```
ONEWAY pretraining BY group
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS
  /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Notes

Output Created		23-JUN-2023 13:18:13
Comments		
Input	Data	/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/datasheet_full.sav
	Active Dataset	DataSet0
	Filter	<none>
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	N of Rows in Working Data File	15
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY pretraining BY group /STATISTICS DESCRIPTIVES /MISSING ANALYSIS /POSTHOC=TUKEY ALPHA(0.05).
Resources	Processor Time	00:00:00.01
	Elapsed Time	00:00:00.00

Descriptives

pretraining

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	5	28.7500	5.59017	2.50000	21.8089	35.6911
2	5	28.7500	7.12610	3.18689	19.9018	37.5982
3	5	27.5000	9.47859	4.23896	15.7308	39.2692
Total	15	28.3333	7.03414	1.81621	24.4380	32.2287

Descriptives

pretraining

	Minimum	Maximum
1	25.00	37.50
2	18.75	37.50
3	12.50	37.50
Total	12.50	37.50

ANOVA

pretraining

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.208	2	2.604	.045	.956
Within Groups	687.500	12	57.292		
Total	692.708	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: pretraining

Tukey HSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.00000	4.78714	1.000	-12.7714	12.7714
	3	1.25000	4.78714	.963	-11.5214	14.0214
2	1	.00000	4.78714	1.000	-12.7714	12.7714
	3	1.25000	4.78714	.963	-11.5214	14.0214
3	1	-1.25000	4.78714	.963	-14.0214	11.5214
	2	-1.25000	4.78714	.963	-14.0214	11.5214

Homogeneous Subsets

pretraining

Tukey HSD[a]

group	N	Subset for alpha = 0.05
		1
3	5	27.5000
1	5	28.7500
2	5	28.7500
Sig.		.963

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.

```
ONEWAY post_im_trained BY group
 /STATISTICS DESCRIPTIVES
 /MISSING ANALYSIS
 /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Notes

Output Created		23-JUN-2023 13:19:41
Comments		
Input	Data	/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/datasheet_full.sav
	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	15
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.

Notes

Syntax		ONEWAY post_im_trained BY group /STATISTICS DESCRIPTIVES /MISSING ANALYSIS /POSTHOC=TUKEY ALPHA(0.05).
Resources	Processor Time	00:00:00.01
	Elapsed Time	00:00:00.00

Descriptives

post_im_trained

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	5	92.5000	6.84653	3.06186	83.9989	101.0011
2	5	67.5000	6.84653	3.06186	58.9989	76.0011
3	5	30.0000	6.84653	3.06186	21.4989	38.5011
Total	15	63.3333	27.33174	7.05702	48.1975	78.4691

Descriptives

post_im_trained

	Minimum	Maximum
1	87.50	100.00
2	62.50	75.00
3	25.00	37.50
Total	25.00	100.00

ANOVA

post_im_trained

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9895.833	2	4947.917	105.556	.000
Within Groups	562.500	12	46.875		
Total	10458.333	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: post_im_trained

Tukey HSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	25.00000*	4.33013	.000	13.4478	36.5522
	3	62.50000*	4.33013	.000	50.9478	74.0522
2	1	-25.00000*	4.33013	.000	-36.5522	-13.4478
	3	37.50000*	4.33013	.000	25.9478	49.0522
3	1	-62.50000*	4.33013	.000	-74.0522	-50.9478
	2	-37.50000*	4.33013	.000	-49.0522	-25.9478

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

post_im_trained

Tukey HSD[a]

