Statistical Power

- Sampling Distributions
- Randomness
- Types of errors
- Meaning of Power
- Calculating Power
- Interpreting results

Central Limit Theorem

- Basic gist : no matter what the Population distribution looks like, if you take enough (*) samples of the mean, the distribution of your samples of the mean will have a Normal distribution
- Central Limit Theorem Exercise (Java)

  Choose a Skewed distribution to show

- This fact makes our life easy: Many statistics assume a normal distribution. The CLT provides us a normal distribution in most cases, even when the population data is skewed

Statistical Power Kid

- You send your kid to the toolshed to find a wrench. She comes back and says "it isn't there"
- Is the tool there? Or not?

- Results depend on...
- How long did she spend looking? **N (sample Size)**
- How big/easy to see is the tool? **r (Effect Size)**
- How messy is the tool shed? **SD (reliability)**

did your kid find the wrench?

	It was there	It wasn't There
"I found it!"	brings back the wrench	brings back a screwdriver
"didn't find it"	brings back nothing	brings back nothing

Types Of Errors

	Effect	No Effect
Significant	True Positive	False Positive (Type I)
Not Significant	False Negative (Type II)	True Negative

Power

- Type I rate : α (typically 5%, typically known)
- Type II rate: ß (historically not measured, often much more than 5%)

- α : is set by experimenter
- ß : depends on effect size, and N

- Power : 1 - ß : probability of *not* making a false-negative error

Interpreting Results

- Alpha : .05 = 5%

- Beta : unknown -- but for most of you, probably 30% to 60% in this experiment.

- Thus, it's very likely that some of you will be committing Type II errors.
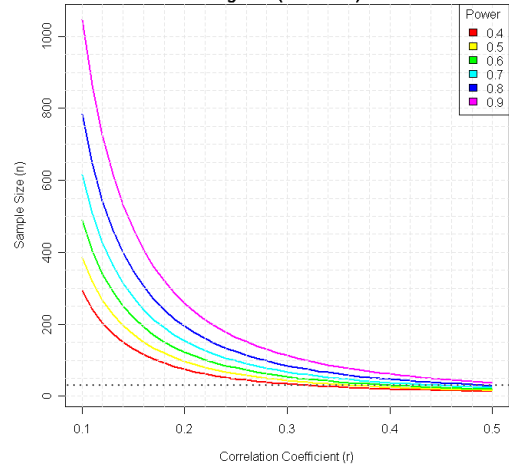
Sample Size Estimation for Correlation Studies

N=31