Introduction to Sampling Distributions

Key Question:
How to find Population Parameters?

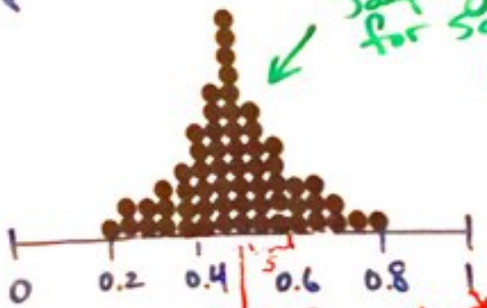
* Calculate Parameter from unbiased Census.

What if we cannot take a census? Need to study Random Samples!
(All we have is Sample data.)

Def: Point Estimate
Using a sample statistic as an estimate of the population parameter.
Creates Confusion!

Def: Sampling Distribution
Collecting many random samples from a population, calulate many sample statistics and put them on the same graph.

Exampl: Flip coins 30 times
Count # tails
Calculate Sample proportion $P = \frac{\text{amount tails}}{30}$
Repeat many times.
60 total samples
60 sample proportions



Population proportion tails $\pi = 0.5$

* Did all random Sample proportions come out the same? No!
* Were all random Sample proportions the same as the population parameter 0.5? No!
* Shape of Sampling Distribution? Normal
* Is center of sampling distribution close to the population parameter of 0.5? Yes!
* Spread of Sampling Distribution

Def: Standard Error: The Standard Deviation of the Sampling Distribution.
(How far typical statistics are from the population parameter.)

Def: Sampling Variability
Random Sample statistics will usually be different from each other and different from the population parameter.
"Random Chance"

Def: Margin of Error
How far off a sample statistic could be from the population parameter.

Margin of Error $\approx 2 \times$ Standard Error