group	N	Subset for alpha = 0.05		
		1	2	3
3	5	30.0000		
2	5		67.5000	
1	5			92.5000
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.

```
ONEWAY post_im_new BY group
 /STATISTICS DESCRIPTIVES
 /MISSING ANALYSIS
 /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Notes

Output Created		23-JUN-2023 13:20:01
Comments		
Input	Data	/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/datasheet_full.sav
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	15
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY post_im_new BY group /STATISTICS DESCRIPTIVES /MISSING ANALYSIS /POSTHOC=TUKEY ALPHA(0.05).
Resources	Processor Time	00:00:00.01
	Elapsed Time	00:00:00.00

Descriptives

post_im_new

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	5	90.0000	5.59017	2.50000	83.0589	96.9411
2	5	70.0000	6.84653	3.06186	61.4989	78.5011
3	5	27.5000	5.59017	2.50000	20.5589	34.4411
Total	15	62.5000	27.54866	7.11303	47.2441	77.7559

Descriptives

post_im_new

	Minimum	Maximum
1	87.50	100.00
2	62.50	75.00
3	25.00	37.50
Total	25.00	100.00

ANOVA

post_im_new

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10187.500	2	5093.750	139.714	.000
Within Groups	437.500	12	36.458		
Total	10625.000	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: post_im_new

Tukey HSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	20.00000*	3.81881	.001	9.8119	30.1881
	3	62.50000*	3.81881	.000	52.3119	72.6881
2	1	-20.00000*	3.81881	.001	-30.1881	-9.8119
	3	42.50000*	3.81881	.000	32.3119	52.6881
3	1	-62.50000*	3.81881	.000	-72.6881	-52.3119
	2	-42.50000*	3.81881	.000	-52.6881	-32.3119

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

post_im_new

Tukey HSD[a]

group	N	Subset for alpha = 0.05		
		1	2	3
3	5	27.5000		
2	5		70.0000	
1	5			90.0000
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.

```
ONEWAY post_de_trained BY group
 /STATISTICS DESCRIPTIVES
 /MISSING ANALYSIS
 /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Notes

Output Created		23-JUN-2023 13:20:37
Comments		
Input	Data	/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/datasheet_full.sav
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	15
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.

Notes

Syntax		ONEWAY post_de_trained BY group /STATISTICS DESCRIPTIVES /MISSING ANALYSIS /POSTHOC=TUKEY ALPHA(0.05).
Resources	Processor Time	00:00:00.01
	Elapsed Time	00:00:00.00

Descriptives

post_de_trained

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	5	90.0000	5.59017	2.50000	83.0589	96.9411
2	5	65.0000	10.45825	4.67707	52.0144	77.9856
3	5	22.5000	5.59017	2.50000	15.5589	29.4411
Total	15	59.1667	29.68084	7.66356	42.7300	75.6034

Descriptives

post_de_trained

	Minimum	Maximum
1	87.50	100.00
2	50.00	75.00
3	12.50	25.00
Total	12.50	100.00

ANOVA

post_de_trained

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11645.833	2	5822.917	101.636	.000
Within Groups	687.500	12	57.292		
Total	12333.333	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: post_de_trained

Tukey HSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	25.00000*	4.78714	.001	12.2286	37.7714
	3	67.50000*	4.78714	.000	54.7286	80.2714
2	1	-25.00000*	4.78714	.001	-37.7714	-12.2286
	3	42.50000*	4.78714	.000	29.7286	55.2714
3	1	-67.50000*	4.78714	.000	-80.2714	-54.7286
	2	-42.50000*	4.78714	.000	-55.2714	-29.7286

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

post_de_trained

Tukey HSD[a]

group	N	Subset for alpha = 0.05		
		1	2	3
3	5	22.5000		
2	5		65.0000	
1	5			90.0000
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.

```
ONEWAY post_de_new BY group
 /STATISTICS DESCRIPTIVES
 /MISSING ANALYSIS
 /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Notes

Output Created		23-JUN-2023 13:20:59
Comments		
Input	Data	/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/datasheet_full.sav
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	15
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.
Syntax		ONEWAY post_de_new BY group /STATISTICS DESCRIPTIVES /MISSING ANALYSIS /POSTHOC=TUKEY ALPHA(0.05).
Resources	Processor Time	00:00:00.01
	Elapsed Time	00:00:00.00

Descriptives

post_de_new

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	5	85.0000	5.59017	2.50000	78.0589	91.9411
2	5	65.0000	5.59017	2.50000	58.0589	71.9411
3	5	25.0000	8.83883	3.95285	14.0251	35.9749
Total	15	58.3333	26.58656	6.86462	43.6102	73.0565

Descriptives

post_de_new

	Minimum	Maximum
1	75.00	87.50
2	62.50	75.00
3	12.50	37.50
Total	12.50	87.50

ANOVA

post_de_new

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9333.333	2	4666.667	99.556	.000
Within Groups	562.500	12	46.875		
Total	9895.833	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: post_de_new

Tukey HSD

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	20.00000*	4.33013	.002	8.4478	31.5522
	3	60.00000*	4.33013	.000	48.4478	71.5522
2	1	-20.00000*	4.33013	.002	-31.5522	-8.4478
	3	40.00000*	4.33013	.000	28.4478	51.5522
3	1	-60.00000*	4.33013	.000	-71.5522	-48.4478
	2	-40.00000*	4.33013	.000	-51.5522	-28.4478

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

post_de_new

Tukey HSD[a]

group	N	Subset for alpha = 0.05		
		1	2	3
3	5	25.0000		
2	5		65.0000	
1	5			85.0000
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.

