Table 26-7 Simple Effects for Interaction: Pain-Free ROM Across Levels of Modality and Medication

```
UNIANOVA ROMChange BY Modality Med
  /METHOD=SSTYPE(2)
  /INTERCEPT=INCLUDE
  /POSTHOC=Modality Med(TUKEY)
  /EMMEANS=TABLES(OVERALL)
  /EMMEANS=TABLES(Modality) COMPARE ADJ(LSD)
  /EMMEANS=TABLES(Med) COMPARE ADJ(LSD)
  /EMMEANS=TABLES(Med*Modality)COMPARE(Modality)
  /EMMEANS=TABLES(Med*Modality)COMPARE(Med)
  /PRINT DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /DESIGN=Modality Med Modality*Med.
```

Run using General Linear Model > Univariate **See sections 4 and 5 of the output for the pairwise contrasts**
Obtaining contrasts for simple effects requires using syntax in SPSS. The syntax is shown above. Not all of these commands can be obtained by clicking on choices within GLM. Syntax can be applied by using the PASTE button, rather than clicking OK when running the analysis.

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
Modality	1	Ice	20
	2	Splint	20
	3	Rest	20
Medication	1	NSAID	30
	2	No Med	30

Descriptive Statistics

Dependent Variable: ROM Change

Modality	Medication	Mean	Std. Deviation	N
Ice	NSAID	50.0000	8.44591	10
	No Med	22.0000	19.43079	10
	Total	36.0000	20.46820	20
Splint	NSAID	20.0000	15.65602	10
	No Med	21.0000	12.35584	10
	Total	20.5000	13.73624	20
Rest	NSAID	24.0000	17.50555	10
	No Med	23.0000	14.32946	10
	Total	23.5000	15.57833	20
Total	NSAID	31.3333	19.39842	30
	No Med	22.0000	15.13161	30
	Total	26.6667	17.87875	60

Tests of Between-Subjects Effects

Dependent Variable: ROM Change

Source	Type II Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6633.333[a]	5	1326.667	5.860	.000
Intercept	42666.667	1	42666.667	188.451	.000
Modality	2703.333	2	1351.667	5.970	.005
Med	1306.667	1	1306.667	5.771	.020
Modality * Med	2623.333	2	1311.667	5.793	.005
Error	12226.000	54	226.407		
Total	61526.000	60			
Corrected Total	18859.333	59			

a. R Squared = .352 (Adjusted R Squared = .292)

Estimated Marginal Means

1. Grand Mean

Dependent Variable: ROM Change

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
26.667	1.943	22.772	30.561

2. Modality

Estimates

Dependent Variable: ROM Change

Modality	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Ice	36.000	3.365	29.254	42.746
Splint	20.500	3.365	13.754	27.246
Rest	23.500	3.365	16.754	30.246

Pairwise Comparisons

Dependent Variable: ROM Change

(I) Modality	(J) Modality	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
Ice	Splint	15.500*	4.758	.002	5.960	25.040
	Rest	12.500*	4.758	.011	2.960	22.040
Splint	Ice	-15.500*	4.758	.002	-25.040	-5.960
	Rest	-3.000	4.758	.531	-12.540	6.540
Rest	Ice	-12.500*	4.758	.011	-22.040	-2.960
	Splint	3.000	4.758	.531	-6.540	12.540

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable: ROM Change

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	2703.333	2	1351.667	5.970	.005
Error	12226.000	54	226.407		

The F tests the effect of Modality. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

3. Medication

Estimates

Dependent Variable: ROM Change

Medication	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
NSAID	31.333	2.747	25.826	36.841
No Med	22.000	2.747	16.492	27.508

Pairwise Comparisons

Dependent Variable: ROM Change

(I) Medication	(J) Medication	Mean Difference (I-J)	Std. Error	Sig.b	95% Confidence Interval for Differenceb	
					Lower Bound	Upper Bound
NSAID	No Med	9.333*	3.885	.020	1.544	17.122
No Med	NSAID	-9.333*	3.885	.020	-17.122	-1.544

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable: ROM Change

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	1306.667	1	1306.667	5.771	.020
Error	12226.000	54	226.407		

The F tests the effect of Medication. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

