

## Univariate Analysis of Variance

### Notes

Output Created		04-NOV-2023 12:34:37
Comments		
Input	Data	/Users/eschles/Downloads/Zombies.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	20
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 number BY weapon skill /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /POSTHOC=weapon skill(LSD) /PLOT=PROFILE (weapon*skill) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO /EMMEANS=TABLES (weapon) COMPARE ADJ (LSD) /EMMEANS=TABLES (skill) COMPARE ADJ(LSD) /EMMEANS=TABLES (weapon*skill) /PRINT ETASQ DESCRIPTIVE PARAMETER HOMOGENEITY /CRITERIA=ALPHA(.05) /DESIGN=weapon skill weapon*skill.
Resources	Processor Time	00:00:02.15
	Elapsed Time	00:00:01.00

[DataSet1] /Users/eschles/Downloads/Zombies.sav

### Between-Subjects Factors

		Value Label	N
Preferred Weapon	1	katana	8
	2	crossbow	6
	3	flamethrower	6
Rated Skill Level	1	novice	11
	2	expert	9

### Descriptive Statistics

Dependent Variable: Number of Zombies Killed

Preferred Weapon	Rated Skill Level	Mean	Std. Deviation	N
katana	novice	3.60	1.517	5
	expert	15.67	4.041	3
	Total	8.13	6.707	8
crossbow	novice	4.00	1.000	3
	expert	11.33	2.517	3
	Total	7.67	4.367	6
flamethrower	novice	16.33	3.512	3
	expert	16.67	5.508	3
	Total	16.50	4.135	6
Total	novice	7.18	6.178	11
	expert	14.56	4.391	9
	Total	10.50	6.509	20

### Levene's Test of Equality of Error Variances<sup>a,b</sup>

		Levene Statistic	df1	df2
Number of Zombies Killed	Based on Mean	1.565	5	14
	Based on Median	1.074	5	14
	Based on Median and with adjusted df	1.074	5	8.094
	Based on trimmed mean	1.536	5	14

### Levene's Test of Equality of Error Variances<sup>a,b</sup>

		Sig.
Number of Zombies Killed	Based on Mean	.234
	Based on Median	.416
	Based on Median and with adjusted df	.440
	Based on trimmed mean	.242

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

a. Dependent variable: Number of Zombies Killed

b. Design: Intercept + weapon + skill + weapon \* skill

### Tests of Between-Subjects Effects

Dependent Variable: Number of Zombies Killed

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	663.133 <sup>a</sup>	5	132.627	13.088	<.001	.824
Intercept	2448.086	1	2448.086	241.587	<.001	.945
weapon	261.787	2	130.894	12.917	<.001	.649
skill	208.610	1	208.610	20.586	<.001	.595
weapon * skill	114.967	2	57.483	5.673	.016	.448
Error	141.867	14	10.133			
Total	3010.000	20				
Corrected Total	805.000	19				

a. R Squared = .824 (Adjusted R Squared = .761)

### Parameter Estimates

Dependent Variable: Number of Zombies Killed

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	16.667	1.838	9.068	<.001	12.725	20.609
[weapon=1]	-1.000	2.599	-.385	.706	-6.575	4.575
[weapon=2]	-5.333	2.599	-2.052	.059	-10.908	.241
[weapon=3]	0 <sup>a</sup>	.	.	.	.	.
[skill=1]	-.333	2.599	-.128	.900	-5.908	5.241
[skill=2]	0 <sup>a</sup>	.	.	.	.	.
[weapon=1] * [skill=1]	-11.733	3.487	-3.365	.005	-19.212	-4.254
[weapon=1] * [skill=2]	0 <sup>a</sup>	.	.	.	.	.
[weapon=2] * [skill=1]	-7.000	3.676	-1.904	.078	-14.884	.884
[weapon=2] * [skill=2]	0 <sup>a</sup>	.	.	.	.	.
[weapon=3] * [skill=1]	0 <sup>a</sup>	.	.	.	.	.
[weapon=3] * [skill=2]	0 <sup>a</sup>	.	.	.	.	.