```
 NEW FILE.
DATASET NAME DataSet4 WINDOW=FRONT.
GLM pretraining post_im_trained post_de_trained
  /WSFACTOR=time 3 Polynomial
  /MEASURE=perception_score
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO
  /EMMEANS=TABLES(time) COMPARE ADJ(BONFERRONI)
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time.
```

General Linear Model

Notes

Output Created		23-JUN-2023 13:26:58
Comments		
Input	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	5
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM pretraining post_im_trained post_de_trained /WSFACTOR=time 3 Polynomial /MEASURE=perception_score /METHOD=SSTYPE(3) /PLOT=PROFILE(time) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /EMMEANS=TABLES (time) COMPARE ADJ (BONFERRONI) /CRITERIA=ALPHA(.05) /WSDESIGN=time.
Resources	Processor Time	00:00:00.35
	Elapsed Time	00:00:01.00

[DataSet4]

Within-Subjects Factors

Measure: perception_score

time	Dependent Variable
1	pretraining
2	post_im_trained
3	post_de_trained

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.733	4.125[b]	2.000	3.000	.138
	Wilks' Lambda	.267	4.125[b]	2.000	3.000	.138
	Hotelling's Trace	2.750	4.125[b]	2.000	3.000	.138
	Roy's Largest Root	2.750	4.125[b]	2.000	3.000	.138

a. Design: Intercept
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
time	.375	2.946	2	.229	.615

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
time	.750	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: perception_score

Source		Type III Sum of Squares	df	Mean Square	F
time	Sphericity Assumed	145.833	2	72.917	1.806
	Greenhouse-Geisser	145.833	1.230	118.518	1.806
	Huynh-Feldt	145.833	1.499	97.267	1.806
	Lower-bound	145.833	1.000	145.833	1.806
Error(time)	Sphericity Assumed	322.917	8	40.365	
