Factorial ANOVA

1. What are factorial designs?
   1. When you use at least TWO independent variables in an experiment.
   2. Complete designs – you will have two (or more) variables crossed – so all combinations are represented by groups (or measurements).
      1. You can have incomplete designs, but they are analyzed differently that what is discussed here.
   3. Terminology
      1. Factor – the individual IVs – the overall label for the independent variable
      2. Levels – the groups of the IV – so the different manipulations for the independent variable
      3. Conditions – the crossing of levels – the combination of different levels.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Due Date | |
| Weather |  | Now | Later |
| Hot | Hot, Now | Hot, Later |
| Cold | Cold, Now | Cold, Later |

1. Things you can analyzed with a factorial study:
   1. Single factors – tends to be called simple effects
      1. These effects are usually ONLY discussed if you find an interaction effect.
      2. Analyzing DOWN or ACROSS
   2. Interaction effects
      1. Definition (page 201 – weirdly there’s a verb missing here) – occurs when the effect of one IV on behavior change is different for different levels of the second IV
      2. When the cell means vary on BOTH IVs – you will normally see this as a different pattern of results for each Level of each IV
         1. Show example
         2. Examine conditions
      3. If you get an interaction, this result will be followed up by a post hoc test
         1. Unfortunately, there is no button for this ☹ but that’s why we talked so long about how to calculate Tukey/Scheffe/etc.
   3. Main effects
      1. Number of IVs = number of main effects
      2. Here we would get one for Weather condition, and one for Due Date
         1. Give example average across and down.
         2. Examine averages across conditions
      3. **You usuallyreport main effects but if the interaction is significant, you will not follow up with post hoc tests**
2. Interactions
   1. See page 200 and 201 for pictures – draw these
   2. Pictures (see also page 205)
      1. If NOTHING – lines will be stacked on top of each other or flat
      2. If MAIN EFFECTS ONLY – lines will be parallel but not flat/stacked
      3. If INTERACTION ONLY – lines will be perfectly crossed
      4. If ALL – lines will cross, but not at the same rates
   3. Please note that line graphs are often inappropriate for ANOVA presentation – remember if it is not mildly continuous (3, 5, 7 lines is kind of continuous, but gender is not), then do bar graphs.
3. An example of an interaction
   1. Talk about qwerty here

*Note – make sure you can read a chart for main effects and interactions. If you study page 205, you will be able to label pictures on the exam. Understanding graphs will improve your ability to read research articles – without having to read the results section you can tell what their results were in the study.*

1. The Dependent variable
   1. We’ve mostly be ignoring the DV because we’ve been discussing the manipulations of the IV as important.
   2. However DV selection is important for understanding interactions.
   3. The DV should be an interval scale – scores have the same space between values, so that differences (i.e. a 10 point change) means the same thing no matter what numbers they are (i.e. 20-30 = 60-70).
   4. (ignore section on removable and nonremovable interactions).