

## Dr. Chun's Numb3rs & Løgic

*The Chicken or the Egg?*



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# Which Olympic Sport Wins Gold for Touchiest?

Fist Bumps, Bro Hugs and Chest Bumps Proliferate; 'We've Got Each Other's Backs'

(*Wall Street Journal*, August 10, 2012)

During their win against China last week, members of the [U.S. women's volleyball team](#) demonstrated their mastery of digs, sets, spikes and blocks. They also excelled in another area: [Spontaneous displays of affection](#).

A review of the first 25 plays in that game shows that the six Americans on the court shared 24 [group hugs](#), 6 [high fives](#), 10 [double-high fives](#), 29 [low fives](#), 2 [double-low fives](#), and 12 [bum taps](#).

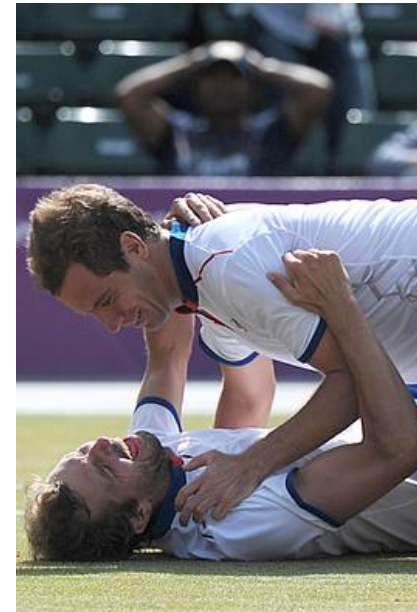
That works out to 83 total touches, or an average of 3.32 [public displays of affection](#) for every stoppage in play.



"It's a celebration sport because you can't do it without each other," says [Lindsey Berg](#), the U.S. team's captain. In these interludes, she says, "we look into each other's eyes and we know we have each other's backs."



# Public Displays of Affection





# The Chicken or the Egg?

Research suggests **touching** may be good for building **team chemistry**, or at the least, a symptom of a healthy team dynamic.

In 2010, three researchers at the **University of California, Berkeley**, reviewed broadcasts of games from the 2008-09 **NBA season** to see how often players touched and whether touching had an impact on winning and losing.

Teams that touch more at **the beginning of the season** win more over **the course of the entire season**. The two touchiest teams in the study, the **Boston Celtics** and **Los Angeles Lakers**, finished the season with two of the NBA's top three records, and the Celtics **Kevin Garnett** was the **touchiest player** in the league by at least a 15% margin, said one of the study's authors.



# Correlation does not imply causation!



1. The more **firemen** fighting a fire, the bigger the **fire** is observed to be.  
Therefore, **firemen** cause an increase in the size of a **fire**.  
(If there is a large **fire**, a greater number of **firemen** are sent.)
2. As **ice cream sales** increase, the rate of **drowning deaths** increases sharply.  
Therefore, **ice cream** consumption causes **drowning**.  
(**Ice cream** is sold during the hot summer months.)
3. Since the 1950s, both the atmospheric **CO<sub>2</sub> level** and **obesity levels** have increased sharply. Hence, atmospheric **CO<sub>2</sub>** causes **obesity**.  
(Richer populations tend to eat more **food** and consume more **energy**.)

4. With a decrease in the number of **pirates**,  
there has been an increase in **global warming** over the same period.  
Therefore, **global warming** is caused by a lack of **pirates**.



