Approaches for Repeated Measures Analysis

   As mentioned in a previous lecture, a basic two-factor repeated measures experiment can be thought of as a variant of a split-plot design where the split plot factor is time. The problem that arises is that since time is not randomized (as the split-plot factors usually are) a correlation structure among split-plot levels (i.e., across times) can result for which the usual split-plot F ratios are not longer valid. We can test for this assumption, called the Huynh-Feldt assumption, to see if it is violated, and if not we can use a typical split-plot analysis. However, if the Huynh-Feldt assumption is violated, then we must adopt a different approach. The text mentions three approaches and I have added a two more: i) we can use a multivariate analysis (usually covered in a multivariate analysis course), ii) we can use the split-plot analysis but downweight the degrees of freedom used in the F tests to reflect the amount of violation of the Huynh-Feldt assumption, iii) we can define contrasts among the time levels and use standard univariate ANOVA approaches with the contrasts, iv) we can directly model the covariance structure among the times and conduct tests using this fitted structure, or v) we can fit individual models for the relationship over time using random coefficient models.Options ii) - v) are illustrated in the SAS and R code.