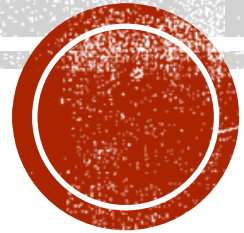
Why $n - 1$?



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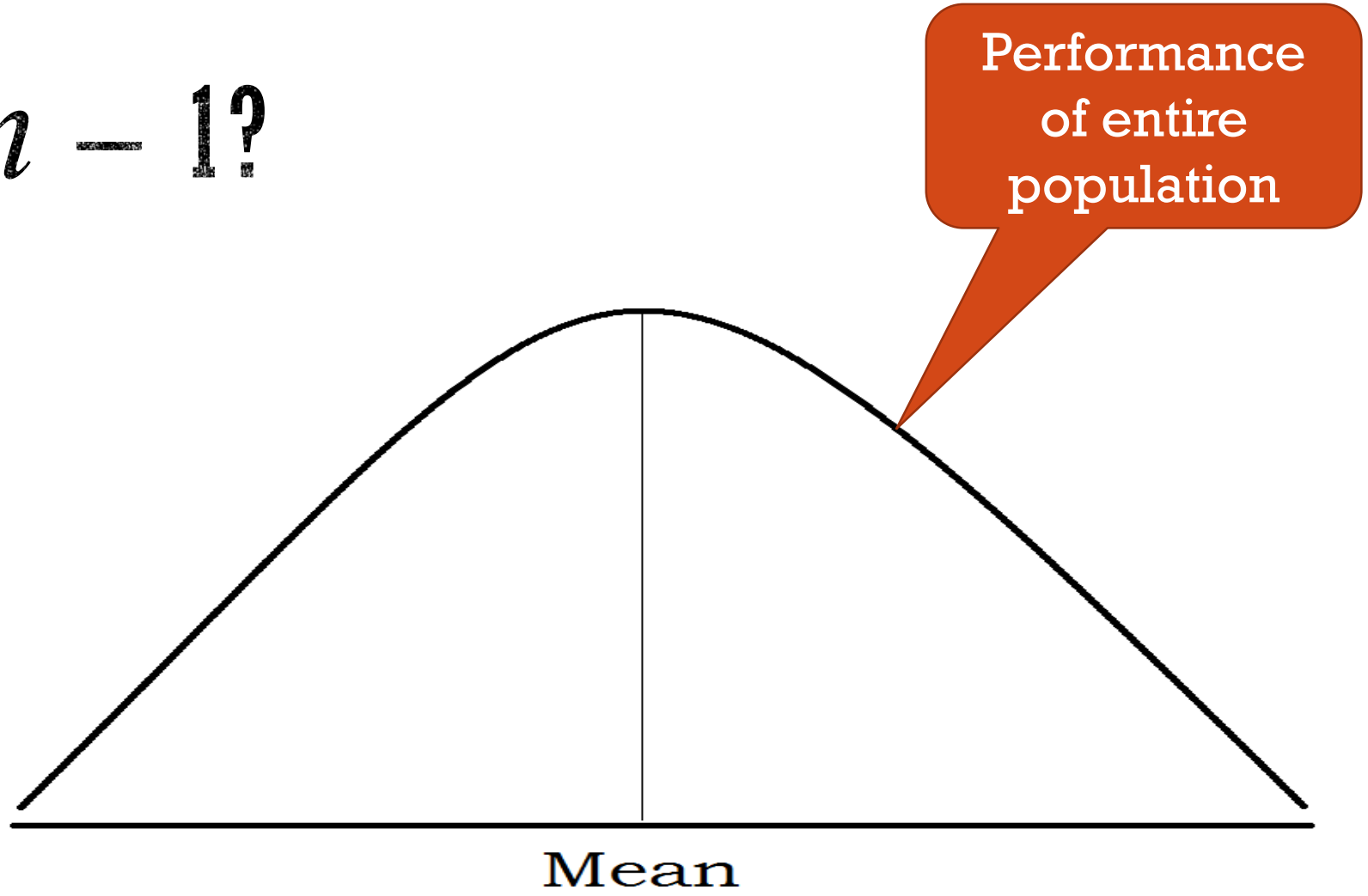
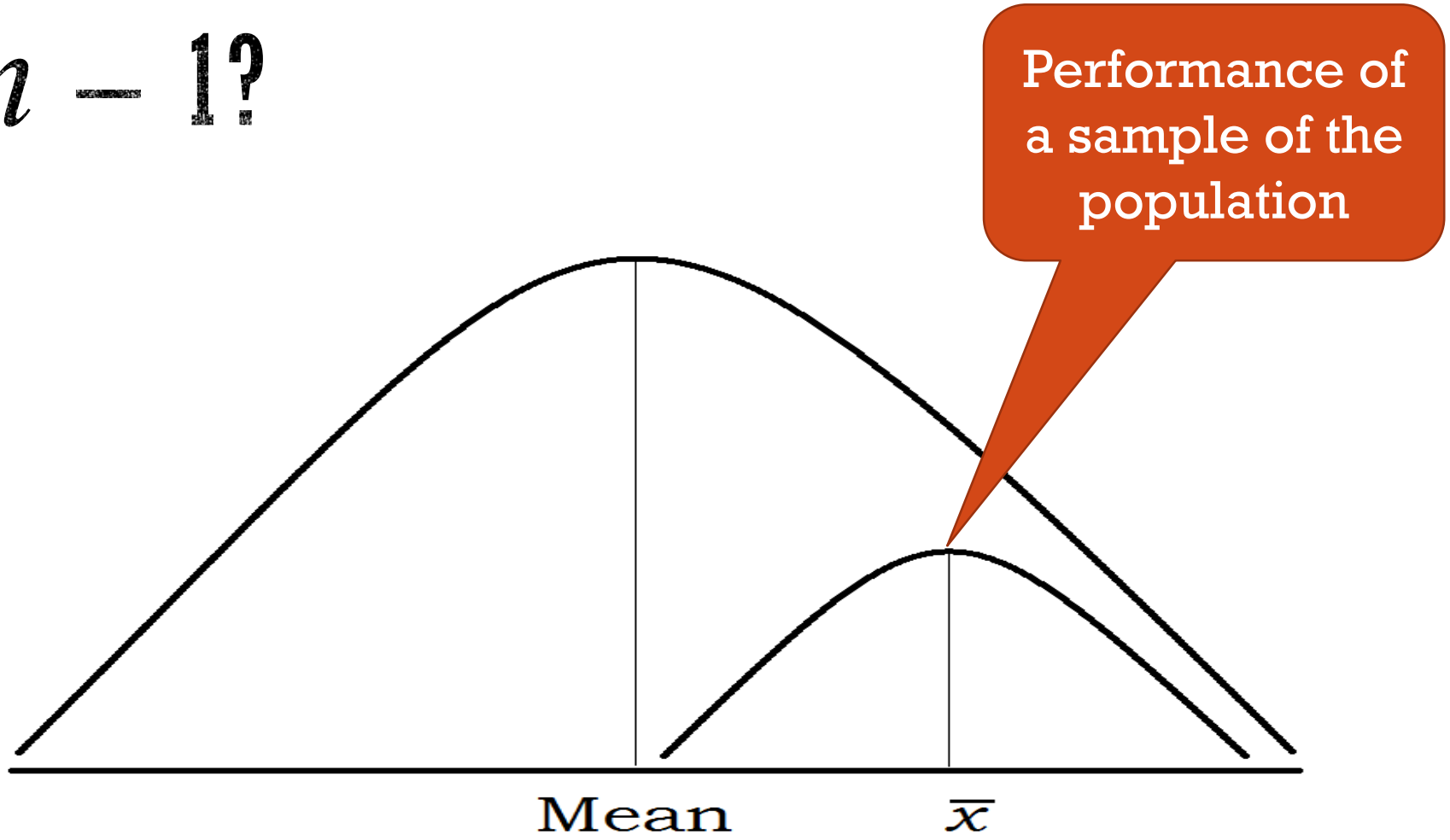
Why $n - 1$?

