

## ▼ Correlation does not imply Causation:

Causation takes a step further than correlation. It says any change in the value of one variable will

Generally, if two variables X and Y are correlated, there are at least four possible explanations:

> X causes Y

Example: Total\_bill causes Tip value; That means, One variable is influencing the other.

> Y causes X

Example: Tip NEVER influences Total\_bills (in general). May be two vars Correlated but that doesn't mean

Example 2: Windmill speed is affected by Wind speed (Correlated). But we cannot say Wind Speed causes

> X and Y are both caused by a third variable, Z.

Example: Total\_bills and Tips are caused by Gender.

> X and Y are NOT correlated but third variable Z influencing both X and Y variables.

Example: Spending hours may cause stomach ache (stupid) but there is third variable Food may : cause

> Chance (the correlation is spurious(not real)).

Example: One State revenue is influencing other state revenue. May be they are correlated but

Example: Ice cream sales is correlated with homicides in New York (Study)

As the sales of ice cream rise and fall, so do the number of homicides. Does the consumption of ice cream cause

No. Two things are correlated doesn't mean one causes other.

Correlation does not mean causality or in our example, ice cream is not causing the death of people.

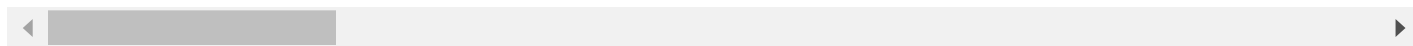
When 2 unrelated things tied together, so these can be either bound by causality or correlation.

In Majority of the cases correlation, are just because of the coincidences. Just because it seems like

Correlation is something which we think, when we can't see under the covers. So the less the informati

## Consider underlying factors before conclusion

In some cases there are some hidden factors which are related on some level. Like in our example of ice cream and homicide rate, sunny weather is bringing



There is no causal relationship between the ice cream and rate of homicide, sunny weather is bringing



## Don't conclude too fast!

Just after finding correlation, don't draw the conclusion too quickly. Take time to find other underlying factors.

Establishing a causation requires a lot more work than finding a correlation because it is a much stronger