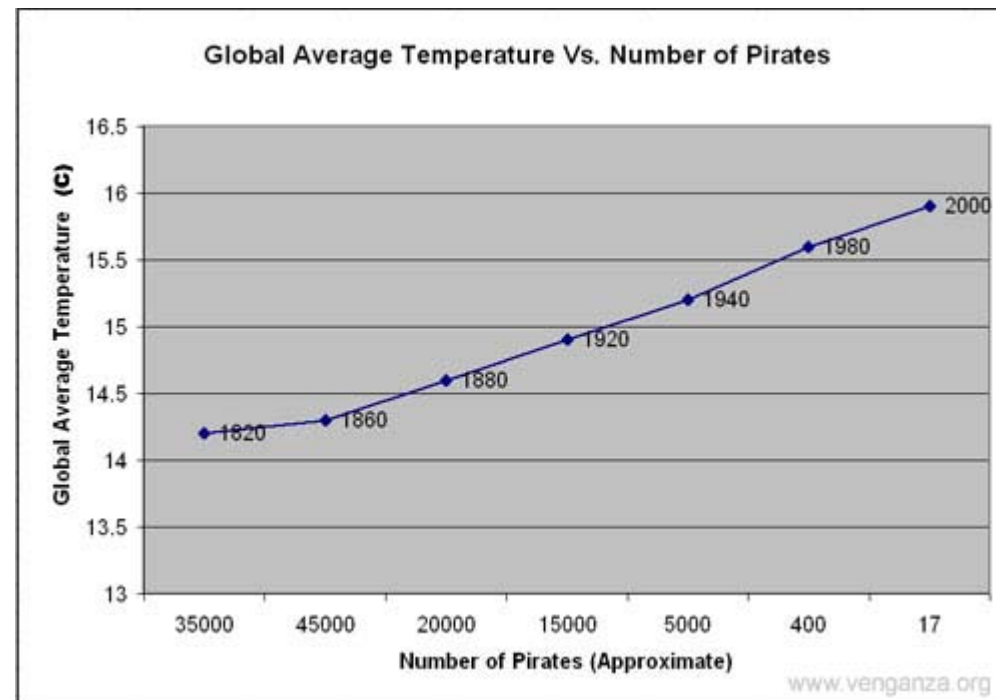


# Less Pirates, Higher Global Temperature?

"You may be interested to know that global warming, earthquakes, hurricanes, and other natural disasters are a direct effect of the shrinking **numbers of Pirates** since the 1800s. For your interest, I have included a graph of the approximate **number of pirates** versus the average **global temperature** over the last 200 years.



As you can see, there is a statistically significant **inverse** relationship between **pirates** and **global temperature**."



# Correlation does not imply causation!



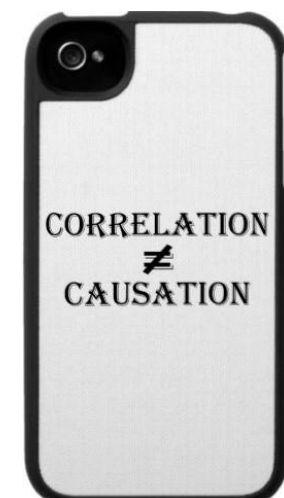
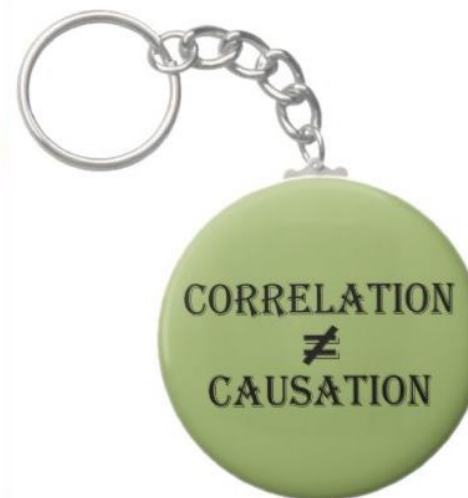
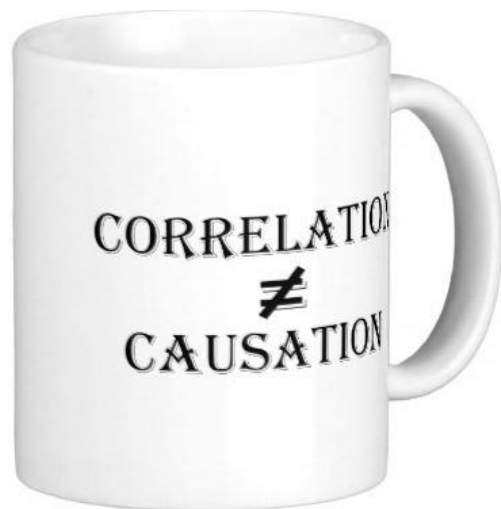
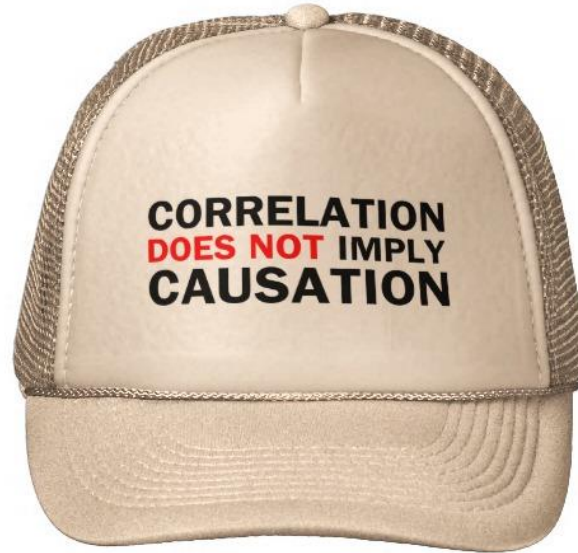
Someone might look at professional **basketball players** and conclude that this sport makes people grow **tall**.