### Parameter Estimates

Dependent Variable: Number of Zombies Killed

Parameter	Partial Eta Squared
Intercept	.855
[weapon=1]	.010
[weapon=2]	.231
[weapon=3]	.
[skill=1]	.001
[skill=2]	.
[weapon=1] * [skill=1]	.447
[weapon=1] * [skill=2]	.
[weapon=2] * [skill=1]	.206
[weapon=2] * [skill=2]	.
[weapon=3] * [skill=1]	.
[weapon=3] * [skill=2]	.

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

### Estimated Marginal Means

#### 1. Preferred Weapon

#### Estimates

Dependent Variable: Number of Zombies Killed

Preferred Weapon	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
katana	9.633	1.162	7.140	12.126
crossbow	7.667	1.300	4.879	10.454
flamethrower	16.500	1.300	13.713	19.287

### Pairwise Comparisons

Dependent Variable: Number of Zombies Killed

(I) Preferred Weapon	(J) Preferred Weapon	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference Lower Bound
katana	crossbow	1.967	1.744	.278	-1.773
	flamethrower	-6.867 <sup>*</sup>	1.744	.001	-10.606
crossbow	katana	-1.967	1.744	.278	-5.706
	flamethrower	-8.833 <sup>*</sup>	1.838	<.001	-12.775
flamethrower	katana	6.867 <sup>*</sup>	1.744	.001	3.127
	crossbow	8.833 <sup>*</sup>	1.838	<.001	4.891

### Pairwise Comparisons

Dependent Variable: Number of Zombies Killed

(I) Preferred Weapon	(J) Preferred Weapon	95% Confidence Interval for Difference Upper Bound
katana	crossbow	5.706
	flamethrower	-3.127
crossbow	katana	1.773
	flamethrower	-4.891
flamethrower	katana	10.606
	crossbow	12.775

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: Number of Zombies Killed

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	261.787	2	130.894	12.917	<.001	.649
Error	141.867	14	10.133			

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

## 2. Rated Skill Level

### Estimates

Dependent Variable: Number of Zombies Killed

Rated Skill Level	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
novice	7.978	.988	5.859	10.096
expert	14.556	1.061	12.280	16.831

### Pairwise Comparisons

Dependent Variable: Number of Zombies Killed

(I) Rated Skill Level	(J) Rated Skill Level	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval
					Lower Bound
novice	expert	-6.578 <sup>*</sup>	1.450	<.001	-9.687
expert	novice	6.578 <sup>*</sup>	1.450	<.001	3.468

### Pairwise Comparisons

Dependent Variable: Number of Zombies Killed

(I) Rated Skill Level	(J) Rated Skill Level	95% Confidence Interval for ...
		Upper Bound
novice	expert	-3.468
expert	novice	9.687

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: Number of Zombies Killed

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	208.610	1	208.610	20.586	<.001	.595
Error	141.867	14	10.133			

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

### 3. Preferred Weapon \* Rated Skill Level

Dependent Variable: Number of Zombies Killed

Preferred Weapon	Rated Skill Level	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
katana	novice	3.600	1.424	.547	6.653
	expert	15.667	1.838	11.725	19.609
crossbow	novice	4.000	1.838	.058	7.942
	expert	11.333	1.838	7.391	15.275
flamethrower	novice	16.333	1.838	12.391	20.275
	expert	16.667	1.838	12.725	20.609

### Post Hoc Tests

#### Preferred Weapon

#### Multiple Comparisons

Dependent Variable: Number of Zombies Killed

LSD

(I) Preferred Weapon	(J) Preferred Weapon	Mean Difference (I-J)	Std. Error	Sig.	95% ...
					Lower Bound
katana	crossbow	.46	1.719	.794	-3.23
	flamethrower	-8.37 <sup>*</sup>	1.719	<.001	-12.06
crossbow	katana	-.46	1.719	.794	-4.15
	flamethrower	-8.83 <sup>*</sup>	1.838	<.001	-12.78
flamethrower	katana	8.38 <sup>*</sup>	1.719	<.001	4.69
	crossbow	8.83 <sup>*</sup>	1.838	<.001	4.89