	Greenhouse-Geisser	322.917	4.922	65.608	
	Huynh-Feldt	322.917	5.997	53.844	
	Lower-bound	322.917	4.000	80.729	

Tests of Within-Subjects Effects

Measure: perception_score

Source		Sig.
time	Sphericity Assumed	.225
	Greenhouse-Geisser	.245
	Huynh-Feldt	.238
	Lower-bound	.250
Error(time)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: perception_score

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
time	Linear	62.500	1	62.500	.865	.405
	Quadratic	83.333	1	83.333	9.846	.035
Error(time)	Linear	289.062	4	72.266		
	Quadratic	33.854	4	8.464		

Tests of Between-Subjects Effects

Measure: perception_score

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	10666.667	1	10666.667	122.269	.000
Error	348.958	4	87.240		

Estimated Marginal Means

time

Estimates

Measure: perception_score

time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	27.500	4.239	15.731	39.269
2	30.000	3.062	21.499	38.501
3	22.500	2.500	15.559	29.441

Pairwise Comparisons

Measure: perception_score

(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-2.500	3.187	1.000	-15.123	10.123
	3	5.000	5.376	1.000	-16.295	26.295
2	1	2.500	3.187	1.000	-10.123	15.123
	3	7.500	3.062	.211	-4.627	19.627
3	1	-5.000	5.376	1.000	-26.295	16.295
	2	-7.500	3.062	.211	-19.627	4.627

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

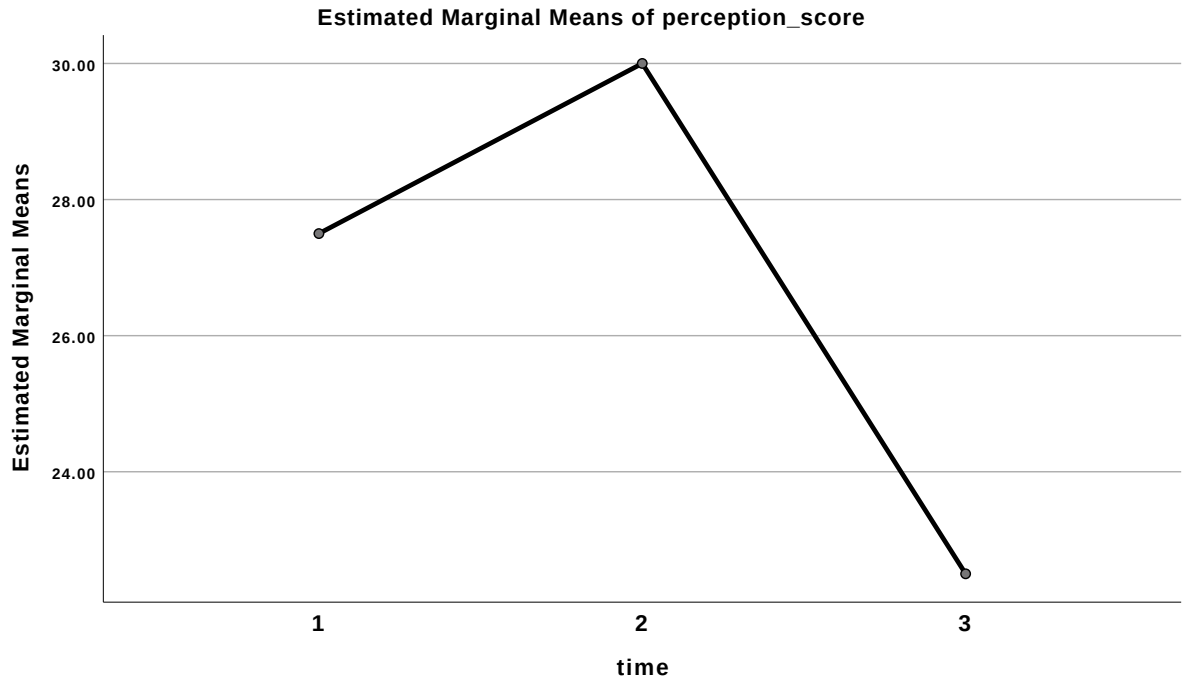
Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.733	4.125[a]	2.000	3.000	.138
Wilks' lambda	.267	4.125[a]	2.000	3.000	.138
Hotelling's trace	2.750	4.125[a]	2.000	3.000	.138
Roy's largest root	2.750	4.125[a]	2.000	3.000	.138

Each F tests the multivariate effect of time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Profile Plots




