

Comparing $I > 2$ Groups - Numeric Responses

- Extension of Methods used to Compare 2 Groups
- Independent and Dependent Samples
- Normal and non-normal data structures

Data Design	Normal	Non-normal
Independent Samples (CRD)	F-Test 1-Way ANOVA	Kruskal-Wallis Test
Dependent Samples (RBD)	F-Test 2-Way ANOVA	Friedman's Test

Independent Samples - Completely Randomized Design (CRD)

- Controlled Experiments - Subjects assigned at random to one of the I treatments to be compared
- Observational Studies - Subjects are sampled from I existing groups
- Statistical model x_{ij} is a subject from group i :

$$x_{ij} = \mu_i + \varepsilon_{ij}$$

where μ_i is the population mean of group/treatment i , ε_{ij} is a random error

1-Way ANOVA for Normal Data (CRD)

- For each group obtain the mean, standard deviation, and sample size:

$$\bar{x}_i = \frac{\sum_j x_{ij}}{n_i} \quad s_i = \sqrt{\frac{\sum_j (x_{ij} - \bar{x}_i)^2}{n_i - 1}}$$

- Obtain the overall mean and sample size

$$N = n_1 + \dots + n_I \quad \bar{x} = \frac{n_1 \bar{x}_1 + \dots + n_I \bar{x}_I}{N} = \frac{\sum_i \sum_j x_{ij}}{N}$$