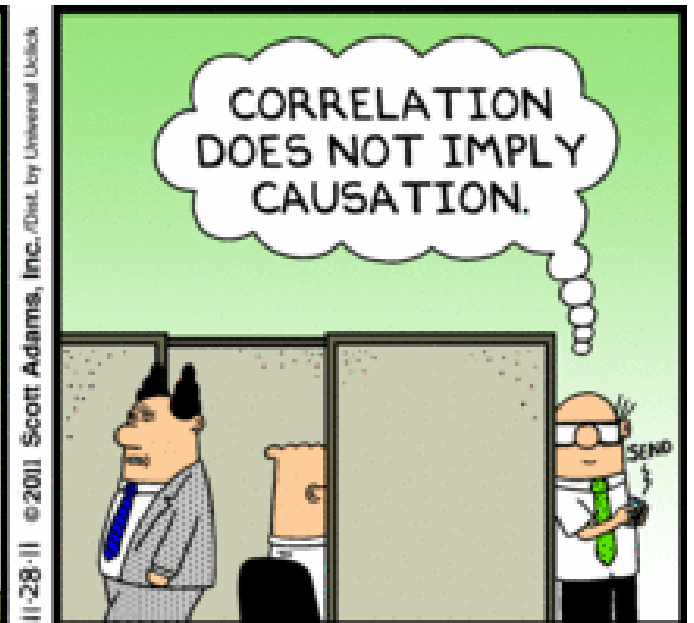


Or look at the damage wreaked on **mobile-home parks** by **tornadoes**, then conclude that **mobile home parks** cause **tornadoes**.

