SPSS: TWO-WAY ANOVA

BETWEEN-SUBJECTS

TWO-WAY ANOVA

- Between-subjects design = between-subjects ANOVA
- Compares the mean differences between groups that have been split on **two independent variables**
  - *Two IV's, each with **two or more** levels*

THINGS TO REMEMBER

- Two-way ANOVA is used when you have **two IV's**, and each IV will contain two or more levels.
- Parametric test – relies on a number of assumptions relating to data
- A two-way ANOVA tests whether there is an **interaction** between the two IV's on the DV, as well as the **main effect** of each IV in isolation.
  - A significant interaction ($p < .05$) informs us whether the effect of one of our IVs on the DV is the same for all levels of your other IV – and vice versa
  - Significant interaction = simple main effects!!

ASSUMPTIONS AND REQUIREMENTS FOR DATA

1. The DV should be measured on a continuous scale – interval or ratio
2. The two IV's should each have two or more categorical, independent levels
3. Independence of observations:
   a) Each measurement should be a distinct and independent entity
4. No significant outliers!
5. Normality: approximately normal distribution for each combination of the groups of the two IV's
6. Homogeneity of variance for each combination of the groups
   a) Assumption that the variability of DV scores for each group is similar
   b) LEVENE'S TEST! ($p > .05$)

STUDY EXAMPLE

- Exploring the effects of gender and subject of study on end of degree grades
-
- NOTE: we need…
  - Two between-subjects **categorical** IV's:
    1. Gender (Male OR female)
    2. Subject of study (Psychology OR Art OR Education)
  - One **continuous** DV: end of year 3 grades

RESULTS

F (df1, df2) = F-value, p < / > .05

Remember that you will have THREE of these!
One for the interaction effect, and two for each of the main effects.

Interaction: F (2, 15) = 2.26, p > .05 (= .14)

M.E of Gender: F (1, 15) = .04, p > .05 (= .85)

M.E of subject: F (2, 15) = 4.75, p < .05 (= .03)

INTERPRETING RESULTS

- A two-way between-subjects ANOVA was conducted to assess the effect of gender (male/female) and subject studied (Psychology/Art/Education) on end of university degree grades. Results indicate that there was no interaction effect between gender and subject; $F\ (2, 15) = 2.26$, $p > .05$. The main effect of gender did not reach statistical significance [$F\ (1, 15) = .04$, $p > .05$], however there was a significant main effect of the subject studied by students [$F\ (2, 15) = 4.75$, $p < .001$].

RESULTS

M.E of subject: $F\ (2, 15) = 4.75, p = .03$

Because this is significant, we need to assess multiple comparisons!

MULTIPLE COMPARISONS

If the main effect of your IV is significant, the information in the multiple comparisons table will allow us to determine where the significant difference lies across the three groups. If needed, you should report these with the associated mean scores (where necessary) and Sig. values.

INTERPRETING RESULTS

- A two-way between-subjects ANOVA was conducted to assess the effect of gender (male/female) and subject studied (Psychology/Art/Education) on end of university degree grades. Results indicate that there was no interaction effect between gender and subject; F (2, 15) = 2.26, $p > .05$. The main effect of gender did not reach statistical significance [F (1, 15) = .04, $p > .05$], however there was a significant main effect of the subject studied by students [F (2, 15) = 4.75, $p < .001$]. **Multiple comparisons across the three levels show that, overall, psychology students scored significant higher at the end of their third year (M = 68.57) than students studying education (M = 56.00; p = .02). No significant difference was observed between psychology and art students (*p* = .27) or between art and education students (*p* = .33).**