Univariate Analysis of Variance

Notes

Output Created		07-MAR-2016 12:58:55
Comments		
Input	Data	D:\Google Drive\ELEX_2016\CD\Bab 5\5.2.2.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	36
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		UNIANOVA Y BY Material Temperatur WITH X /CONTRAST(Material)=Simple(1) /CONTRAST(Temperatur)=Simple(1) /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PLOT=PROFILE(Temperatur*Material) /EMMEANS=TABLES(Material) WITH (X=MEAN) COMPARE ADJ(LSD) /EMMEANS=TABLES(Temperatur) WITH (X=MEAN) COMPARE ADJ(LSD) /EMMEANS=TABLES(Material*Temperatur) WITH(X=MEAN) /PRINT=PARAMETER HOMOGENEITY DESCRIPTIVE /CRITERIA=ALPHA(.05) /DESIGN=X Material Temperatur Material*Temperatur.
Resources	Processor Time	00:00:04.22
	Elapsed Time	00:00:01.50

Between-Subjects Factors

		Value Label	N
Material	1	Material tipe 1	12
	2	Material tipe 2	12
	3	Material tipe 3	12
Temperatur	1	15F	12
	2	70F	12
	3	125F	12

Descriptive Statistics

Dependent Variable: Y

Material	Temperatur	Mean	Std. Deviation	N
Material tipe 1	15F	134.75	45.353	4
	70F	57.25	23.599	4
	125F	57.50	26.851	4
	Total	83.17	48.589	12
Material tipe 2	15F	155.75	25.617	4
	70F	119.75	12.659	4
	125F	49.50	19.261	4
	Total	108.33	49.472	12
Material tipe 3	15F	144.00	25.974	4
	70F	145.75	22.544	4
	125F	85.50	19.279	4
	Total	125.08	35.766	12
Total	15F	144.83	31.694	12
	70F	107.58	42.883	12
	125F	64.17	25.672	12
	Total	105.53	47.101	36

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

Dependent Variable: Y

F	df1	df2	Sig.
.677	8	27	.707

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

a. Design: Intercept + X + Material + Temperatur + Material * Temperatur

Tests of Between-Subjects Effects

Dependent Variable: Y

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	60094.518[a]	9	6677.169	9.891	.000
Intercept	3734.700	1	3734.700	5.532	.027
X	678.296	1	678.296	1.005	.325
Material	9065.823	2	4532.911	6.714	.004
Temperatur	34564.617	2	17282.308	25.600	.000
Material * Temperatur	8514.456	4	2128.614	3.153	.031
Error	17552.454	26	675.094		
Total	478547.000	36			
Corrected Total	77646.972	35			

a. R Squared = .774 (Adjusted R Squared = .696)

Parameter Estimates

Dependent Variable: Y

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	162.554	77.961	2.085	.047	2.301	322.806
X	-.562	.561	-1.002	.325	-1.716	.591
[Material=1]	-23.641	18.880	-1.252	.222	-62.450	15.167
[Material=2]	-29.813	19.382	-1.538	.136	-69.652	10.026
[Material=3]	0[a]	.	.	.	.	.
[Temperatur=1]	59.344	18.392	3.227	.003	21.539	97.148
[Temperatur=2]	59.547	18.386	3.239	.003	21.754	97.340
[Temperatur=3]	0[a]	.	.	.	.	.
[Material=1] * [Temperatur=1]	14.954	26.257	.570	.574	-39.019	68.926
[Material=1] * [Temperatur=2]	-62.750	26.079	-2.406	.024	-116.357	-9.143
[Material=1] * [Temperatur=3]	0[a]	.	.	.	.	.
[Material=2] * [Temperatur=1]	41.001	26.841	1.528	.139	-14.171	96.173
[Material=2] * [Temperatur=2]	.720	27.583	.026	.979	-55.977	57.417
[Material=2] * [Temperatur=3]	0[a]	.	.	.	.	.
[Material=3] * [Temperatur=1]	0[a]	.	.	.	.	.
[Material=3] * [Temperatur=2]	0[a]	.	.	.	.	.
[Material=3] * [Temperatur=3]	0[a]	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

