

Cluster Analysis

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Table of Contents:

I. Model	p. 1-4
II. Running SPSS	p. 5-20
III. SPSS Output	p. 21-33
IV. Tabling Results	p. 34
V. Write-up	p. 35 -37
VI. Appendix Decision Tools	

I. Model

Data Set: **National Community Study 2006 conducted by CATI**

I. Internal Variables/Clustering Variables (11 total):

Q61 through Q71 All questions have the following measurement categories (5-0, 9 where 5 is several and 0 is never on scale and 9 indicates missing data):

- 5- Several times a day;
- 4- About once a day;
- 3- Several times a week;
- 2- About once a week;
- 1- Less often than that;
- 0- Have never gone on Internet;
- 9- Missing data

Frequency of Internet use overall

Q61. Today, people use the internet and other communication technologies to keep up with their communities and for a host of other reasons.

Have you ever gone on the Internet? If said yes, remaining questions follow. 0=never gone Internet

If yes, how often do you go on the Internet at home or at work?

Website content/specific use

Q62. How often do you visit websites representing larger community or metro area where you live?

Q63. How about a website representing your immediate neighborhood or community?

Q64. Media websites such as one of the TV networks, a newspaper site or radio site?

Q65. Websites of businesses or companies?

Q66. Entertainment websites such as those for movies, games, hobbies, etc.?

Q67. Websites of public or non-profit organizations?

Q68. Websites in other countries, outside the United States?

Q69. Sports websites?

Q70. Websites in other languages?

Email use

Q71. How often do you use email?

II. External Variables/Profiling Variables (9 total):

Q1. First, which of the following best describes where you live?

- 1- in a central city neighborhood of a metropolitan area;
- 2- in a near-by suburb or a metro area;
- 3- in a more distant suburb of a metro area;
- 4- in a fair-sized city outside a metro area;
- 5- in a small town outside a metro area, or;
- 6- in the country;
- 7- other

Q2. How long have you lived there?

- 1- less than a year;
- 2- from 1 to 5 years;
- 3- 6 to 10 years;
- 4- 11 to 20 years;
- 5- 21 to 30 years;
- 6- 31 to 40 years;
- 7- 41 to 50 years;
- 8- more than 50 years;
- 9- missing information

Q97. I enjoy learning about other peoples and cultures

- 0-0 Completely disagree
- 1-1
- 2-2
- 3-3
- 4-4
- 5- Neutral
- 6-6
- 7-7
- 8-8
- 9-9
- 10-10 Completely agree
- 99- Missing data/Don't know

Q98. I think of myself as a citizen of the world.

- 0-0 Completely disagree
- 1-1
- 2-2
- 3-3
- 4-4
- 5- Neutral
- 6-6
- 7-7
- 8-8
- 9-9
- 10-10 Completely agree
- 99- Missing data/Don't know

Recoded Q.97 and Q.98 compute variable "Cosmopolitaness" Cosmo= ZQ97 + Zq98

Q103. Marital status

- 1-married;
- 2-divorced;
- 3-widowed;
- 4-separated;
- 5-never been married;
- 9-missing information

Recoded as nominal variable Q.103Dummy “Marriedness” where 1=1 and 0=all others

Q104. Age

- 1- 18-20;
- 2- 21-30;
- 3- 31-40;
- 4- 41-50;
- 5- 51-60;
- 6- 61-70;
- 7-71 or older;
- 9-Declines to answer

Q105. How much formal education have you completed?

- 1-completed grade school (8 years or less);
- 2-some high school;
- 3-high school graduate;
- 4-some college;
- 5-college graduate;
- 6-advanced college degree;
- 9-Missing information

Recoded as nominal variable Q.105Dummy “Post High school Education” where 1=4-6 & 0=1-3

Q106. What is your ethnic or racial background?

- 1-Black/African American;
- 2-White/Caucasian;
- 3-Hispanic;
- 4-Asian;
- 5-American Indian;
- 6-Mixed;
- 7-Other;
- 9-Missing information/Refused)

Recoded as nominal variable Q.106 Dummy “Whiteness” where 1= 2 (white) and 0= all others

Q107. Annual household income

- 1- \$10,000 or less;
- 2- \$10,001 to \$20,000;
- 3- \$20,001 to \$30,000;
- 4- \$30,001 to \$40,000;
- 5- \$40,001 to \$50,000;
- 6- \$50,001 to \$75,000;
- 7- \$75,001 to \$100,000;
- 8- \$100,001 to \$150,000;
- 9- more than \$150,000;
- 99-missing information/don't know/refused)

Recoded into nominal variable Q107Dummy “Above Median Income” where median income+ = 1, below median = 0. 1 = responses include 6,7,8,9 and 0= responses 1,2,3,4,5