#### Multiple Comparisons

Dependent Variable: Number of Zombies Killed

LSD

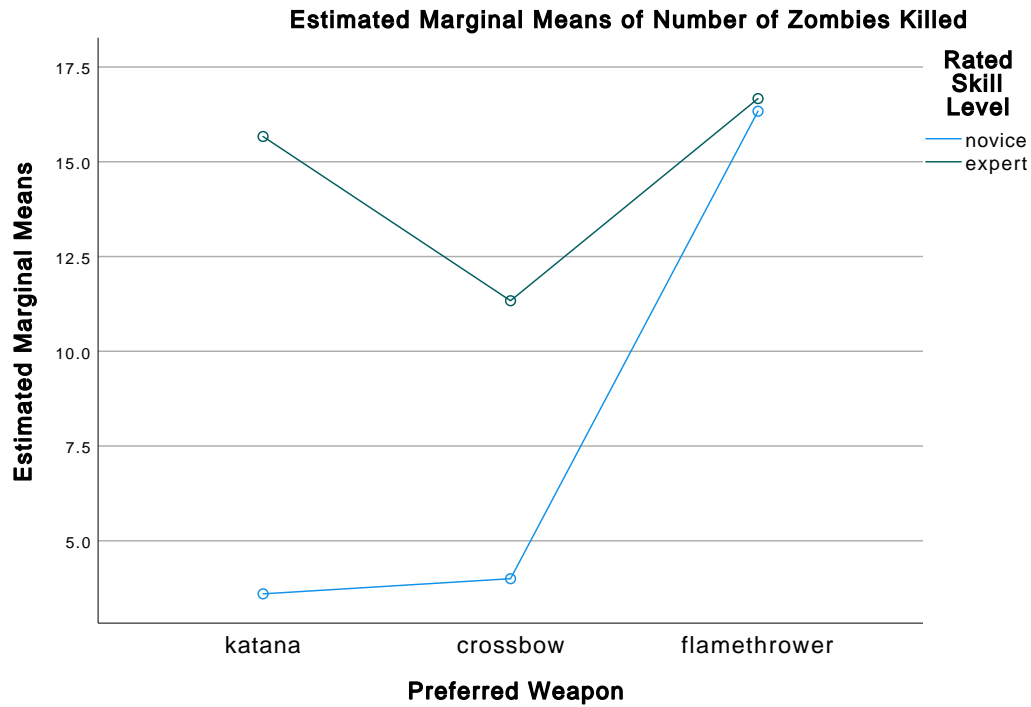
(I) Preferred Weapon	(J) Preferred Weapon	95% ...
		Upper Bound
katana	crossbow	4.15
	flamethrower	-4.69
crossbow	katana	3.23
	flamethrower	-4.89
flamethrower	katana	12.06
	crossbow	12.78

Based on observed means.

The error term is Mean Square(Error) = 10.133.

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

### Profile Plots



## T-Test

### Notes

Output Created		04-NOV-2023 16:04:17
Comments		
Input	Data	/Users/eschles/Downloads/Zombies.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	Preferred Weapon
	N of Rows in Working Data File	20
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=skill(1 2) /MISSING=ANALYSIS /VARIABLES=number /ES DISPLAY(TRUE) /CRITERIA=CI(.95).



### Notes

Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.00

Preferred Weapon = katana

### Group Statistics<sup>a</sup>

	Rated Skill Level	N	Mean	Std. Deviation	Std. Error Mean
Number of Zombies Killed	novice	5	3.60	1.517	.678
	expert	3	15.67	4.041	2.333

a. Preferred Weapon = katana

### Independent Samples Test<sup>a</sup>

		Levene's Test for Equality of Variances		t-test for Equality of
		F	Sig.	t
Number of Zombies Killed	Equal variances assumed	3.334	.118	-6.255
	Equal variances not assumed			-4.966

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means		
		df	Significance One-Sided p	Two-Sided p
Number of Zombies Killed	Equal variances assumed	6	<.001	<.001
	Equal variances not assumed	2.344	.014	.027

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		Mean Difference	Std. Error Difference
Number of Zombies Killed	Equal variances assumed	-12.067	1.929
	Equal variances not assumed	-12.067	2.430