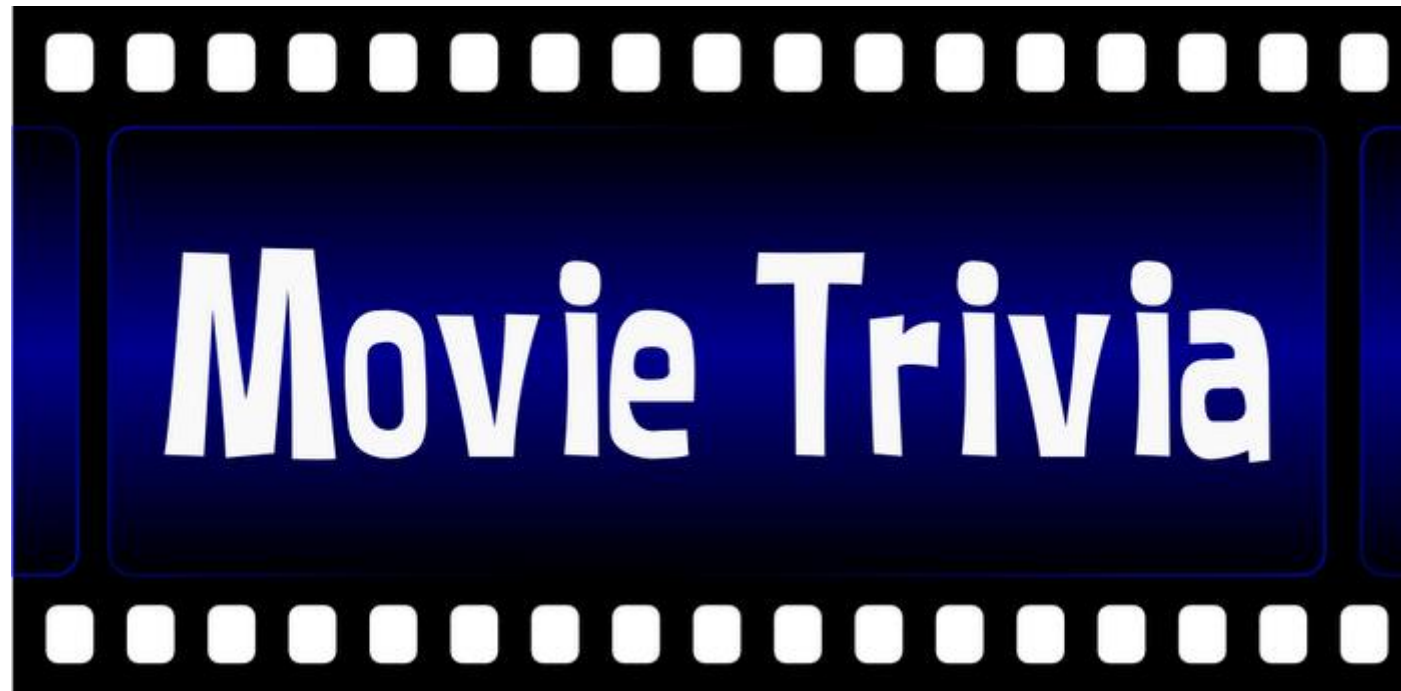
Experts call this **falsely** concluding that **association proves causation**. We just call it **crazy thinking**.

