Lecture 31

Two-way Anova without Replication

While one cannot analyze interaction terms in a 2-way ANOVA without replication, the use of an additive model in such situations is extremely useful. The individuals that form the rows, for instance, are used as blocking factors which remove variance so that you can actually see differences between the column factors. This is identical to paired t-tests when there are 2 column factors, for instance. The method is used to control for individual differences in repeated measures experiments. In fact, the congressman who re-analyzed Donato et al.'s seedling data reported that he used a "Between-Within Repeated Measures Analysis of Variance" - it's just that this is equivalent to a 2-sided paired t-test on the differences when there is only 2 treatments and before versus after logging measurements.

Two-Way ANOVA without Replication

The following example represents gene expression levels for one gene in four samples under four different treatments (α-interferon, γ-interferon, a combination treatment, and no treatment.

	Treatment			
Sample	α	γ	Combo	None
1	550	567	602	525
2	504	572	599	530
3	543	562	575	499
4	1365	1380	1400	1325

If we run a one-way ANOVA on these data with treatment as the factor/group, then the variance within groups swamps the variance between groups and we see no treatment effect.

If we run a two-way ANOVA on these data controlling for the sample effect, we see a highly significant treatment effect and the ANOVA model explains most of the variance in the data.

The point is that although we are uninterested in the sample effect, it needs to be included in the model as a blocking (control) variable in order to allow us to see the difference in treatments.

Exercises for Lecture 31

1. –

2. –