

Chapter 12 Problems

- For all possible pairwise comparisons, conduct a Tukey test.
 - For pairwise comparisons of one group to all others, conduct a Dunnett test
 - For a mixture of pairwise and complex comparisons, conduct a Scheffé test

- For a Tukey test, the critical difference is:

$$\bar{d}_T = (q_T \sqrt{MS_{S/A}}) / \sqrt{s} = (3.61 \sqrt{2.048}) / \sqrt{7} = 1.95$$

Only the difference between the Praise ($\bar{Y} = 5.00$) and Reproof ($\bar{Y} = 7.14$) exceeds this critical difference.

- For a Dunnett test, the critical difference is:

$$\bar{d}_D = (q_D \sqrt{2 MS_{S/A}}) / \sqrt{s} = (2.40 \sqrt{2 \cdot 2.048}) / \sqrt{7} = 1.84$$

Neither the Praise nor the Reproof condition is significantly different from the control condition ($\bar{Y} = 6.00$).

- For a Scheffé test, the critical value is:

$$\bar{F}_S = (a-1) F(df_A, df_{S/A}) = (3-1)(3,55) = 7.10$$

Univariate Analysis of Variance

Descriptive Statistics

Dependent Variable: Number of errors

ANOVA code	Mean	Std. Deviation	N
Praise	5.0000	1.41421	7
Reproof	7.1429	1.06904	7
None	6.0000	1.73205	7
Total	6.0476	1.62715	21

Tests of Between-Subjects Effects

Dependent Variable: Number of errors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16.095 ^a	2	8.048	3.930	.038
Intercept	768.048	1	768.048	375.093	.000
anova	16.095	2	8.048	3.930	.038
Error	36.857	18	2.048		
Total	821.000	21			
Corrected Total	52.952	20			

a. R Squared = .304 (Adjusted R Squared = .227)

Post Hoc Tests

ANOVA code

Multiple Comparisons

Dependent Variable: Number of errors

	(I) ANOVA code	(J) ANOVA code	Mean Difference (I-J)	Std. Error	Sig.
Tukey HSD	Praise	Reproof	-2.1429*	.76488	.030
		None	-1.0000	.76488	.409
	Reproof	Praise	2.1429*	.76488	.030
		None	1.1429	.76488	.317
	None	Praise	1.0000	.76488	.409
		Reproof	-1.1429	.76488	.317
Scheffe	Praise	Reproof	-2.1429*	.76488	.039
		None	-1.0000	.76488	.442
	Reproof	Praise	2.1429*	.76488	.039
		None	1.1429	.76488	.349
	None	Praise	1.0000	.76488	.442
		Reproof	-1.1429	.76488	.349
Dunnett t (2-sided) ^a	Praise	None	-1.0000	.76488	.341
	Reproof	None	1.1429	.76488	.257

Based on observed means.

Multiple Comparisons

Dependent Variable: Number of errors

	(I) ANOVA code	(J) ANOVA code	95% Confidence Interval	
			Lower Bound	Upper Bound
Tukey HSD	Praise	Reproof	-4.0949	-.1908
		None	-2.9521	.9521
	Reproof	Praise	.1908	4.0949
		None	-.8092	3.0949
	None	Praise	-.9521	2.9521
		Reproof	-3.0949	.8092
Scheffe	Praise	Reproof	-4.1822	-.1035
		None	-3.0394	1.0394
	Reproof	Praise	.1035	4.1822
		None	-.8965	3.1822
	None	Praise	-1.0394	3.0394
		Reproof	-3.1822	.8965
Dunnett t (2-sided) ^a	Praise	None	-2.8346	.8346
	Reproof	None	-.6917	2.9775

Based on observed means.

*. The mean difference is significant at the .05 level.

a. Dunnett t-tests treat one group as a control, and compare all other groups against it.

Homogeneous Subsets

Number of errors

	ANOVA code	N	Subset	
			1	2
Tukey HSD ^{a,b}	Praise	7	5.0000	
	None	7	6.0000	6.0000
	Reproof	7		7.1429
	Sig.		.409	.317
Scheffe ^{a,b}	Praise	7	5.0000	
	None	7	6.0000	6.0000
	Reproof	7		7.1429
	Sig.		.442	.349

Means for groups in homogeneous subsets are displayed.

Based on Type III Sum of Squares

The error term is Mean Square(Error) = 2.048.

a. Uses Harmonic Mean Sample Size = 7.000.

b. Alpha = .05.