4. Medication * Modality

Estimates

Dependent Variable: ROM Change

Medication	Modality	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
NSAID	Ice	50.000	4.758	40.460	59.540
	Splint	20.000	4.758	10.460	29.540
	Rest	24.000	4.758	14.460	33.540
No Med	Ice	22.000	4.758	12.460	31.540
	Splint	21.000	4.758	11.460	30.540
	Rest	23.000	4.758	13.460	32.540

Pairwise Comparisons

Dependent Variable: ROM Change

Medication	(I) Modality	(J) Modality	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
NSAID	Ice	Splint	30.000*	6.729	.000	16.509	43.491
		Rest	26.000*	6.729	.000	12.509	39.491
	Splint	Ice	-30.000*	6.729	.000	-43.491	-16.509
		Rest	-4.000	6.729	.555	-17.491	9.491
	Rest	Ice	-26.000*	6.729	.000	-39.491	-12.509
		Splint	4.000	6.729	.555	-9.491	17.491
No Med	Ice	Splint	1.000	6.729	.882	-12.491	14.491
		Rest	-1.000	6.729	.882	-14.491	12.491
	Splint	Ice	-1.000	6.729	.882	-14.491	12.491
		Rest	-2.000	6.729	.767	-15.491	11.491
	Rest	Ice	1.000	6.729	.882	-12.491	14.491
		Splint	2.000	6.729	.767	-11.491	15.491

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable: ROM Change

Medication		Sum of Squares	df	Mean Square	F	Sig.
NSAID	Contrast	5306.667	2	2653.333	11.719	.000
	Error	12226.000	54	226.407		
No Med	Contrast	20.000	2	10.000	.044	.957
	Error	12226.000	54	226.407		

Each F tests the simple effects of Modality within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

5. Medication * Modality

Estimates

Dependent Variable: ROM Change

Medication	Modality	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound

NSAID	Ice	50.000	4.758	40.460	59.540
	Splint	20.000	4.758	10.460	29.540
	Rest	24.000	4.758	14.460	33.540
No Med	Ice	22.000	4.758	12.460	31.540
	Splint	21.000	4.758	11.460	30.540
	Rest	23.000	4.758	13.460	32.540

Pairwise Comparisons

Dependent Variable: ROM Change

Modality	(I) Medication	(J) Medication	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Ice	NSAID	No Med	28.000*	6.729	.000	14.509	41.491
	No Med	NSAID	-28.000*	6.729	.000	-41.491	-14.509
Splint	NSAID	No Med	-1.000	6.729	.882	-14.491	12.491
	No Med	NSAID	1.000	6.729	.882	-12.491	14.491
Rest	NSAID	No Med	1.000	6.729	.882	-12.491	14.491
	No Med	NSAID	-1.000	6.729	.882	-14.491	12.491

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Dependent Variable: ROM Change

Modality		Sum of Squares	df	Mean Square	F	Sig.
Ice	Contrast	3920.000	1	3920.000	17.314	.000
	Error	12226.000	54	226.407		
Splint	Contrast	5.000	1	5.000	.022	.882
	Error	12226.000	54	226.407		
Rest	Contrast	5.000	1	5.000	.022	.882
	Error	12226.000	54	226.407		

Each F tests the simple effects of Medication within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Post Hoc Tests

Modality

Multiple Comparisons

Dependent Variable: ROM Change

Tukey HSD

(I) Modality	(J) Modality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Ice	Splint	15.5000*	4.75823	.005	4.0327	26.9673
	Rest	12.5000*	4.75823	.030	1.0327	23.9673
Splint	Ice	-15.5000*	4.75823	.005	-26.9673	-4.0327
	Rest	-3.0000	4.75823	.804	-14.4673	8.4673
Rest	Ice	-12.5000*	4.75823	.030	-23.9673	-1.0327
	Splint	3.0000	4.75823	.804	-8.4673	14.4673

Based on observed means.

  The error term is Mean Square(Error) = 226.407.

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

Homogeneous Subsets

ROM Change

Tukey HSD[a,b]

Modality	N	Subset	
		1	2
Splint	20	20.5000	
Rest	20	23.5000	
Ice	20		36.0000
Sig.		.804	1.000

Means for groups in homogeneous subsets are
displayed.

  Based on observed means.

  The error term is Mean Square(Error) = 226.407.

a. Uses Harmonic Mean Sample Size = 20.000.

b. Alpha = .05.