

Homework 9: General Manova

In this assignment, you will analyze a multivariate one-way between-subjects design. The study tried to determine whether talking or touching by humans has any impact on a plant's growth, coloring, and durability (you already saw a little bit of these data in lecture). Thirty plants were examined in three Conditions (no-intervention control, talking, touching). On various rating scales, independent judges (blind to the intervention) then rated each plant for growth, color saturation, and pliancy (which was assessed by a squeeze and bend test).

The Canvas folder contains both the raw data file (with variable names in the first line) and the SPSS data file.

1. Comment on the dependent variables' distributional properties (e.g., with EXAMINE) and their intercorrelations. What can we learn from these correlations about whether Manova is appropriate or not?
2. After consulting the lecture handout and the SPSS MANOVA guide in the Canvas Readings folder (especially pp. 105-119 of this SPSS guide), devise syntax commands for the following features:
 - (a) an appropriate contrast for the Condition factor (justify your choice)
 - (b) displaying the observed means
 - (c) displaying the **H** and **E** matrices
 - (d) separate tests for each contrast, with effect sizes
 - (e) the standardized discriminant function coefficients and loadings.

Make sure you explain which command yields which feature.

If you use a different software environment, you have to select the appropriate commands that achieve the same goals (a) through (e) and briefly explain the commands.

3. Run MANOVA and examine the cell means to get a sense of the patterns of data. Describe in plain English what you see in these patterns. Provide a graph.
4. Inspect the **H** and **E** matrices. Can we expect Manova to be helpful for this data set?
5. Examine the omnibus main effect for Condition. Describe the elements that make up the table called "Multivariate Tests of Significance" and identify what should be reported. What have we learned from the omnibus test?

6. Turn to the two multivariate contrasts (labeled “1st parameter,” “2nd parameter”).
 - (a) What is each contrast’s effect size? How does this effect size get computed?
 - (b) Looking at discriminant function coefficients and loadings (“correlations”), which variables contribute most to each contrast?
 - (c) Interpret what the results tell us about the impact of each of our interventions on the various dependent measures.
7. The raw or standardized discriminant function coefficients allow you to compute the two discriminant functions (scores that each plant has on these two “variates,” DF1 and DF2).
 - (a) Calculate these scores and also compute the mean DF1 and DF2 score for each intervention group.
 - (b) Use DF1 and DF2 as axes of a 2-dimensional graph and plot (using a graphing program of your choice) the means of each intervention group within the area defined by these two dimensions. Make sure the graph is easily readable (like a well-made figure in a journal article). What do we see now clearly?
8. As usual, summarize your results in journal format. Explain why MANOVA is more appropriate here than univariate ANOVA; explain your choice of contrasts; and describe the findings in your own words, along with the appropriate statistics (such as Pillai’s V or Wilks’ Λ , F tests, r^2 ...).

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