```
 DATASET ACTIVATE DataSet0.
DATASET CLOSE DataSet4.
NEW FILE.
DATASET NAME DataSet5 WINDOW=FRONT.
GLM pretraining post_im_trained post_de_trained
  /WSFACTOR=time 3 Polynomial
  /MEASURE=perception_score
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(time) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO
  /EMMEANS=TABLES(time) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE ETASQ
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time.
```

General Linear Model

Notes

Output Created		23-JUN-2023 13:30:04
Comments		
Input	Active Dataset	DataSet5
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	5
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM pretraining post_im_trained post_de_trained /WSFACTOR=time 3 Polynomial /MEASURE=perception_score /METHOD=SSTYPE(3) /PLOT=PROFILE(time) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /EMMEANS=TABLES (time) COMPARE ADJ (BONFERRONI) /PRINT=DESCRIPTIVE ETASQ /CRITERIA=ALPHA(.05) /WSDESIGN=time.
Resources	Processor Time	00:00:00.32
	Elapsed Time	00:00:00.00

[DataSet5]

Within-Subjects Factors

Measure: perception_score

time	Dependent Variable
1	pretraining
2	post_im_trained
3	post_de_trained

Descriptive Statistics

	Mean	Std. Deviation	N
pretraining	27.5000	9.47859	5
post_im_trained	30.0000	6.84653	5
post_de_trained	22.5000	5.59017	5

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.733	4.125[b]	2.000	3.000	.138
	Wilks' Lambda	.267	4.125[b]	2.000	3.000	.138
	Hotelling's Trace	2.750	4.125[b]	2.000	3.000	.138
	Roy's Largest Root	2.750	4.125[b]	2.000	3.000	.138

Multivariate Tests[a]

Effect		Partial Eta Squared
time	Pillai's Trace	.733
	Wilks' Lambda	.733
	Hotelling's Trace	.733
	Roy's Largest Root	.733

a. Design: Intercept
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
time	.375	2.946	2	.229	.615

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
time	.750	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: perception_score

Source		Type III Sum of Squares	df	Mean Square	F
time	Sphericity Assumed	145.833	2	72.917	1.806
	Greenhouse-Geisser	145.833	1.230	118.518	1.806