Why do we use n in certain calcualtions and n-1 in other calculations? It can be very confusing!

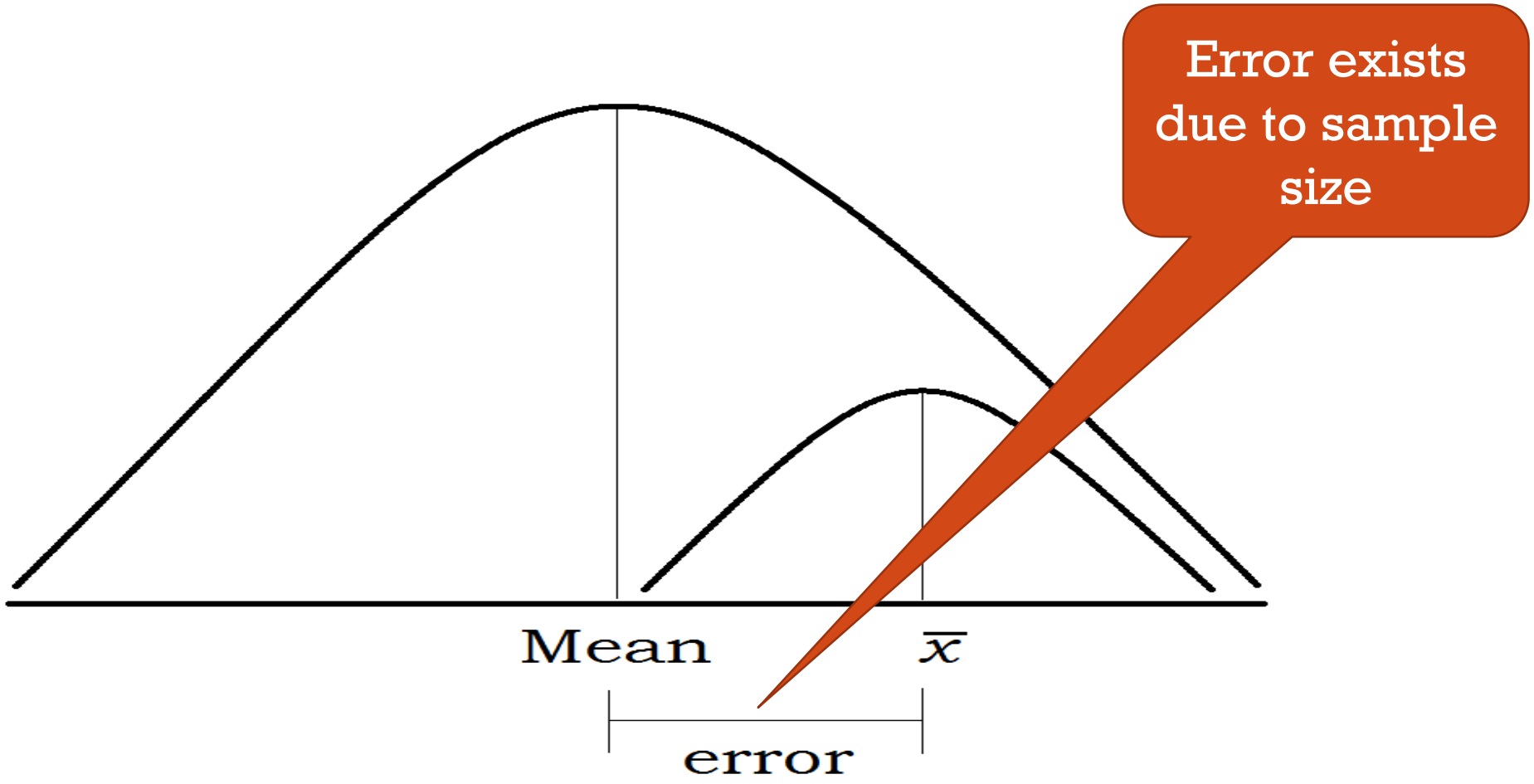
Why $n - 1$?



