Technical Paper 26

Two-way Analysis of Variance (ANOVA)

A. Test for comparing more than two sample means.
B. Two-way ANOVA is applicable to interval and ratio scale data.
C. Assumptions
    1. Random sampling (very important)
    2. Normally distributed populations
    3. Equal variances within treatments
    4. Equal sample sizes improves power and robustness

$$SS_{Total} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{l=1}^{n}(x_{ijl} - \bar{x})^2$$

$$SS_{Among-cells} = \sum_{i=1}^{a}\sum_{j=1}^{b} n(\bar{x}_{ij} - \bar{x})^2$$

$$SS_{Within-cells} = \sum_{i=1}^{a}\sum_{j=1}^{b}\left[\sum_{l=1}^{n}(\bar{x}_{ijl} - \bar{x}_{ij})^2\right]$$

$$SS_{Factor-A} = bn\sum_{i=1}^{a}(\bar{x}_i - \bar{x})^2$$

$$SS_{Factor-B} = an\sum_{j=1}^{b}(\bar{x}_j - \bar{x})^2$$

$$SS_{Interaction} = SS_{Among} - SS_{Factor-A} - SS_{Factor-B}$$