	Huynh-Feldt	145.833	1.499	97.267	1.806
	Lower-bound	145.833	1.000	145.833	1.806
Error(time)	Sphericity Assumed	322.917	8	40.365	
	Greenhouse-Geisser	322.917	4.922	65.608	
	Huynh-Feldt	322.917	5.997	53.844	
	Lower-bound	322.917	4.000	80.729	

Tests of Within-Subjects Effects

Measure: perception_score

Source		Sig.	Partial Eta Squared
time	Sphericity Assumed	.225	.311
	Greenhouse-Geisser	.245	.311
	Huynh-Feldt	.238	.311
	Lower-bound	.250	.311
Error(time)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: perception_score

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
time	Linear	62.500	1	62.500	.865	.405
	Quadratic	83.333	1	83.333	9.846	.035
Error(time)	Linear	289.062	4	72.266		
	Quadratic	33.854	4	8.464		

Tests of Within-Subjects Contrasts

Measure: perception_score

Source	time	Partial Eta Squared
time	Linear	.178
	Quadratic	.711
Error(time)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: perception_score

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	10666.667	1	10666.667	122.269	.000	.968
Error	348.958	4	87.240			

Estimated Marginal Means

time

Estimates

Measure: perception_score

time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	27.500	4.239	15.731	39.269
2	30.000	3.062	21.499	38.501
3	22.500	2.500	15.559	29.441

Pairwise Comparisons

Measure: perception_score

(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-2.500	3.187	1.000	-15.123	10.123
	3	5.000	5.376	1.000	-16.295	26.295
2	1	2.500	3.187	1.000	-10.123	15.123
	3	7.500	3.062	.211	-4.627	19.627
3	1	-5.000	5.376	1.000	-26.295	16.295
	2	-7.500	3.062	.211	-19.627	4.627

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

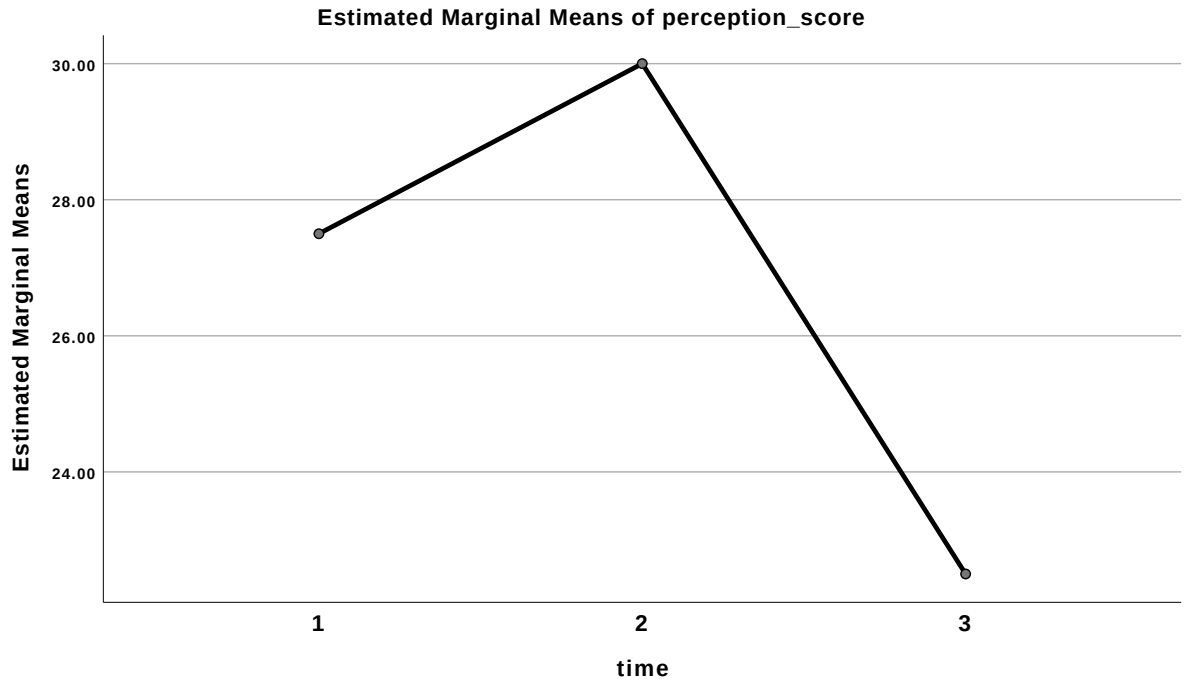
Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.733	4.125[a]	2.000	3.000	.138	.733
Wilks' lambda	.267	4.125[a]	2.000	3.000	.138	.733
Hotelling's trace	2.750	4.125[a]	2.000	3.000	.138	.733
Roy's largest root	2.750	4.125[a]	2.000	3.000	.138	.733

Each F tests the multivariate effect of time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Profile Plots