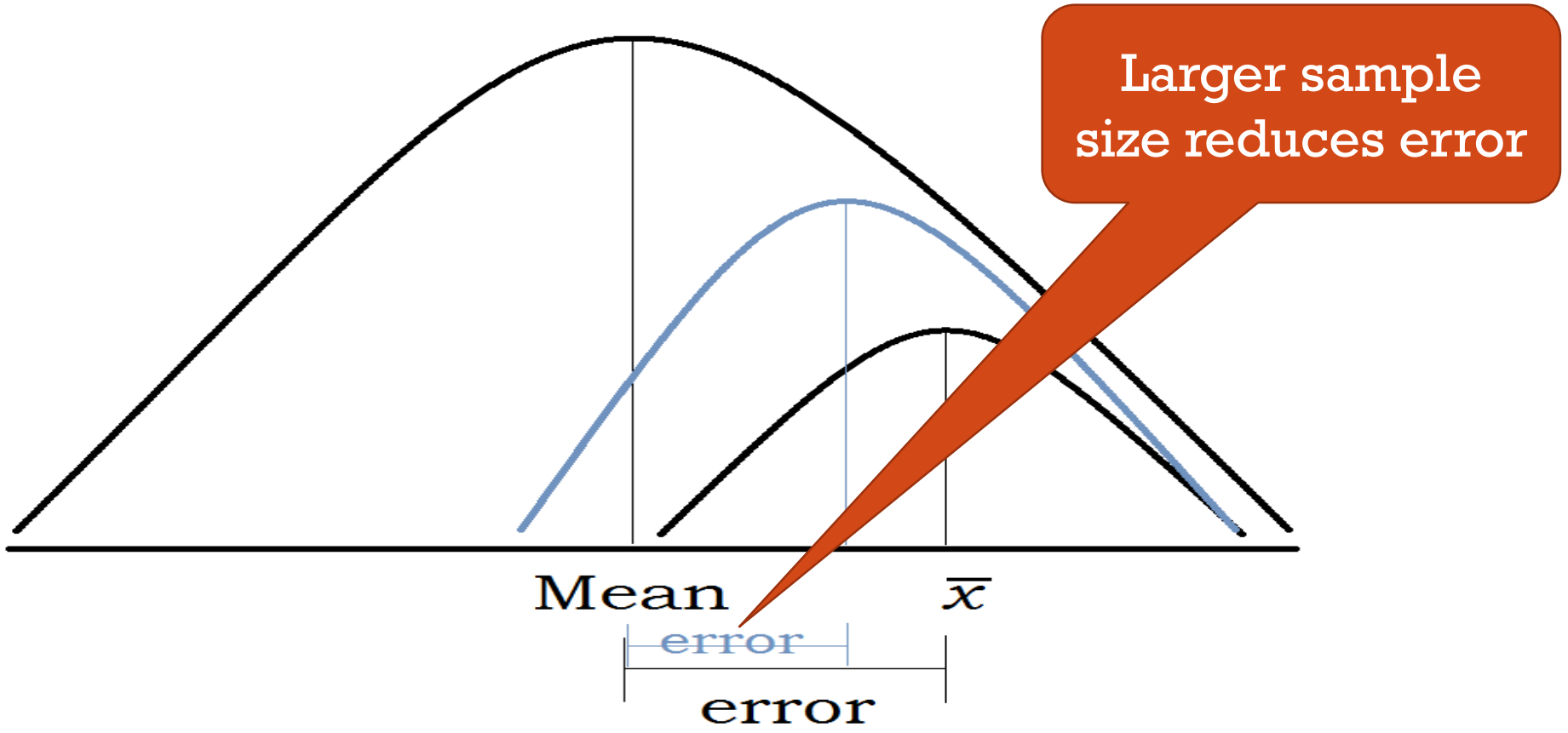
Why $n - 1$?



Why $n - 1$?