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Number of Zombies Killed	Equal variances assumed	-16.787	-7.346
	Equal variances not assumed	-21.181	-2.952

a. Preferred Weapon = katana

### Independent Samples Effect Sizes<sup>a</sup>

		Standardizer <sup>b</sup>	Point Estimate	95% ... Lower
Number of Zombies Killed	Cohen's d	2.642	-4.568	-7.427
	Hedges' correction	3.041	-3.968	-6.451
	Glass's delta	4.041	-2.986	-6.021

### Independent Samples Effect Sizes<sup>a</sup>

		95% ... Upper
Number of Zombies Killed	Cohen's d	-1.638
	Hedges' correction	-1.423
	Glass's delta	.044

a. Preferred Weapon = katana

b. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

### Preferred Weapon = crossbow

#### Group Statistics<sup>a</sup>

		Rated Skill Level	N	Mean	Std. Deviation	Std. Error Mean
Number of Zombies Killed	novice		3	4.00	1.000	.577
	expert		3	11.33	2.517	1.453

a. Preferred Weapon = crossbow

### Independent Samples Test<sup>a</sup>

		Levene's Test for Equality of Variances		t-test for Equality of
		F	Sig.	t
Number of Zombies Killed	Equal variances assumed	1.923	.238	-4.690
	Equal variances not assumed			-4.690

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means		
		df	Significance	
			One-Sided p	Two-Sided p
Number of Zombies Killed	Equal variances assumed	4	.005	.009
	Equal variances not assumed	2.616	.012	.025

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		Mean Difference	Std. Error Difference
Number of Zombies Killed	Equal variances assumed	-7.333	1.563
	Equal variances not assumed	-7.333	1.563

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Number of Zombies Killed	Equal variances assumed	-11.674	-2.992
	Equal variances not assumed	-12.749	-1.918

a. Preferred Weapon = crossbow

### Independent Samples Effect Sizes<sup>a</sup>

		Standardizer <sup>b</sup>	Point Estimate	95% ... Lower
Number of Zombies Killed	Cohen's d	1.915	-3.830	-6.793
	Hedges' correction	2.400	-3.056	-5.420
	Glass's delta	2.517	-2.914	-5.960

### Independent Samples Effect Sizes<sup>a</sup>

		95% ... Upper
Number of Zombies Killed	Cohen's d	-.778
	Hedges' correction	-.621
	Glass's delta	.174

a. Preferred Weapon = crossbow

b. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

### Preferred Weapon = flamethrower

### Group Statistics<sup>a</sup>

		Rated Skill Level	N	Mean	Std. Deviation	Std. Error Mean
Number of Zombies Killed	novice		3	16.33	3.512	2.028
	expert		3	16.67	5.508	3.180

a. Preferred Weapon = flamethrower

### Independent Samples Test<sup>a</sup>

		Levene's Test for Equality of Variances		t-test for Equality of
		F	Sig.	t
Number of Zombies Killed	Equal variances assumed	.434	.546	-.088
	Equal variances not assumed			-.088

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means		
		df	Significance	
			One-Sided p	Two-Sided p
Number of Zombies Killed	Equal variances assumed	4	.467	.934
	Equal variances not assumed	3.396	.467	.935

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		Mean Difference	Std. Error Difference
Number of Zombies Killed	Equal variances assumed	-.333	3.771
	Equal variances not assumed	-.333	3.771

### Independent Samples Test<sup>a</sup>

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Number of Zombies Killed	Equal variances assumed	-10.804	10.137
	Equal variances not assumed	-11.581	10.915

a. Preferred Weapon = flamethrower

### Independent Samples Effect Sizes<sup>a</sup>

		Standardizer <sup>b</sup>	Point Estimate	95% ... Lower
Number of Zombies Killed	Cohen's d	4.619	-.072	-1.669
	Hedges' correction	5.789	-.058	-1.332
	Glass's delta	5.508	-.061	-1.655

### Independent Samples Effect Sizes<sup>a</sup>

		95% ... Upper
Number of Zombies Killed	Cohen's d	1.533
	Hedges' correction	1.223
	Glass's delta	1.548

- a. Preferred Weapon = flamethrower
- b. The denominator used in estimating the effect sizes.
  - Cohen's d uses the pooled standard deviation.
  - Hedges' correction uses the pooled standard deviation, plus a correction factor.
  - Glass's delta uses the sample standard deviation of the control group.