

Two-way Anova Lab

The SPSS data set may be downloaded from:

www.mtsu.edu/~dkfuller/psy629/retail1.sav.

A marketing researcher contacted individuals leaving four different stores. The researcher recorded each person's sex and asked them to indicate their level of agreement with the statement 'I never buy a product unless it is on sale.' Their responses are given below.

I never buy a product unless it is on sale (1 = Strongly Disagree, 5 = Strongly Agree)							
1 = Target		2 = Kmart		3 = Wal-Mart		4 = Dollar General	
1=Male	2=Female	1=Male	2=Female	1=Male	2=Female	1=Male	2=Female
1	1	1	1	1	1	1	1
1	2	1	1	1	1	1	1
3	1	1	1	1	1	1	1
4	1	1	1	2	1	2	2
1	2	1	2	2	1	2	2
2	4	2	2	3	2	2	2
2	1	2	3	3	2	2	2
1	4	2	3	3	2	3	2
1	2	3	3	4	2	3	2
2	2	3	4	4	3	3	3
2	1	4	4	5	3	4	3
1	4	4	4	5	3	4	3
4	1	5	4	5	3	5	3
5	3	5	4	5	4	5	3
1	4	5	5	5	4	5	5

The data should be entered in three columns in the SPSS data file.

<i>Sex</i>	<i>Store</i>	<i>Agree1</i>
Male	Wal-Mart	5
Male	Kmart	4
...		
Female	Target	3
Female	Dollar General	4
...		

What is the relationship of store type and sex to level of agreement?

The screenshot shows the SPSS Data Editor window with a dataset named 'retail1'. The dataset has columns for 'sex' and 'store', and rows for 10 observations. The 'Analyze' menu is open, and the 'Univariate...' option is selected. The 'Univariate' dialog box is open, showing the dependent variable 'I never buy a product u' and fixed factors 'sex' and 'store'.

	sex	store				
1	Female	Targ				
2	Male	Kma				
3	Male	Kma				
4	Female	Wal-Ma				
5	Male	Dollar Ge	5	No Children	3	
6	Female	Dollar Ge	5	No Children	3	
7	Female	Targ	5	No Children	1	
8	Male	Kma	5	Small Child	1	
9	Female	Kma	5	Small Child	3	
10	Female	Kmart	5	Small Child	1	

Univariate

Dependent Variable: I never buy a product u

Fixed Factor(s): sex, store

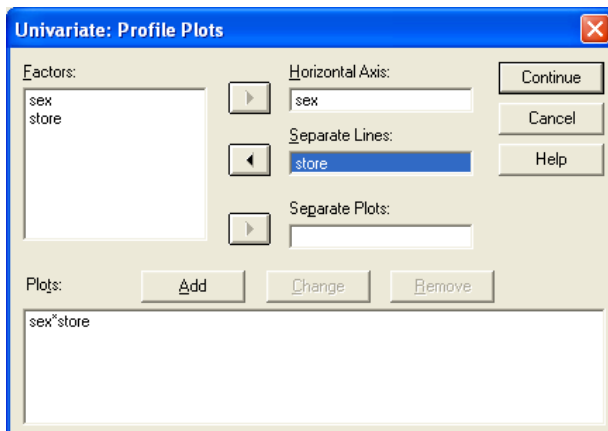
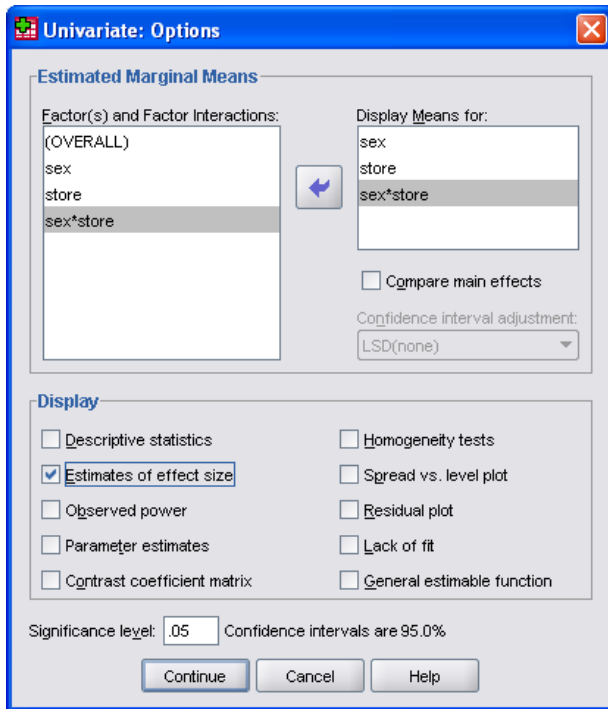
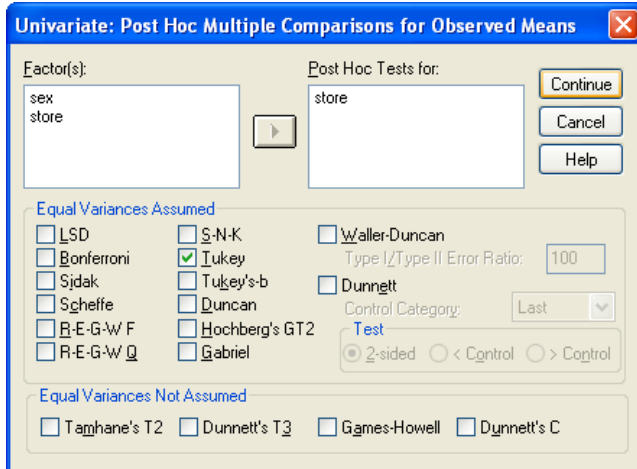
Random Factor(s):

