Multivariate Statistical Techniques
CLPS2908, Spring 2019
Prof. Bertram Malle

Homework 11:

Multi-factorial Mixed Manova

In this assignment you will analyze a mixed between-within design studying the effects of caffeine on psychological alertness. The data file and partial syntax are in the canvas folder.

In the first run you consider two factors. One control group (no dose) and two experimental groups (single dose, double dose) make up a 3-level between-subjects factor, DOSE. Subjects' alertness was measured at three time points, within minutes after intake (1), after one hour (2), and after two hours (3), creating the 3-level TIME within-subject factor. Alertness was measured on a scale of 0 to 50 (integrating a battery of tests for reaction time, concentration, and wakefulness), where a higher number means more alertness.

1. Inspecting the first MANOVA commands in the syntax file, (a) comment on what each of the command lines does and (b) choose contrasts and justify your choice. First run the analysis without the RENAME command, then use the transformation matrix to (c) select appropriate labels for your transformed variables and include them in the RENAME command.

2. (a) Inspect the means from the first MANOVA run and draw a graph (which you include in your homework file). You can do this either by hand or in a program such as EXCEL. (b) Looking at the means and the graph, what patterns do you detect in the data? What main effects, interactions, or simple effects would you expect to be substantial?

3. (a) Briefly report the omnibus results for the entire design and comment on the limitations of interpreting these results. (b) More specifically, what does the DOSE main effect signify? Is it a meaningful effect in this data set?

4. (a) Now interpret the DOSE × TIME multivariate test with its two discriminant functions and the TIME multivariate test. (The latter test has only one function. Why?) (b) Briefly explain what the averaged-F table contains and how it differs from the multivariate tables earlier in the output, but don't report on it in detail.

5. (a) Now run the second MANOVA analysis, a 2 (INFORM) × 3 (DOSE) × 3 (TIME) between-within mixed multivariate design. Thus, we add a second between-subjects factor, called INFORM: Half of the people were informed about the dose of caffeine they received, the other half was uninformed. (b) As before, first inspect the means and draw graphs. Because we now have three factors, you may want to use multiple graphs or graphs that plot difference scores to display the various interaction patterns in a comprehensible way. (c) Use the appropriate contrasts and discriminant functions to interpret the exact nature of the effects. Things get complicated here, so keep careful track of which effects are worth interpreting, what contrasts constitute them, how to best graph them, and how to interpret them (e.g., by way of their discriminant function coefficients and loadings).

6. Write your one-page summary of analyses and results.