

Multiple Comparisons Using Dunnett's Test

José Maurício Schneedorf Ferreira da Silva

2026-02-10

Dunnett's test is designed to compare multiple treatments against a control in order to detect significant differences. As with other *post-hoc* tests, Dunnett's test is considered conservative and requires a prior ANOVA to be conducted. The test relies on a *specific t-table* that depends on the number of treatments.

1 Equation:

$$dms = d\sqrt{\frac{2qmr}{r}}$$

Where:

- dms = minimum significant difference;
- qmr = mean square of residuals;
- d = tabulated critical value (5% significance level).

2 Files

1. Program
2. Critical d-table at 5% significance (HP50)
3. Critical d-table (PDF)
4. ANOVA program
5. Source code;
6. This tutorial

3 Usage

```
# Input:
1. Enter a matrix containing the dataset;
   Note: the control group must be placed in the 1st column of the matrix;
2. Run ANOVA by the program "1ANAVA1matrix";
3. Run the program "Dunnet1matrix".

# Output:
1. Statistical quantities: sqtr, sqt, qmtr, qmr;
2. F-value;
3. p-value;
4.  $R^2$ , coefficient of determination;
5. Results of comparisons between each treatment and the control group
   (positive values indicate significant differences);
6. dcrit5%: calculated value from the distribution;
7. dms: minimum significant difference;
8. "HSD": minimum significant difference value;
9. Matrix containing comparison values for each pair of groups.
```

The *dms* result is identical to that reported in the reference source (Vieira, 2000).

4 References:

1. Vieira, Sônia. *Analysis of Variance: ANOVA*. Atlas Publishing, 2000.

Author

José Maurício Schneedorf Ferreira da Silva
Dept. Biochemistry, Institute of Biomedical Sciences
Federal University of Alfenas - UNIFAL-MG, Brazil
Email: jose.dasilva@unifal-mg.edu.br Site: <https://bioquanti.netlify.app>
Lattes: <http://lattes.cnpq.br/0436922594542722>
ORCID: 0000-0002-2031-6315



Figure 1: *Dunnett1matrix* program running on the Android version of the HP50G calculator (Go49gp), showing data input, ANOVA, and test results.