Covariate(s):

WLS Weight:

Model...
Contrasts...
Plots...
Post Hoc...
Save...
Options...

OK Paste Reset Cancel Help



Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
sex	1	Male	60
	2	Female	60
store	1	Target	30
	2	Kmart	30
	3	Wal-Mart	30
	4	Dollar General	30

Tests of Between-Subjects Effects

Dependent Variable: I never buy a product unless it is on sale.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	49.700 ^a	7	7.100	4.623	.000	.224
Intercept	1116.300	1	1116.300	726.893	.000	.866
sex	.033	1	.033	.022	.883	.000
store	47.233	3	15.744	10.252	.000	.215
sex * store	2.433	3	.811	.528	.664	.014
Error	172.000	112	1.536			
Total	1338.000	120				
Corrected Total	221.700	119				

a. R Squared = .224 (Adjusted R Squared = .176)

Estimated Marginal Means

1. sex

Dependent Variable:I never buy a product unless it is on sale.

sex	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	3.067	.160	2.750	3.384
Female	3.033	.160	2.716	3.350

2. store

Dependent Variable:I never buy a product unless it is on sale.

store	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Target	2.133	.226	1.685	2.582
Kmart	3.467	.226	3.018	3.915
Wal-Mart	2.833	.226	2.385	3.282
Dollar General	3.767	.226	3.318	4.215

3. sex * store

Dependent Variable:I never buy a product unless it is on sale.

sex	store	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	Target	2.067	.320	1.433	2.701
	Kmart	3.667	.320	3.033	4.301
	Wal-Mart	2.933	.320	2.299	3.567
	Dollar General	3.600	.320	2.966	4.234
Female	Target	2.200	.320	1.566	2.834
	Kmart	3.267	.320	2.633	3.901
	Wal-Mart	2.733	.320	2.099	3.367
	Dollar General	3.933	.320	3.299	4.567

Post Hoc Tests

store

Multiple Comparisons

I never buy a product unless it is on sale.

Tukey HSD

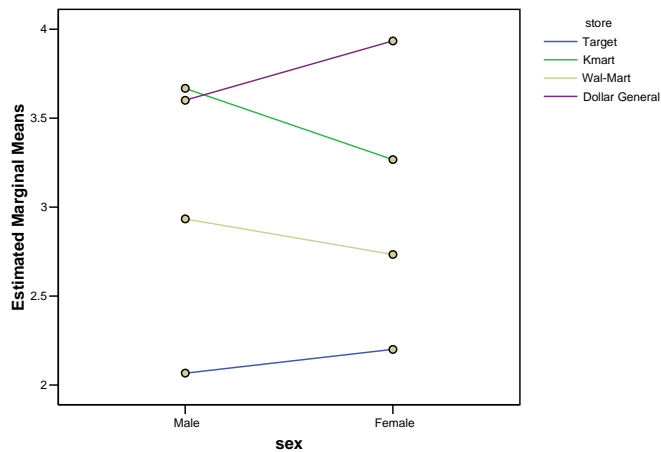
(I) store	(J) store	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Target	Kmart	-1.33*	.320	.000	-2.17	-.50
	Wal-Mart	-.70	.320	.133	-1.53	.13
	Dollar General	-1.63*	.320	.000	-2.47	-.80
Kmart	Target	1.33*	.320	.000	.50	2.17
	Wal-Mart	.63	.320	.202	-.20	1.47
	Dollar General	-.30	.320	.785	-1.13	.53
Wal-Mart	Target	.70	.320	.133	-.13	1.53
	Kmart	-.63	.320	.202	-1.47	.20
	Dollar General	-.93*	.320	.022	-1.77	-.10
Dollar General	Target	1.63*	.320	.000	.80	2.47
	Kmart	.30	.320	.785	-.53	1.13
	Wal-Mart	.93*	.320	.022	.10	1.77