# Remember!



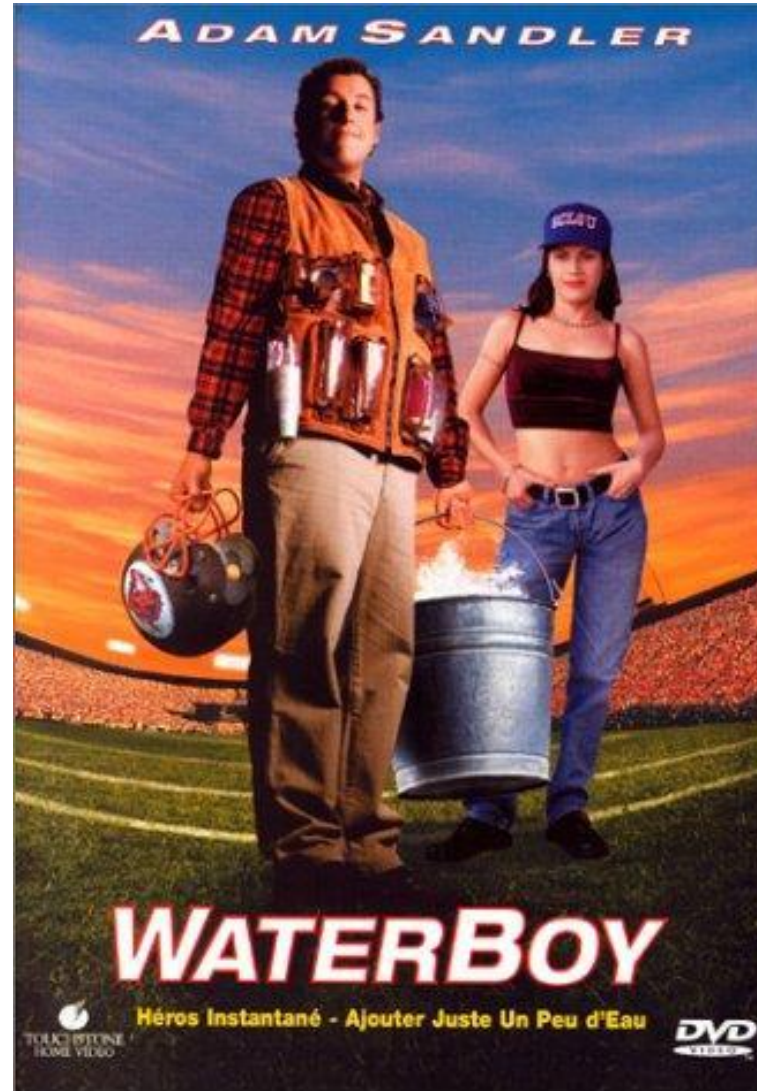


# Movie Trivia



A waterboy for a college football team discovers he has a unique tackling ability and becomes a member of the team.

# The Waterboy (1998)



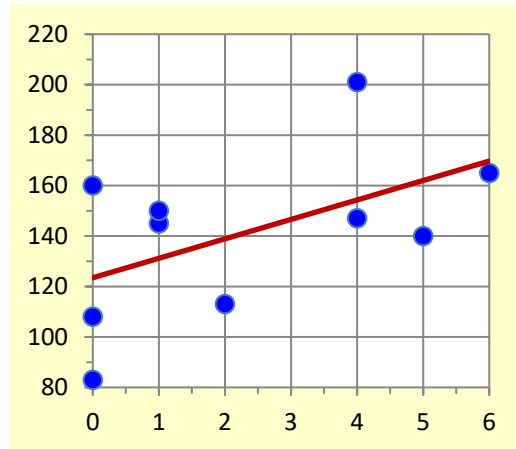
A waterboy for a college football team discovers he has a unique tackling ability and becomes a member of the team.



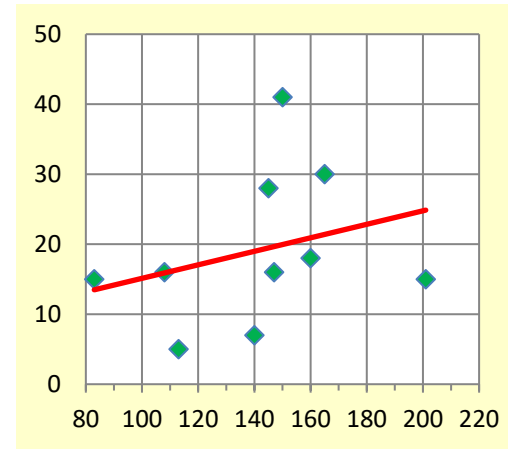
## Bonus Question

- Question: If the correlation between  $X$  and  $Y$  is positive and the correlation between  $Y$  and  $Z$  is positive, then the correlation between  $X$  and  $Z$  is also positive?

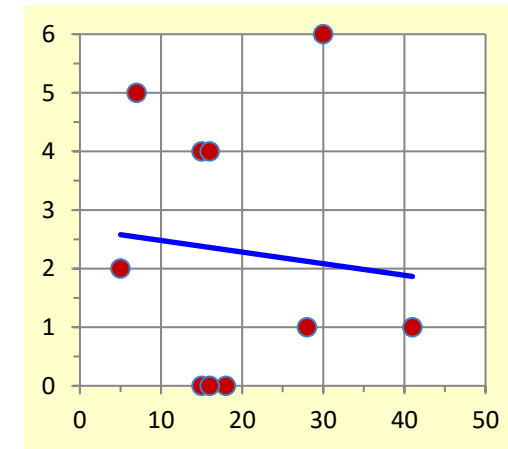
$X$	4	6	1	1	0	2	5	4	0	0
$Y$	201	165	145	150	160	113	140	147	83	108
$Z$	15	30	28	41	18	5	7	16	15	16



$$\text{Corr}(X, Y) = 0.5259$$



$$\text{Corr}(Y, Z) = 0.2926$$



$$\text{Corr}(Z, X) = -0.0956$$

- Answer: Not necessarily!