```
SAVE OUTFILE='/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/
control_group.sav'
  /COMPRESSED.
DATASET ACTIVATE DataSet0.
NEW FILE.
DATASET NAME DataSet6 WINDOW=FRONT.

SAVE OUTFILE='/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/
experimental group.sav'
  /COMPRESSED.
GLM pretraining duringtraining post_im_trained post_de_trained BY group
  /WSFACTOR=time 4 Polynomial
```

```
  /MEASURE=perception_score
  /METHOD=SSTYPE(3)
  /SAVE=SRESID
  /POSTHOC=group(TUKEY GH)
  /PLOT=PROFILE(time*group) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AU
TO
  /EMMEANS=TABLES(group) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(time) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(group*time)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=time
  /DESIGN=group.
```

General Linear Model

Notes

Output Created		**23-JUN-2023 13:34:38**
Comments		
Input	**Data**	**/Users/hongnhungnguyen/Desktop/English phonetics/Final paper/experimental group.sav**
	Active Dataset	**DataSet6**
	Filter	**<none>**
	Weight	**<none>**
	Split File	**<none>**
	N of Rows in Working Data File	**10**
Missing Value Handling	**Definition of Missing**	**User-defined missing values are treated as missing.**
	Cases Used	**Statistics are based on all cases with valid data for all variables in the model.**

Notes

Syntax		GLM pretraining duringtraining post_im_trained post_de_trained BY group /WSFACTOR=time 4 Polynomial /MEASURE=perception_score /METHOD=SSTYPE(3) /SAVE=SRESID /POSTHOC=group (TUKEY GH) /PLOT=PROFILE (time*group) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /EMMEANS=TABLES (group) COMPARE ADJ (BONFERRONI) /EMMEANS=TABLES (time) COMPARE ADJ (BONFERRONI) /EMMEANS=TABLES (group*time) /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY /CRITERIA=ALPHA(.05) /WSDESIGN=time /DESIGN=group.
Resources	Processor Time	00:00:00.32
	Elapsed Time	00:00:01.00
Variables Created or Modified	SRE_1	Studentized Residual for pretraining
	SRE_2	Studentized Residual for duringtraining
	SRE_3	Studentized Residual for post_im_trained
	SRE_4	Studentized Residual for post_de_trained

[DataSet6] /Users/hongnhungnguyen/Desktop/English phonetics/Final paper/experimental group.sav

Warnings

Post hoc tests are not performed for group because there are fewer than three groups.

Within-Subjects Factors

Measure: perception_score

time	Dependent Variable
1	pretraining
2	duringtraining
3	post_im_trained
4	post_de_trained

Between-Subjects Factors

		N
group	1	5
	2	5

Descriptive Statistics

	group	Mean	Std. Deviation	N
pretraining	1	28.7500	5.59017	5
	2	28.7500	7.12610	5
	Total	28.7500	6.03807	10
duringtraining	1	65.0000	10.45825	5
	2	40.0000	7.12610	5
	Total	52.5000	15.64582	10
post_im_trained	1	92.5000	6.84653	5
	2	67.5000	6.84653	5
	Total	80.0000	14.67235	10
post_de_trained	1	90.0000	5.59017	5
	2	65.0000	10.45825	5
	Total	77.5000	15.36591	10

Box's Test of Equality of Covariance Matrices[a]

Box's M	23.715
F	1.019
df1	10
df2	305.976
Sig.	.427

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + group
Within Subjects Design: time

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time	Pillai's Trace	.993	275.756[b]	3.000	6.000	.000
	Wilks' Lambda	.007	275.756[b]	3.000	6.000	.000
	Hotelling's Trace	137.878	275.756[b]	3.000	6.000	.000
	Roy's Largest Root	137.878	275.756[b]	3.000	6.000	.000
time * group	Pillai's Trace	.878	14.395[b]	3.000	6.000	.004
	Wilks' Lambda	.122	14.395[b]	3.000	6.000	.004
	Hotelling's Trace	7.198	14.395[b]	3.000	6.000	.004
	Roy's Largest Root	7.198	14.395[b]	3.000	6.000	.004

Multivariate Tests[a]

Effect		Partial Eta Squared
time	Pillai's Trace	.993
	Wilks' Lambda	.993
	Hotelling's Trace	.993
	Roy's Largest Root	.993
time * group	Pillai's Trace	.878
	Wilks' Lambda	.878
	Hotelling's Trace	.878
	Roy's Largest Root	.878

a. Design: Intercept + group
Within Subjects Design: time

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
time	.440	5.519	5	.360	.732

Mauchly's Test of Sphericity[a]

Measure: perception_score

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
time	1.000	.333

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + group
Within Subjects Design: time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: perception_score

Source		Type III Sum of Squares	df	Mean Square	F
time	Sphericity Assumed	17386.719	3	5795.573	91.537
	Greenhouse-Geisser	17386.719	2.197	7912.100	91.537
	Huynh-Feldt	17386.719	3.000	5795.573	91.537
	Lower-bound	17386.719	1.000	17386.719	91.537
time * group	Sphericity Assumed	1171.875	3	390.625	6.170
	Greenhouse-Geisser	1171.875	2.197	533.280	6.170
