The following handout provides information on the analysis of repeated measures designs using SPSS for Windows. Repeated Measures or Within-Subjects factors involve a design arrangement in which the same subjects or respondents encounter all levels of a factor. Some common examples of a within-subjects factor are a longitudinal design where the same subjects are measured repeatedly, a pretest-posttest design where subjects are measured before and after a treatment, and designs where subjects are tested on all treatments. Repeated measures designs can provide more statistical power than between-subjects designs and control over certain confounding influences associated with the individual subjects. On the other hand, repeated measures designs have a number of possible research design problems (e.g., attrition, carry over effects), an additional statistical model assumption (sphericity), and some additional complexity due to the increased partitioning of variance in the design.

One-Factor Repeated Measures Designs. In analyzing within-subjects factors using SPSS, it is important to note that the organization of variables in the data editor seems different than in the between subjects design. With between subjects designs, the dependent measure is a single variable or column in the data editor and additional variables/columns provide the coded categories or groups for each between-subjects factor. But within-subjects factors represent different measurements on the same subjects so the score arising from each level of the within-subjects factor appears as a different variable or column in the data editor. For example, the screen below shows a one-factor, repeated measures design in which 10 subjects have been measured three times at weekly intervals. The within-subject factor is time. Note that time does not appear explicitly as a variable in the data editor. It will be defined as the analysis is specified.
To test whether there is a significant difference in the three levels or weeks of the time variable for the 10 subjects, choose “analyze” on the tool bar, then General Linear Model, then Repeated Measures. This produces the dialog box at left. In the first window in this dialog box, SPSS automatically assigns a name for the within-subjects factor (“factor1”). This can be changed by the user (I’ll change it to “time” in this example). In the next box, you must supply the number of levels or groups for the factor. In this example, with three weeks of measurement, levels is 3 (see second dialog box at left). When you have finished specifying the name and levels, click the “Add” button. The “Change” or “Remove” buttons can be used to alter specifications.

When specification of the repeated measures factor is completed, click on the “Define” button. This produces the dialog box below. This screen is used to define the details of the design and also provides access to buttons that allow the rest of the analysis and output options to be specified. First, the variables in the data editor (listed in the window at left) that correspond to levels of the within-subjects factor must be specified. Note the “?” in the window at right. A variable from the data editor is specified by highlighting it at left and then clicking the arrow button to move it to the window at right. In our example, week1, week2, and week3 correspond to the three levels of the factor, so they are simply moved over.
Additional details of the analysis can be specified by clicking on the “Contrasts” button to get certain contrast procedures including polynomial contrasts, the “Plots” button to get graphs of means, and the “Options” button to get additional output as shown in the dialog box below.

In the example at left, means have been requested for the “time” factor as well as descriptive statistics, estimates of effect size, and power. When you have chosen to display means for a main effect, you can click on the “Compare main effects” box just at left. This also allows you to choose a post hoc comparison procedure for the repeated measures factors. Choices for alpha adjustment include the LSD approach (no adjustment), Bonferroni’s procedure, or Sidak’s procedure. Click on the “Continue” button, then the “OK” button on the
Two-factor Repeated Measures Designs. Analyzing a two-factor within-subjects design is quite similar to the procedures described above for a one-factor design. Imagine that the first five lines or rows in the previous data file were the scores of five subjects in a control group condition and the second five lines or rows were the same five subject’s scores obtained during administration of a treatment. Each condition (treatment or control) lasts for three weeks. Since all subjects are measured each of the three weeks and each subject is measured in both a treatment and a control condition, we have a (2 X 3) fully repeated measures design. Note that the data structure required by SPSS is that six variables must be specified for each of the five subjects, one variable corresponding to each cell in the two factor design (see data editor below).

Analysis proceeds as in the one factor design by choosing “Analyze-GLM-Repeated Measures” from the toolbar. Then the two repeated measures factors must be specified. It is important to be careful in assigning the different variables in the data editor to the correct factor designations in the two factor design (see completed screen below).
Additional details of the design and requests for particular output are accomplished by clicking on the other buttons at bottom of the screen at left, exactly as in the one factor repeated measures design. Contrasts and post hoc procedures on the interaction effect can not be accomplished through this design in SPSS, however, and must be computed by hand or using the same general procedures described in the handout on interactions.

In the output that results either from the one-factor or two-factor procedures, you should ignore the output labeled “Multivariate Tests”. The output labeled “Mauchly Test of Sphericity” tests the additional statistical model assumption of repeated measures factors whenever there are three or more levels of the factor. If the Mauchly test is significant, the assumption has been failed and you should use the adjusted F-tests presented on the lines labeled Greenhouse-Geisser or Huynh-Feldt to evaluate significance.

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