Based on observed means.

The error term is Mean Square(Error) = 1.536.

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

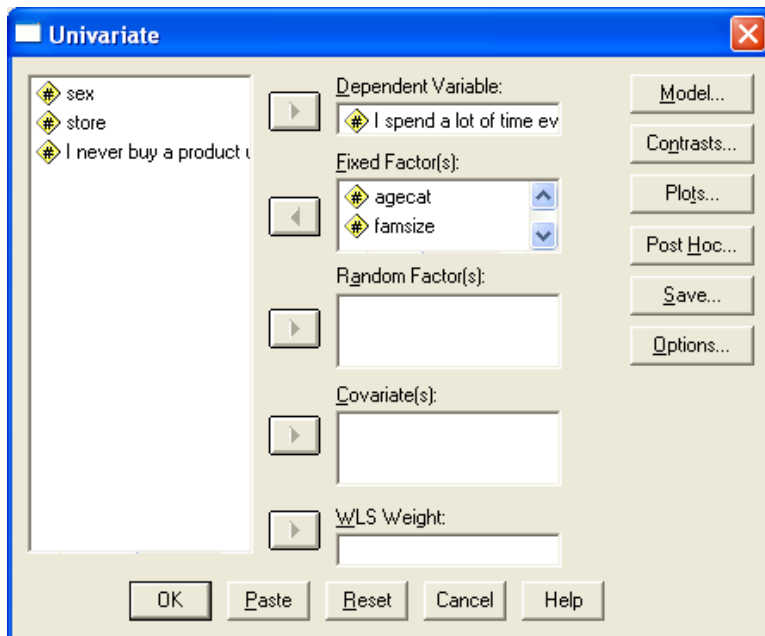
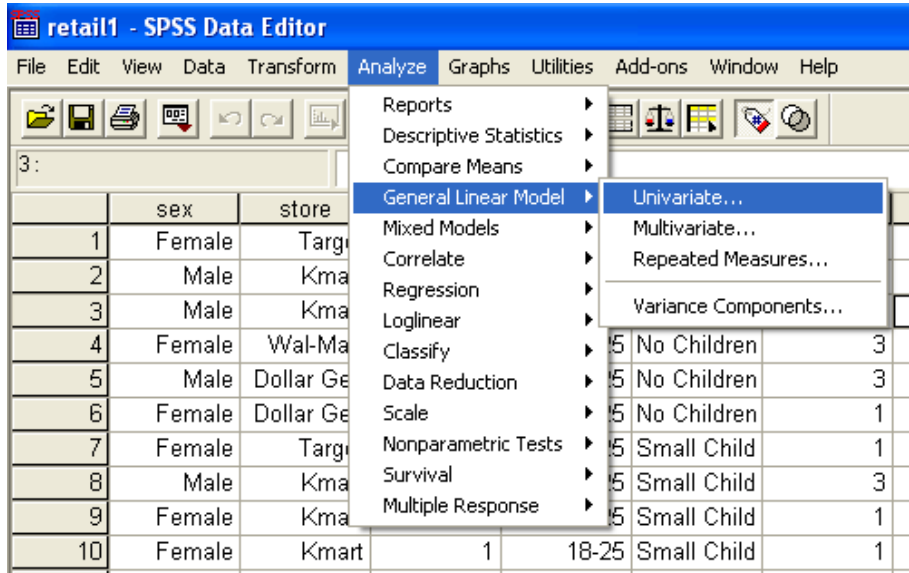
Estimated Marginal Means of I never buy a product unless it is on sale.

