**Topic 5**

**Designing an Experiment**

Sometimes we want to see how an explanatory variable affects the response variable.

Most often we need at least two groups. The different groups will receive different levels of treatment. How do we create those groups to make the experiment effective or to optimize the results? (i.e. optimize the perceived strength of the relationship between the explanatory and response variables )

**Anecdotal evidence** – is not scientifically collected and is not used in experiments or in conclusions.

**Experiment –** study which actively imposes a treatment on subjects.

**Treatment** is an *induced* change in the explanatory variable.

In an experiment, we want to keep the two groups identical.

**Random Assignment** – method in which each O.U. has an equal chance of being assigned to any treatment group.

**Randomized Comparative Experiment** – experiment using random assignment

Random assignment achieves goal of creating similar treatment groups. This method isolates the effect of the explanatory variable on the response variable, thus reducing confounding or as much as possible.

Random assignment also randomly assigns values associated with lurking variables, so their effect is also reduced as much as possible.

Recall that control is another way of reducing the effects of confounding variables.

Recall that expert advice or peer review is a way of reducing the effects of lurking variables.

Statistically significant – when the response variable difference due to a treatment is so large that it would only rarely occur by random assignment alone.

Even though two groups are randomized, what other effects can occur?

**Placebo** - simulated or otherwise medically ineffectual treatment, e.g. a sugar pill

**Placebo Effect** – subject response due to being given a treatment

Note that in the following definitions, no treatment is a treatment. In other words, a subject may receive a sugar pill rather than a pill that contains medicine. This is still a treatment. It is a treatment with the amount of medication = 0.

**Blind**  - subject is unaware of which treatment they are receiving

**Double Blind –** Both subject and administrator are unaware which treatment a subject is receiving