Example post-hoc tests

Contrast #	1 12.21	2 10.40	3 11.37	4 11.00	5 9.50	6 11.82	7 13.22	8 10.33	Ψ Interp.
1	1	1	1	1	-1	-1	-1	-1	.11 Girls v. Boys
2					1		1		-3.72 Dual v. Single Hi Boys
.									
.									
.									

Scheffe method

$SS_{comp} = n\hat{\Psi}^2/\sum c_j^2$ $MS_{comp} = SS_{comp}/1$

$SS_{\Psi 1} = (19)(.11)^2/8 = .0287$ $F = .0287/9.906 < 1$ n.s.

$SS_{\Psi 2} = (19)(-3.72)^2/2 = 131.465$

Compare to $(a-1)F(7,144) = (7)(2.09) = 14.63$
$\alpha = .05$

Confidence interval:

$$3.72 - (\sqrt{14.63})(\sqrt{9.906(2/19)}) \leq \Psi_2 \leq 3.72 + (\sqrt{14.63})(\sqrt{9.906(2/19)})$$

$$-.186 \leq \Psi_2 \leq 7.62$$

Tukey method

$$\#2: \text{ Calc. } q = \frac{\left(\bar{Y}_{A_j} - \bar{Y}_{A_{j'}}\right)}{\sqrt{MS_{S/A}/n_j}} = -3.72/.722 = -5.152$$

Compare |calcq| to table of q with 8 groups and $df_{error} = 144$. Table $q_{\alpha=.05} = 4.36$

By Tukey's method, #2 is significant.

Confidence interval:

$$\hat{\Psi} - (q)(\sqrt{MS_{S/A}/n} \leq \Psi \leq \hat{\Psi} + (q)(\sqrt{MS_{S/A}/n}$$

$$3.72 - (4.36)(\sqrt{9.906 / 19} \leq \Psi_2 \leq 3.72 + (4.36)(\sqrt{9.906/19}$$

$$.572 \leq \Psi_2 \leq 6.87$$

<u>Fisher's L.S.D.</u>

$$\text{L.S.D.} = t\sqrt{2 \cdot MS_{S/A}}/\sqrt{n} = 1.98\sqrt{19.812}/\sqrt{19} = 8.813/4.359 = 2.02$$

$$t(df = 144, \alpha = .05) = 1.98$$

Now we know that any pair of means that differs by at least 2.02 is sig. diff. by Fisher's L.S.D.
Note that Fisher's LSD should not be used in this case because the example has more than 3 groups. It does not protect alpha-familywise.