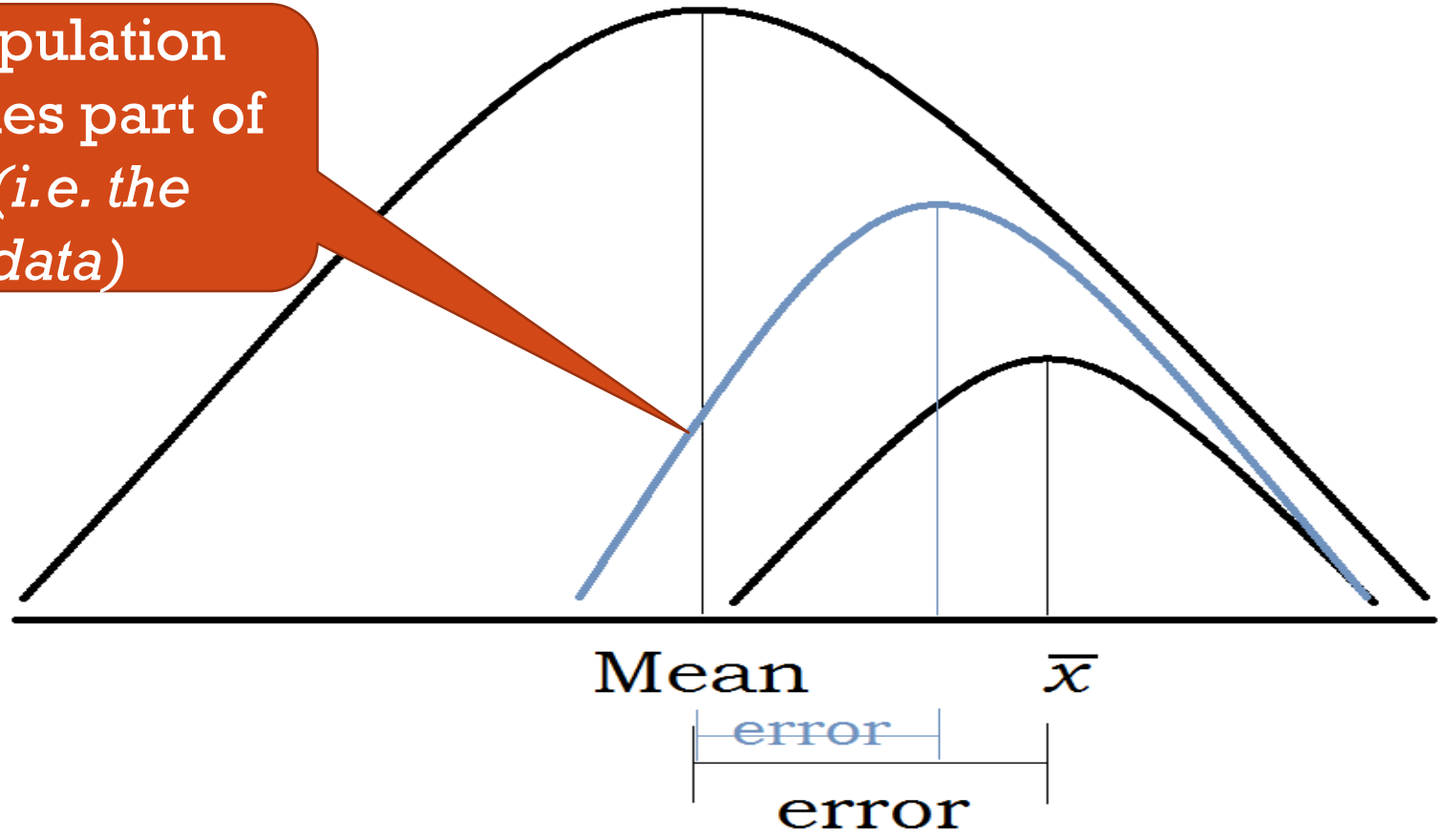


Why $n - 1$?



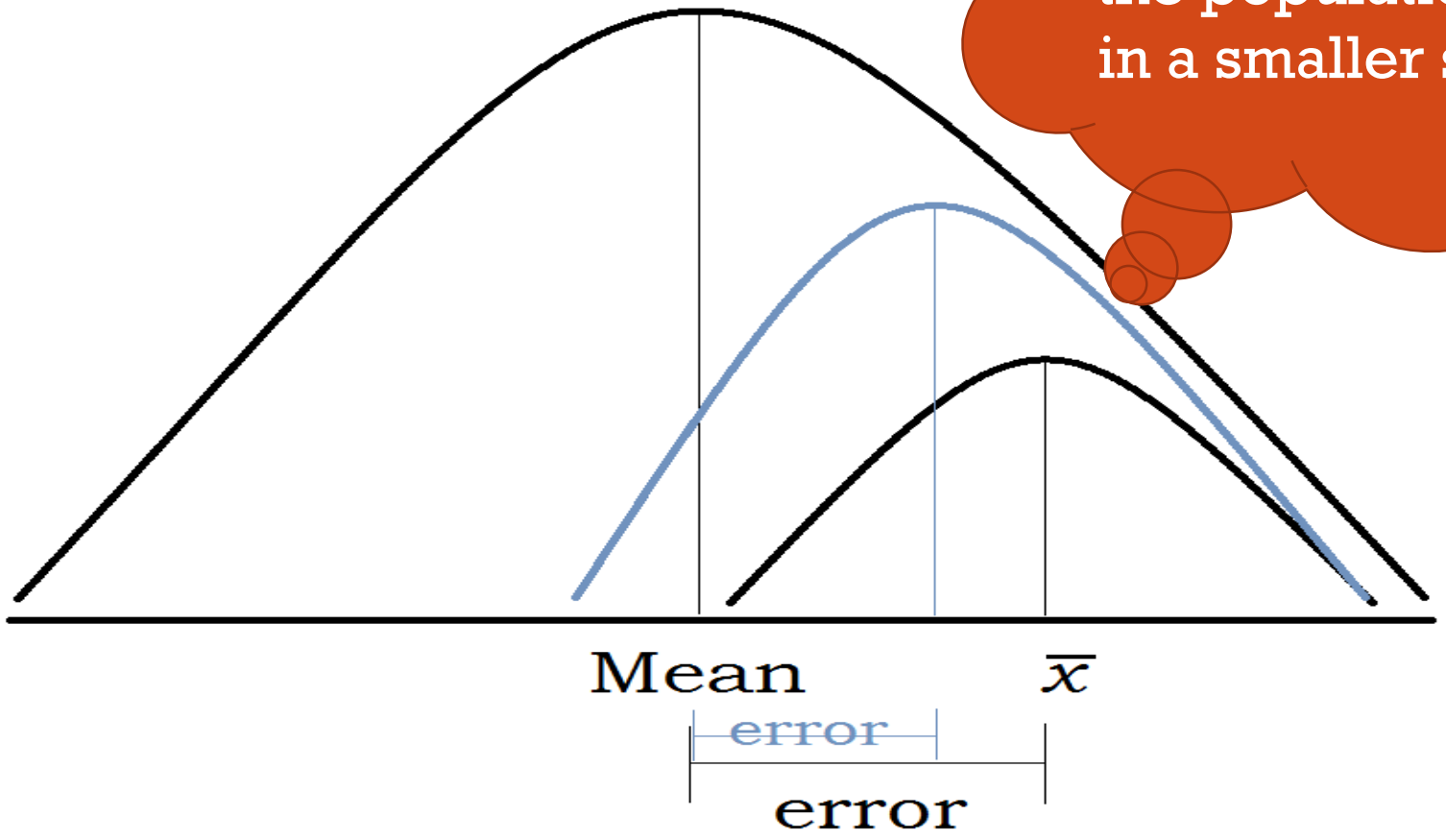
Why $n - 1$?