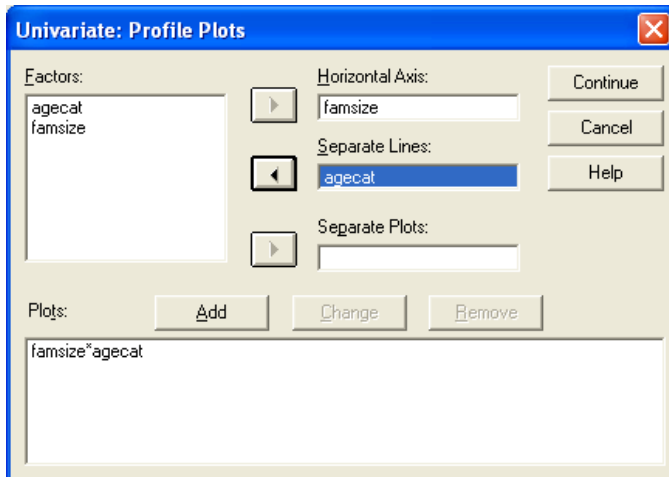
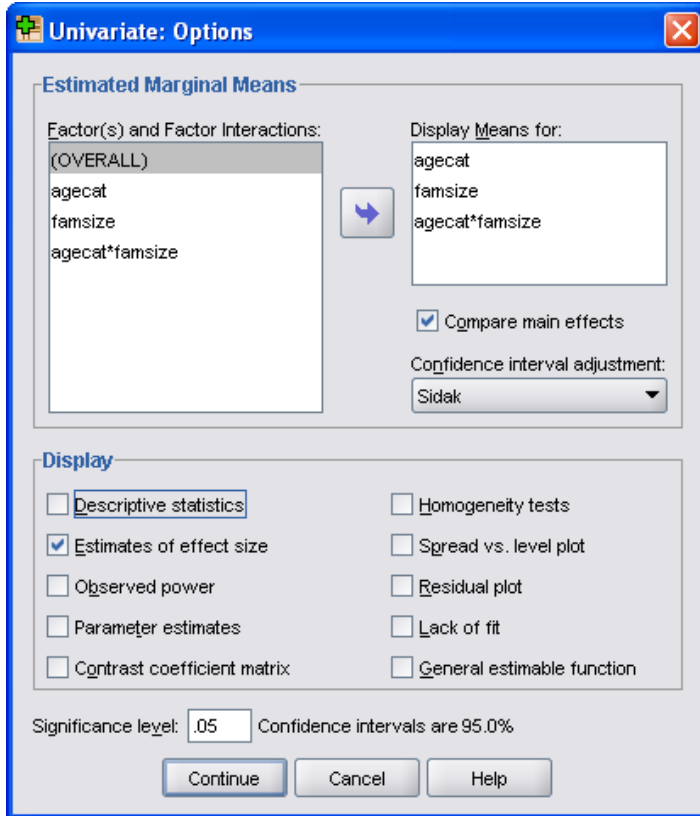


A marketing researcher contacted individuals within a local shopping mall. The researcher recorded each person's age and family size as well as their level of agreement with the statement 'I spend a lot of time evaluating products before I make a purchase.' Their responses are given below.

I spend a lot of time evaluating products before I make a purchase (1 = Strongly Disagree, 5 = Strongly Agree).				
Family Size	1 = Age 18 – 25	2 = Age 26 – 35	3 = Age 35 – 50	4 = Age 50+
1 = No Children in Home	2	1	4	5
	1	5	4	3
	2	1	3	3
	3	5	4	5
	3	3	5	4
	1	4	1	2
		4	2	3
		1	5	5
		4	5	1
		3	2	3
		5	4	5
		1	4	3
		3	2	
			5	
			1	
		3		
2 = Young Children in Home	1	5	1	1
	3	2	3	2
	1	3	4	5
	1	1	3	2
	1	3	4	2
	2	1	1	3
	1	4	2	
	2	2		
	1			
	2			
3				
1				
3 = Older Children in Home	3	1	1	5
	1	2	1	1
	3	4	4	2
	3	5	5	2
	1	4	3	5
	1	1	4	
	2	4	5	
	2	3	1	
		5	2	
		5	3	
		1	3	
		2	4	
		2	2	
		2	3	
			2	

What is the relationship of age and family size to level of agreement?





Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
agecat	1	18-25	26
	2	26-35	35
	3	36-50	36
	4	51+	23
famsize	1	No Children in Home	47
	2	Small Children in Home	33
	3	Older Children in Home	40

Tests of Between-Subjects Effects

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	40.859 ^a	11	3.714	2.020	.033	.171
Intercept	749.137	1	749.137	407.370	.000	.790
agecat	22.253	3	7.418	4.034	.009	.101
famsize	7.892	2	3.946	2.146	.122	.038
agecat * famsize	1.173	6	.196	.106	.996	.006
Error	198.608	108	1.839			
Total	1158.000	120				
Corrected Total	239.467	119				

a. R Squared = .171 (Adjusted R Squared = .086)

Estimated Marginal Means

1. agecat

Estimates

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

agecat	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
18-25	1.861	.277	1.312	2.410
26-35	2.877	.236	2.408	3.345
36-50	2.982	.240	2.506	3.458
51+	3.000	.303	2.399	3.601

Pairwise Comparisons

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

(I) agecat	(J) agecat	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
18-25	26-35	-1.016*	.364	.037	-1.991	-.040
	36-50	-1.121*	.366	.017	-2.103	-.139
	51+	-1.139*	.411	.039	-2.239	-.038
26-35	18-25	1.016*	.364	.037	.040	1.991
	36-50	-.105	.337	1.000	-1.008	.798
	51+	-.123	.384	1.000	-1.154	.907
36-50	18-25	1.121*	.366	.017	.139	2.103
	26-35	.105	.337	1.000	-.798	1.008
	51+	-.018	.387	1.000	-1.055	1.019
51+	18-25	1.139*	.411	.039	.038	2.239
	26-35	.123	.384	1.000	-.907	1.154
	36-50	.018	.387	1.000	-1.019	1.055

Based on estimated marginal means

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

a. Adjustment for multiple comparisons: Sidak.

Univariate Tests

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	22.253	3	7.418	4.034	.009	.101
Error	198.608	108	1.839			

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

2. famsize

Estimates

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

famsize	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No Children in Home	2.988	.212	2.569	3.407
Small Children in Home	2.320	.244	1.836	2.804
Older Children in Home	2.732	.233	2.270	3.194

Pairwise Comparisons

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

(I) famsize	(J) famsize	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
No Children in Home	Small Children in Home	.668	.323	.118	-.115	1.451
	Older Children in Home	.256	.315	.803	-.508	1.020
Small Children in Home	No Children in Home	-.668	.323	.118	-1.451	.115
	Older Children in Home	-.412	.338	.534	-1.231	.406
Older Children in Home	No Children in Home	-.256	.315	.803	-1.020	.508
	Small Children in Home	.412	.338	.534	-.406	1.231

Based on estimated marginal means

a. Adjustment for multiple comparisons: Sidak.

Univariate Tests

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	7.892	2	3.946	2.146	.122	.038
Error	198.608	108	1.839			

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

3. agecat * famsize

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

agecat	famsize	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
18-25	No Children in Home	2.000	.554	.903	3.097
	Small Children in Home	1.583	.391	.807	2.359
	Older Children in Home	2.000	.479	1.050	2.950
26-35	No Children in Home	3.077	.376	2.331	3.822
	Small Children in Home	2.625	.479	1.675	3.575
	Older Children in Home	2.929	.362	2.210	3.647
36-50	No Children in Home	3.375	.339	2.703	4.047
	Small Children in Home	2.571	.513	1.555	3.587
	Older Children in Home	3.000	.376	2.254	3.746
51+	No Children in Home	3.500	.391	2.724	4.276
	Small Children in Home	2.500	.554	1.403	3.597

3. agecat * famsize

Dependent Variable: I spend a lot of time evaluating products before I make a purchase.

agecat	famsize	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
18-25	No Children in Home	2.000	.554	.903	3.097
	Small Children in Home	1.583	.391	.807	2.359
	Older Children in Home	2.000	.479	1.050	2.950
26-35	No Children in Home	3.077	.376	2.331	3.822
	Small Children in Home	2.625	.479	1.675	3.575
	Older Children in Home	2.929	.362	2.210	3.647
36-50	No Children in Home	3.375	.339	2.703	4.047
	Small Children in Home	2.571	.513	1.555	3.587
	Older Children in Home	3.000	.376	2.254	3.746
51+	No Children in Home	3.500	.391	2.724	4.276
	Small Children in Home	2.500	.554	1.403	3.597
	Older Children in Home	3.000	.606	1.798	4.202

Estimated Marginal Means of I spend a lot of time evaluating products before I make a purchase.