Q107 source <http://www.census.gov/prod/2007pubs/acs-08.pdf> \$48,451

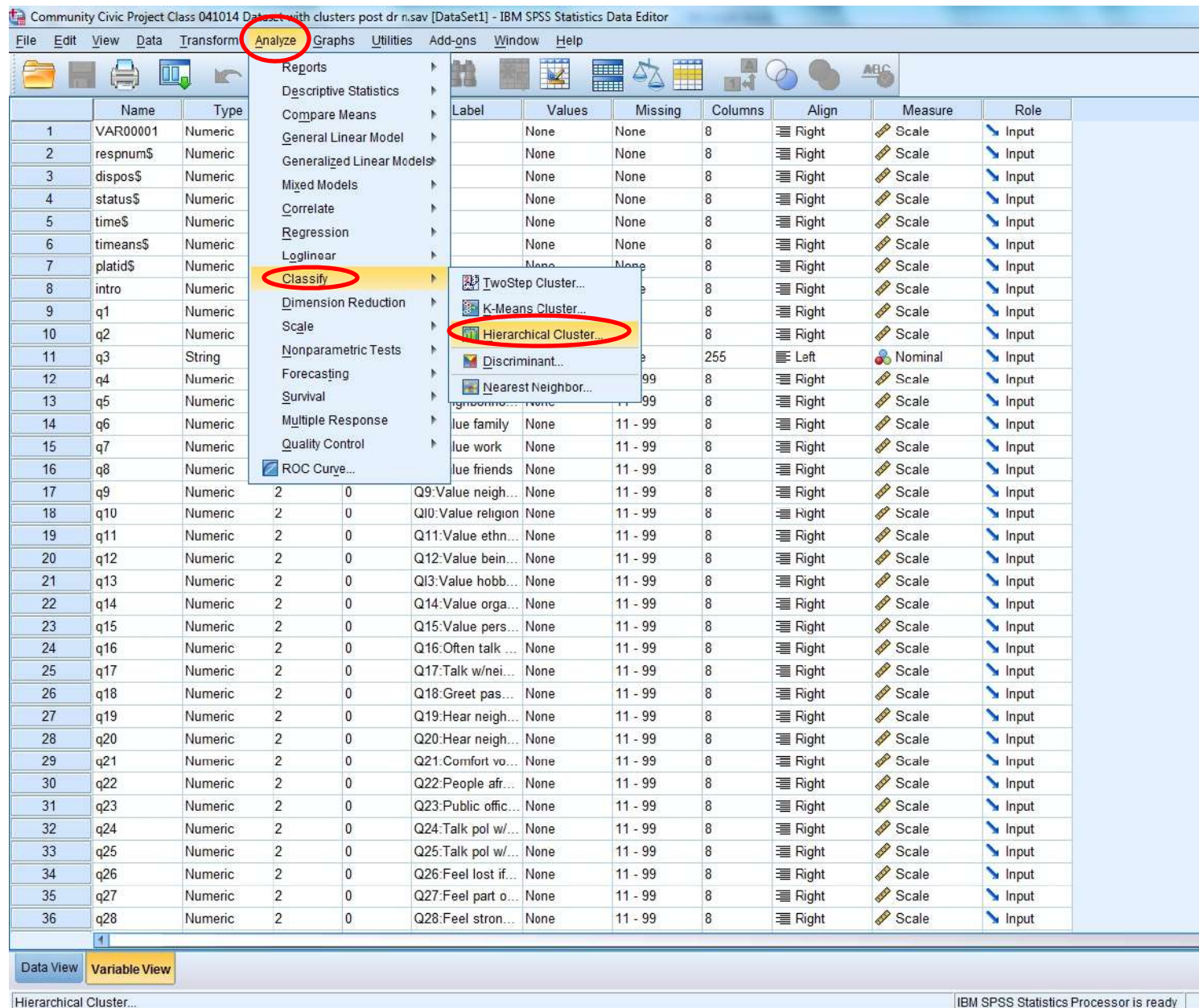
Q109. And, just for the record, are you male or female?

- 1-male;
- 2-female

Recoded as nominal variable Q.109Dummy “Femaleness” where 1= 2 (female) and 0= 1 (male)