Custom Hypothesis Tests Index

1	Contrast Coefficients (L' Matrix)	Simple Contrast (reference category = 1) for Material
	Transformation Coefficients (M Matrix)	Identity Matrix
	Contrast Results (K Matrix)	Zero Matrix
2	Contrast Coefficients (L' Matrix)	Simple Contrast (reference category = 1) for Temperatur
	Transformation Coefficients (M Matrix)	Identity Matrix
	Contrast Results (K Matrix)	Zero Matrix

Custom Hypothesis Tests #1

Contrast Results (K Matrix)

Material Simple Contrast[a]			Dependent Variable Y
Level 2 vs. Level 1	Contrast Estimate		23.667
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		23.667
	Std. Error		10.712
	Sig.		.036
	95% Confidence Interval for Difference	Lower Bound	1.647
		Upper Bound	45.686
Level 3 vs. Level 1	Contrast Estimate		39.573
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		39.573
	Std. Error		10.862
	Sig.		.001
	95% Confidence Interval for Difference	Lower Bound	17.246
		Upper Bound	61.900

a. Reference category = 1

Test Results

Dependent Variable: Y

Source	Sum of Squares	df	Mean Square	F	Sig.
Contrast	9065.823	2	4532.911	6.714	.004
Error	17552.454	26	675.094		

Custom Hypothesis Tests #2

Contrast Results (K Matrix)

Temperatur Simple Contrast[a]			Dependent Variable: Y
Level 2 vs. Level 1	Contrast Estimate		-39.125
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		-39.125
	Std. Error		10.771
	Sig.		.001
	95% Confidence Interval for Difference	Lower Bound	-61.265
		Upper Bound	-16.985
Level 3 vs. Level 1	Contrast Estimate		-77.995
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		-77.995
	Std. Error		10.937
	Sig.		.000
	95% Confidence Interval for Difference	Lower Bound	-100.477
		Upper Bound	-55.514

a. Reference category = 1

Test Results

Dependent Variable: Y

Source	Sum of Squares	df	Mean Square	F	Sig.
Contrast	34564.617	2	17282.308	25.600	.000
Error	17552.454	26	675.094		

Estimated Marginal Means

1. Material

Estimates

Dependent Variable: Y

Material	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Material tipe 1	84.448[a]	7.609	68.808	100.088
Material tipe 2	108.115[a]	7.504	92.691	123.539
Material tipe 3	124.021[a]	7.575	108.450	139.592

a. Covariates appearing in the model are evaluated at the following values: X = 138.97.

Pairwise Comparisons

Dependent Variable: Y

(I) Material	(J) Material	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
Material tipe 1	Material tipe 2	-23.667*	10.712	.036	-45.686	-1.647
	Material tipe 3	-39.573*	10.862	.001	-61.900	-17.246
Material tipe 2	Material tipe 1	23.667*	10.712	.036	1.647	45.686
	Material tipe 3	-15.906	10.641	.147	-37.779	5.966
Material tipe 3	Material tipe 1	39.573*	10.862	.001	17.246	61.900
	Material tipe 2	15.906	10.641	.147	-5.966	37.779

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: Y

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	9065.823	2	4532.911	6.714	.004
Error	17552.454	26	675.094		

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

2. Temperatur

Estimates

Dependent Variable: Y

Temperatur	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
15F	144.568[a]	7.505	129.141	159.995
70F	105.443[a]	7.799	89.413	121.473
125F	66.573[a]	7.875	50.385	82.760

a. Covariates appearing in the model are evaluated at the following values: X = 138.97.