And, the population mean becomes part of the curve *(i.e. the sample data)*

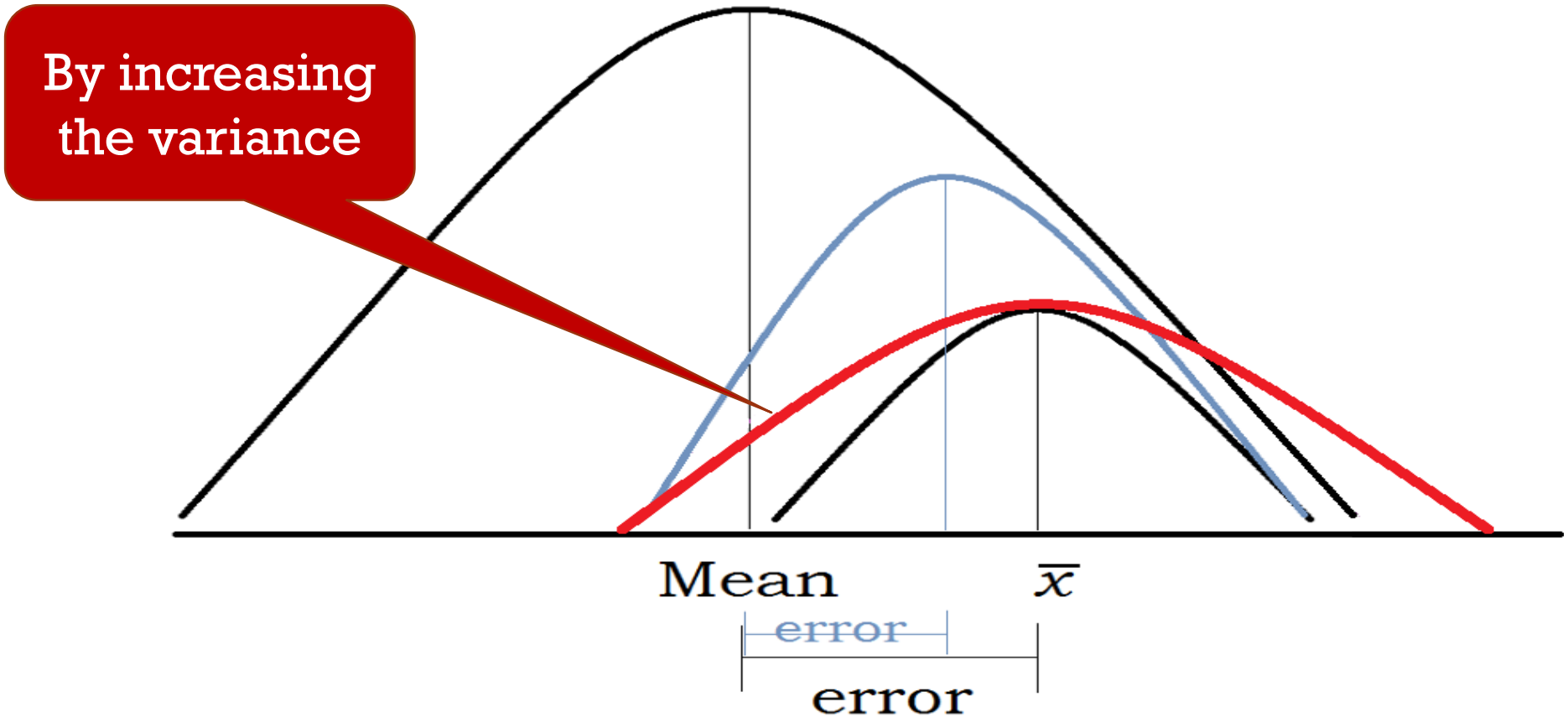


Why $n - 1$?

So how can we increase our chances of including the population