.

Discuss the following examples and try to determine the best explanation for the correlation.

1. There is a fairly strong correlation between ice cream sales and drowning deaths. Does ice cream cause drownings?

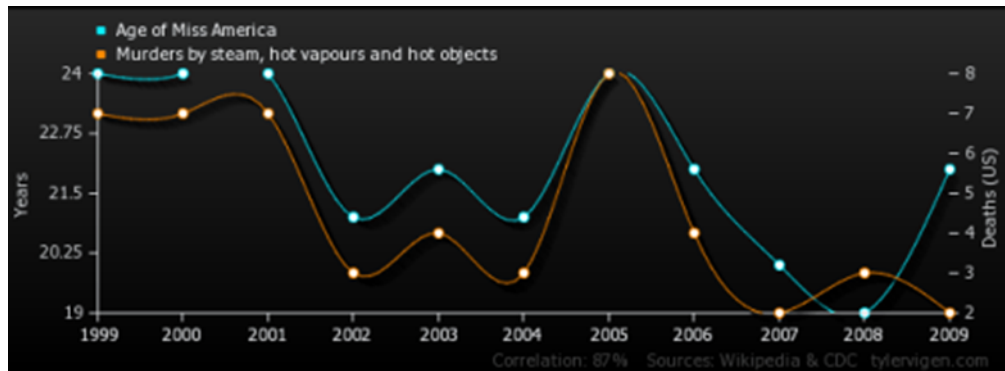
2. "Based on an examination of 22 companies that announced large layoffs during 1994, Downs found a strong correlation between the size of layoffs and the compensation of the CEOs." Does CEO compensation cause layoffs?

3. People who use artificial sweeteners in place of sugar tend to be heavier than people who use sugar. Analyze the claim that use of artificial sweeteners causes weight gain. Is there a better explanation?

4. In 2000, it was observed that since 1937, when the Washington Redskins football team wins their last game before a presidential election, the incumbent party wins, and if they lose, the incumbent party loses. How would you explain this (strong) correlation?

5. A New York Times headline in 2004 read, "Despite Drop in Crime, an Increase in Inmates". Do low crime rates cause high incarceration rates?

6. The graph below shows a correlation between the age of Miss America and murders by steam hot vapors, and hot objects. How would you explain this correlation?



7. Researchers studied the “Hawthorne Works in Cicero, Ill. In a series of experiments from 1924-1932, researchers studied the worker productivity effects associated with altering the Illinois factory’s environment, including changing light levels, tidying up the place and moving workstations around.” Most changes resulted in increased worker productivity, including reversing previous changes. How can these changes be explained?

8. “If one of the 16 original National Football League teams—those in existence before the NFL’s 1966 merger with the American Football League—won the Super Bowl, the stock market would close higher that following year than it did the preceding Dec. 31. If a former AFL team won, it would go down. From 1967 to 1978, Koppett’s system went 12 for 12; up through 1997, it boasted a 95 percent success rate.” How would you explain this (strong) correlation?