

# SPSS Lab 11

## ANOVA (Analysis of Variance)

### *Demo and Lab Assignment 1*

Here is a study that is not of biomedical nature per se, but we will try to give it a medical twist: A study seeks to determine how different degrees of alcohol consumption affect the “short-term visual judgement” of people.

- One Way ANOVA

Open file goggles.sav. It contains three fields, gender, alcohol and attract. For the one-way ANOVA we will ignore the gender variable. The field alcohol identifies three groups.

  - a. Look at Variable View and in the alcohol variable row, click on Values. What are the values? What kind of alcoholic beverage do you think the values are referring to?
  - b. In order to run the One-way ANOVA we go to Analyze\Compare Means\One-Way ANOVA. We add [attract] to the Dependant list and [alcohol] to the factor.
  - c. The ANOVA F test lets us know that at least two groups have different underlying means, but it does not tell us which ones. To find out which groups have different means use a Post Hoc ANOVA test for comparison of pairs after running the F test. In “Post Hoc...” we click on *Bonferroni, LSD and Tuckey*.
  - d. In “Options”, click on *Descriptive and Homogeneity of variance test*. The ANOVA test assumes equal variances, therefore we want to test if the assumption is valid. If you have large sample sizes and they are of equal size, ANOVA is less vulnerable to be affected by violations of its assumptions. Click OK.
  - e. Now before we analyze the ANOVA results, let’s look at a chart of the results. Let’s go to Graphs\Legacy Dialogs\Line. Click on Simple and define. In the frame labeled “Line Represents” click “other statistic” and add [attract]. In Category Axis add [alcohol]. What we are doing is creating line chart that describes the effect of alcohol for varying degree of alcohol consumption. Let’s also add error bars by going to “Options” and checking “Display error bars.” Error bars show you the confidence intervals or the standard error or standard deviations from the mean. Select 95% confidence intervals. Click Continue click Ok.
  - f. Can you describe the graph. No? You need more information in order to describe the graph! You need to know how the study was carried out and what the values mean. An anthropologist was interested in the effects of alcohol on mate selection at night clubs. Her rationale was that after alcohol consumption, subjective perceptions of physical attractiveness would become more inaccurate (the well-known beer-goggles effect). She was also interested in whether this effect was different for men and women (we will look at that in 2-way (factorial) ANOVA). She picked 48 students: 24 male and 24 female. She then took groups of 8 participants to a night club and gave them no alcohol (placebo drinks), 2 pints of strong Lager, or 4 pints of strong Lager. At the end of the evening she took photographs of the person that the participant was chatting up. She then got a pool of independent judges to assess the attractiveness of the person in each photograph (out of 100). The results are in the

- data in file goggles.sav that you are studying today. So, what do you think now?  
Describe the graph!
- g. Now you can go back and describe the ANOVA results. We talked about ANOVA and Post HOC tests in class. If you are not in BIL 311, then you may want to google for ANOVA and ANOVA Post Hoc tests. State the hypothesis of each test, only then describe the results.

## ***Lab Assignment 2***

- Two-Way ANOVA

Aren't we curious to know how the results of the study differ for females and males?

- We need to run a factorial ANOVA and in this case a 2-way ANOVA to answer that question.
- State the hypothesis
- Go to Analyze\General Linear Model\Univariate. ANOVA assumes equal variances therefore we use the "Univariate" option. Select the Dependant variable and the Fixed Factors. You should know which ones!
  - In the Post Hoc option, chose gender and alcohol for the Post Hoc Tests and choose the same tests as before.
  - In Plots, choose alcohol for the horizontal axis and gender for the separate lines, then click on Add. Then on Continue.
  - In Options move all 3 Factors and Factor interactions to the box that is labeled "Display Means for" and click on Descriptives, estimates of effect size and homegenity tests. Click Continue.
  - Click OK.
- If you are curious about the results, you may want to take a look at the line chart. Describe your observation.
- Now look at the 2-way ANOVA results. The Table labeled "Test of Between-Subjects" is one of the most informative. It tells you how significant the alcohol effect is or the gender effect by itself and how significant the interaction between alcohol and gender is (gender\*alcohol row). The "Partial Eta Squared" column describes the "Effect Size" of the interaction. If the value is large the effect size is large. An effect size of more then 0.3 is a medium effect size and of 0.45 or more is a medium to large effect size.
- Do as in 1 c again but this time do not click OK, click Paste instead. You will see the SPSS script that SPSS uses to obtain the results. We will modify it to obtain post hoc comparison test within the group gender and within the group alcohol. Find the line that starts with /POSTHOC. We will add two lines *after* that particular line:  

```
/EMMEANS = TABLES(gender*alcohol) COMPARE (gender) ADJ(BONFERRONI)
/EMMEANS = TABLES(gender*alcohol) COMPARE (alcohol) ADJ(BONFERRONI)
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 Then hit run. Which tables are new and what do the results mean?