mean in a smaller sample?



Why $n - 1$?



Why $n - 1$?

$$\sigma^2 = \frac{\sum (X - \bar{X})^2}{N}$$

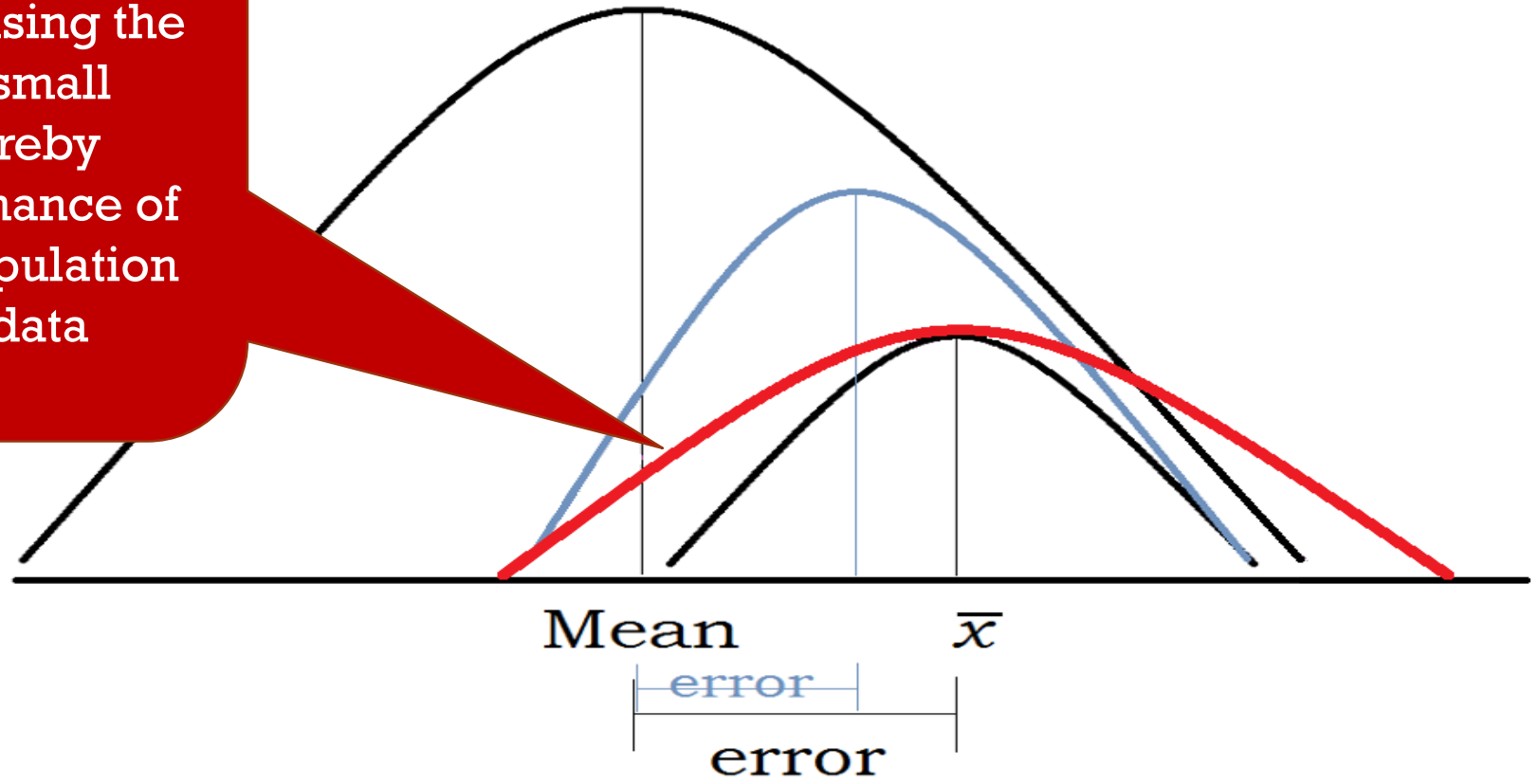
$$s^2 = \frac{\sum (X - \bar{X})^2}{N - 1}$$