Pairwise Comparisons

Dependent Variable: Y

(I) Temperatur	(J) Temperatur	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
15F	70F	39.125*	10.771	.001	16.985	61.265
	125F	77.995*	10.937	.000	55.514	100.477
70F	15F	-39.125*	10.771	.001	-61.265	-16.985
	125F	38.870*	11.536	.002	15.157	62.584
125F	15F	-77.995*	10.937	.000	-100.477	-55.514
	70F	-38.870*	11.536	.002	-62.584	-15.157

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: Y

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	34564.617	2	17282.308	25.600	.000
Error	17552.454	26	675.094		

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

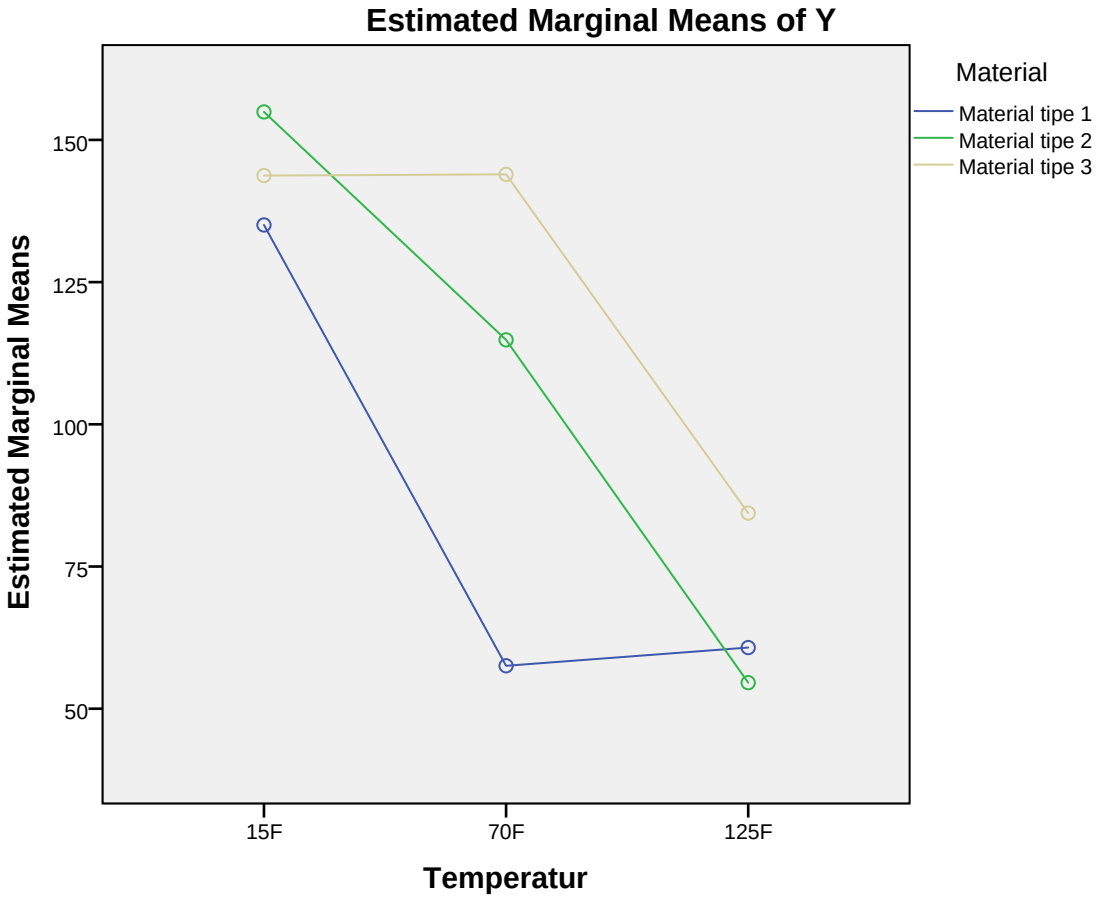
3. Material * Temperatur

Dependent Variable: Y

Material	Temperatur	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Material tipe 1	15F	135.047[a]	12.995	108.336	161.758
	70F	57.547[a]	12.995	30.836	84.258
	125F	60.750[a]	13.390	33.227	88.273
Material tipe 2	15F	154.922[a]	13.018	128.164	181.680
	70F	114.844[a]	13.883	86.308	143.380
	125F	54.578[a]	13.944	25.915	83.240
Material tipe 3	15F	143.734[a]	12.994	117.025	170.444
	70F	143.938[a]	13.116	116.976	170.899
	125F	84.391[a]	13.038	57.590	111.191

a. Covariates appearing in the model are evaluated at the following values: X = 138.97.

Profile Plots



Covariates appearing in the model are evaluated at the following values: X = 138.97