



Cramming Sam's Tips for Chapter 16: Multivariate analysis of variance (MANOVA)

MANOVA

- MANOVA is used to test the difference between groups across several dependent variables/outcomes simultaneously.
- Box's test looks at the assumption of equal covariance matrices. This test can be ignored when sample sizes are equal because when they are some MANOVA test statistics are robust to violations of this assumption. If group sizes differ this test should be inspected. If the value of *Sig.* is less than .001 then the results of the analysis should not be trusted (see Section 16.7.1).
- The table labelled *Multivariate Tests* gives us the results of the MANOVA. There are four test statistics (*Pillai's Trace*, *Wilks's Lambda*, *Hotelling's Trace* and *Roy's Largest Root*). I recommend using Pillai's trace. If the value of *Sig.* for this statistic is less than .05, then the groups differ significantly with respect to the dependent variables.
- ANOVAs can be used to follow up the MANOVA (a different ANOVA for each dependent variable). The results of these are listed in the table entitled *Tests of Between-Subjects Effects*. These ANOVAs can in turn be followed up using contrasts. Personally I don't recommend this approach and suggest conducting a *discriminant function analysis*.

Discriminant function analysis

- Discriminant function analysis can be used after MANOVA to see how the dependent variables discriminate the groups.
- Discriminant function analysis identifies variates (combinations of the dependent variables), and to find out how many variates are significant look at the tables labelled *Wilks's Lambda*: if the value of *Sig.* is less than .05, then the variate is significantly discriminating the groups.
- Once the significant variates have been identified, use the table labelled *Standardized Canonical Discriminant Function Coefficients* to find out how the dependent variables contribute to the variates. High scores indicate that a dependent variable is important for a variate, and variables with positive and negative coefficients are contributing to the variate in opposite ways.
- Finally, to find out which groups are discriminated by a variate look at the table labelled *Functions at Group Centroids*: for a given variate, groups with values opposite in sign are being discriminated by that variate.