ANOVA in SPSS

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1. Start SPSS and enter your data or open your data file.
   - Make any necessary adjustments in the Variable View. Pay particular attention to the Measurement levels of your variables. After all, if the data aren’t scale, we shouldn’t be using them in an ANOVA test.
   - You MUST stack your data. This means all your measurements have to be in the same column. (If your data are already stacked, then skip to Step 2.) To stack your data,
     - Create two new variables in the Variable view. One will hold the stacked data, the other will indicate the group to which each measurement belongs. Name them appropriately.
     - Make any necessary adjustments to the variable for your stacked data (e.g., the number of decimal places, etc.). In particular, make sure the Measurement level is Scale.
     - Also make adjustments to the grouping variable. YOU MUST USE NUMBERS FOR THE NAMES OF YOUR GROUPS. For unfathomable programming reasons, SPSS can’t use words for group names in ANOVA. WARNING: THE MEASUREMENT LEVEL OF YOUR GROUPING VARIABLE IS Nominal, EVEN THOUGH ITS VALUES ARE NUMBERS! Please make this adjustment in the Variable View.
     - Go to the Data View. Copy-and-paste the data for the first group into the column for the stacked data. Then type the number of the first group in the grouping variable’s column, next to each of the first group’s measurements.
     - Copy-and-paste the next group’s data into the stacked data column. Do not replace any of the first group’s data, and do not leave any blank cells between the first group’s data and the second group’s data.
     - Then type the name of the second group in the grouping variable’s column, next to each of the second group’s measurements.
     - Repeat until all the data are stacked in the stacked data column, making sure that the correct group name is next to each measurement, in the grouping variable column.
   - Your data are now stacked. Note that your grouping variable represents the factor in your experiment or study.

2. In the Analyze menu, click Compare Means. A submenu will appear.

3. In the submenu, click One-way ANOVA... The One-way ANOVA dialog will appear.

4. Put in the Test Variables) box the name of the column that contains your stacked measurements. Put in the Factor box the name of the column that tells which group each measurement is in.

5. Click Options. The One-way ANOVA: Options dialog will appear.

6. You will see a check box for Descriptives. If you want simple descriptive statistics, nicely laid out, click this box to put a check mark in it.

7. Farther down, you’ll see a check box for Means plot. To get a means plot, click this box to put a check mark in it.
8. Click **Continue**. SPSS will return you to the **One-way ANOVA** dialog.

9. Click **OK**. The SPSS output will appear in the the **PASW Statistics Viewer** output window, as follows:

   - **First,** there is a **Descriptives** table, if you asked for it. It has in it a row for each of your samples (groups). And the bottom row (**Total**) is for all the data in all the samples, pooled together in one big, happy sample. The **Descriptives** table tells you:
     - The name of the group. (**Total** is for all the data put together.)
     - An \( N \) for each group, and the total \( N \) for the entire data set. **Always check these numbers, to ensure all your data were used.**
     - **Mean**, which contains the sample means for the groups, and for the entire data set.
     - **Std. Deviation**, which gives the standard deviations for the groups, and for the entire data set.
     - **Std. Error**, which is just \( s_x/\sqrt{n} \), for each group, and for the entire data set. (We’re not using this at the present time.)
     - **Lower** and **Upper Bounds** for 95% confidence intervals for the population means involved.
     - The **Minimum** and **Maximum** measurements in each group, and in the entire data set.

   - **Next** is the **ANOVA** table. It has three rows in it. One is labeled **Between groups**, which is the same as “between samples” or “between sample means.” The next is **Within Groups**, which is the same as “within samples”. The third row is **Total**, representing the data set as a whole. The table gives you:
     - The name of the source of variation (between groups, within groups, total).
     - The **Sum of Squares** for between groups, within groups, and total.
     - **df**, the number of degrees of freedom, between the groups, within the groups, and total.
     - The **Mean Square** for between the groups and within the groups. (The mean square is just (sum of squares) \( \div \) (degrees of freedom)).
     - The test statistic \( F \) for the ANOVA test. **This is the test statistic we need.** (\( F \) is calculated as (mean square between groups) \( \div \) (mean square within groups).)
     - **Sig.**, which is the \( P \)-value of the ANOVA test. No need to double or divide by 2, or to count tails, even.

   - **Finally**, the **Means Plot** appears, if you asked for one. It’s just a picture of the means for each group. The means are connected by lines, to make the plot easier to read.

As always, if you have questions, please ask them!