**Two-Way Analysis of Variance**

**Introduction**

The two-way ANOVA is an extension of the one-way ANOVA. The "two-way" comes because each item is classified in two ways, as opposed to one way.

For example, one way classifications might be: gender, political party, religion, or race. Two way classifications might be by gender and political party, gender and race, or religion and race.

Each classification variable is a called a factor and so there are two factors, each having several levels within that factor. The factors are called the "row factor" and the "column factor" because the data is usually arranged into table format. Each combination of a row level and a column level is called a treatment.

The two-way ANOVA that we're going to discuss requires a balanced design. The balanced design is where each treatment has the same sample size.

The two-way analysis of variance is an extension to the one-way analysis of variance. There are two independent variables (hence the name two-way).

### Assumptions

* The populations from which the samples were obtained must be normally or approximately normally distributed.
* The samples must be independent.
* The variances of the populations must be equal.
* The groups must have the same sample size.