	Huynh-Feldt	1171.875	3.000	390.625	6.170
	Lower-bound	1171.875	1.000	1171.875	6.170
Error(time)	Sphericity Assumed	1519.531	24	63.314	
	Greenhouse-Geisser	1519.531	17.580	86.436	
	Huynh-Feldt	1519.531	24.000	63.314	
	Lower-bound	1519.531	8.000	189.941	

Tests of Within-Subjects Effects

Measure: perception_score

Source		Sig.	Partial Eta Squared
time	Sphericity Assumed	.000	.920
	Greenhouse-Geisser	.000	.920
	Huynh-Feldt	.000	.920
	Lower-bound	.000	.920
time * group	Sphericity Assumed	.003	.435
	Greenhouse-Geisser	.008	.435
	Huynh-Feldt	.003	.435
	Lower-bound	.038	.435
Error(time)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: perception_score

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
time	Linear	15094.531	1	15094.531	674.969	.000
	Quadratic	1722.656	1	1722.656	27.349	.001
	Cubic	569.531	1	569.531	5.445	.048
time * group	Linear	703.125	1	703.125	31.441	.001
	Quadratic	390.625	1	390.625	6.202	.038
	Cubic	78.125	1	78.125	.747	.413
Error(time)	Linear	178.906	8	22.363		
	Quadratic	503.906	8	62.988		
	Cubic	836.719	8	104.590		

Tests of Within-Subjects Contrasts

Measure: perception_score

Source	time	Partial Eta Squared
time	Linear	.988
	Quadratic	.774
	Cubic	.405
time * group	Linear	.797
	Quadratic	.437
	Cubic	.085
Error(time)	Linear	
	Quadratic	
	Cubic	

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
pretraining	Based on Mean	.264	1	8	.621
	Based on Median	.133	1	8	.724
	Based on Median and with adjusted df	.133	1	7.965	.725
	Based on trimmed mean	.274	1	8	.615
duringtraining	Based on Mean	.738	1	8	.415
	Based on Median	.421	1	8	.535
	Based on Median and with adjusted df	.421	1	7.482	.536
	Based on trimmed mean	.795	1	8	.399
post_im_trained	Based on Mean	.000	1	8	1.000
	Based on Median	.000	1	8	1.000
	Based on Median and with adjusted df	.000	1	8.000	1.000
	Based on trimmed mean	.000	1	8	1.000
post_de_trained	Based on Mean	1.969	1	8	.198
	Based on Median	1.600	1	8	.242
	Based on Median and with adjusted df	1.600	1	7.692	.243
	Based on trimmed mean	2.194	1	8	.177

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + group
Within Subjects Design: time

Tests of Between-Subjects Effects

Measure: perception_score

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	142503.906	1	142503.906	2947.960	.000	.997
group	3515.625	1	3515.625	72.727	.000	.901
Error	386.719	8	48.340			

Estimated Marginal Means

1. group

Estimates

Measure: perception_score

group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	69.063	1.555	65.477	72.648
2	50.313	1.555	46.727	53.898

Pairwise Comparisons

Measure: perception_score

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	18.750*	2.199	.000	13.680	23.820
2	1	-18.750*	2.199	.000	-23.820	-13.680

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Measure: perception_score

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	878.906	1	878.906	72.727	.000	.901
Error	96.680	8	12.085			

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

2. time

Estimates

Measure: perception_score

time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	28.750	2.025	24.080	33.420
2	52.500	2.830	45.974	59.026
3	80.000	2.165	75.007	84.993
4	77.500	2.652	71.385	83.615

Pairwise Comparisons

Measure: perception_score

(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-23.750*	4.169	.003	-38.254	-9.246
	3	-51.250*	2.380	.000	-59.529	-42.971
	4	-48.750*	2.760	.000	-58.351	-39.149
2	1	23.750*	4.169	.003	9.246	38.254
	3	-27.500*	4.216	.001	-42.166	-12.834
	4	-25.000*	3.563	.001	-37.395	-12.605
3	1	51.250*	2.380	.000	42.971	59.529
	2	27.500*	4.216	.001	12.834	42.166
	4	2.500	3.853	1.000	-10.903	15.903
4	1	48.750*	2.760	.000	39.149	58.351
	2	25.000*	3.563	.001	12.605	37.395
	3	-2.500	3.853	1.000	-15.903	10.903

Based on estimated marginal means

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

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.993	275.756[a]	3.000	6.000	.000	.993
Wilks' lambda	.007	275.756[a]	3.000	6.000	.000	.993
Hotelling's trace	137.878	275.756[a]	3.000	6.000	.000	.993
Roy's largest root	137.878	275.756[a]	3.000	6.000	.000	.993

Each F tests the multivariate effect of time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

3. group * time

Measure: perception_score

group	time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	28.750	2.864	22.145	35.355
	2	65.000	4.002	55.771	74.229
	3	92.500	3.062	85.439	99.561
	4	90.000	3.750	81.352	98.648
2	1	28.750	2.864	22.145	35.355
	2	40.000	4.002	30.771	49.229
	3	67.500	3.062	60.439	74.561
	4	65.000	3.750	56.352	73.648

Profile Plots