Population & Sample Size	*240 / n*	*240 / (n – 1)*
4	60	80
6	40	48
8	30	34.2
10	24	21.8
20	12	12.6

Assume $\sum (X - \bar{X})^2 = 240$

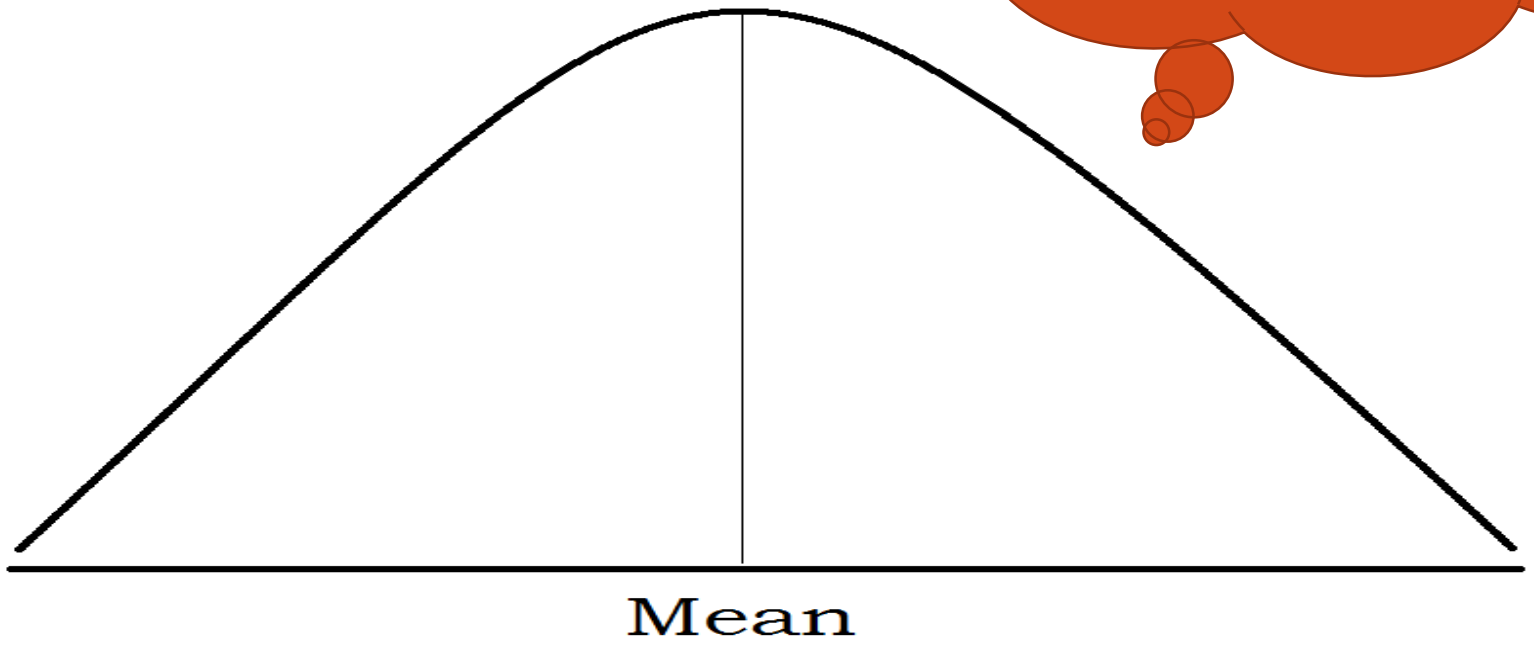
Why $n - 1$?

By using $n - 1$, we are effectively increasing the variance (for small samples), thereby increasing our chance of including the population mean in our data



Why $n - 1$?

So why not use $n - 1$ for all calculations?



Why $n - 1$?

Because there is no error *(due to sample size)* when analyzing entire population data