By entering the contrast coefficients, $c_1 = 2, c_2 = -1, c_3 = -1$ for C_1 and $c_1 = 0, c_2 = 1, c_3 = -1$ for C_2



Practical 3.2: One-way ANOVA with linear contrasts

Example 1

Return to the tapping data in practical 3.1.

Use Analyze/Compare Means/One-way ANOVA and the Contrasts option to specify linear contrasts to test

- a) the 0 treatment (the control group) with the average of the other three treatments,
- b) the 0 treatment with the treatment with the highest dose of caffeine.

Example 2

An experiment was conducted to study the effect of food and/or water deprivation on behaviour in a learning task. Treatment 1 and 2 represent control conditions in which the animal received ad lib food and water (1) or else food and water twice per day (2). In treatment 3 animals were food deprived, in treatment 4, they were water deprived, and in treatment 5 they were deprived of both food and water. The number of trials to reach a predetermined criterion was recorded as follows:

Ad L Cont	ib rol	Two per Day Control	Food Deprived	Water deprived	Food and Water
18		20	6	15-26-	12
20		25	9	82a.	11
21		23	8	9	8
16		27		15-26	13
15		25	11	4	11
		16.	de 4'		
1.	Enter the da	ata into one parte.	umn and creat	e a grouping varial	ble for the treatment

- groups.
- 2. Use Analyze/Compare Means/One-way ANOVA to produce an ANOVA table.
- 3. Use the **Contrasts** option to specify linear contrasts to compare
 - a) combined control groups (treatments 1 and 2) versus combined experimental groups
 - b) control groups with each other
 - c) the singly deprived groups treatments with the doubly deprived treatment
 - d) the singly deprived treatments with each other

Questions for Practical 3.2

Tapping experiment

- i) Write down the linear contrasts that correspond to the planned comparisons.
- ii) State the null and alternative hypotheses for using the two contrasts to test.
- For each test, what is the p-value and do you reject the null hypothesis? iii)
- Give a 95% confidence interval for the change in the number of taps per minute due to iv) using a very large dose of caffeine.

Behaviour in learning experiment

- i) Interpret the results of the analysis of variance.
- ii) Write down the linear contrasts that correspond to the planned comparisons.
- iii) Show that the contrasts are orthogonal.