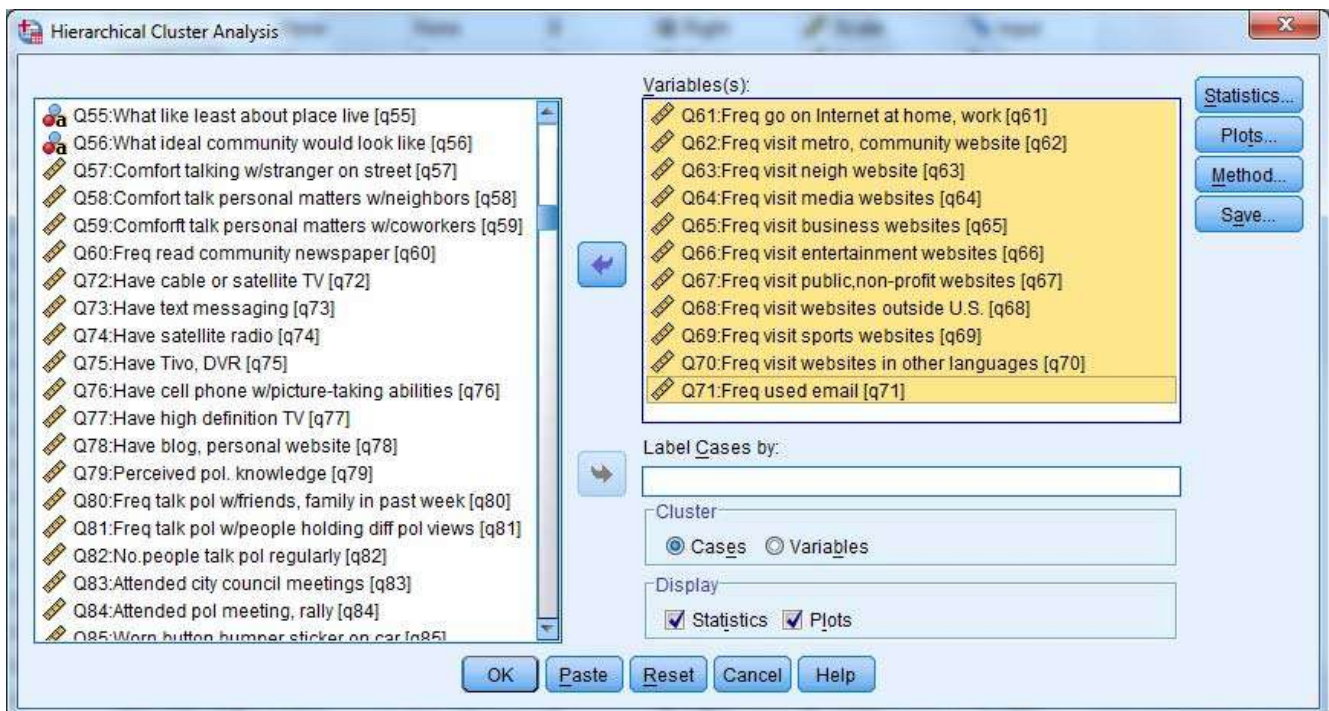
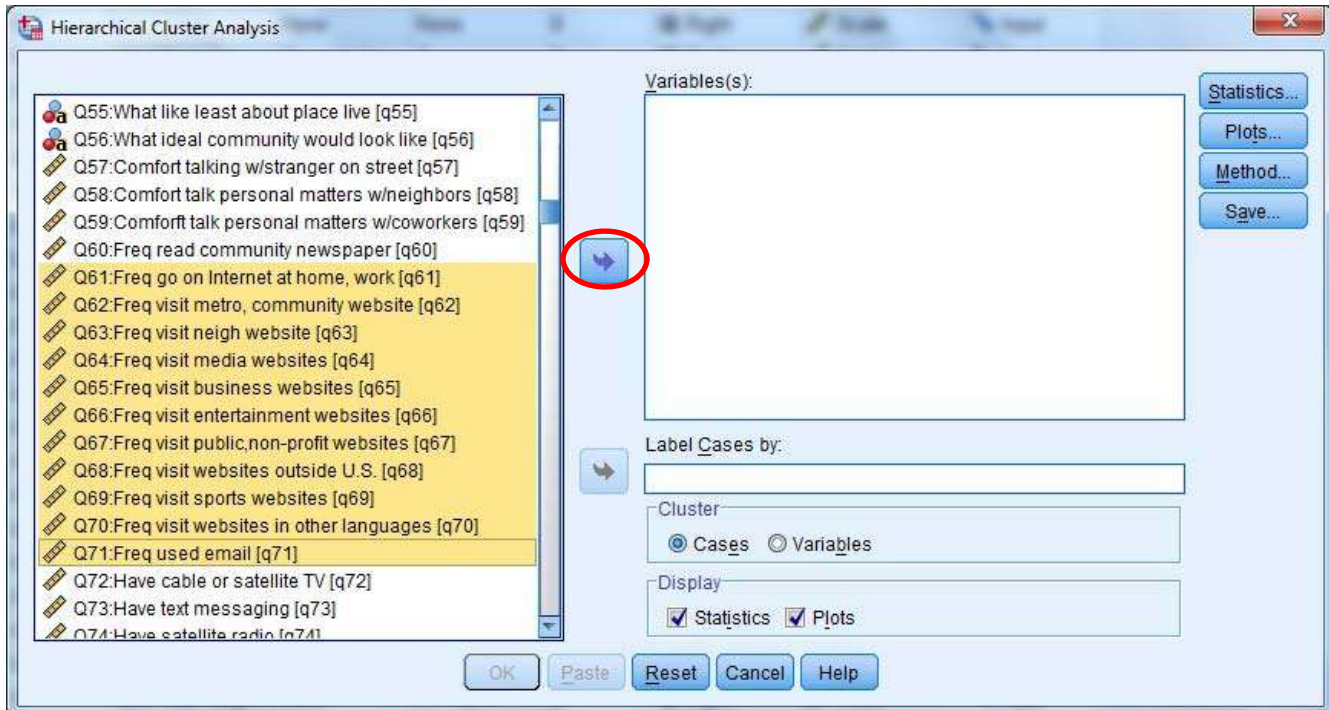
II. Running SPSS

Analyze → Classify → Hierarchical Cluster

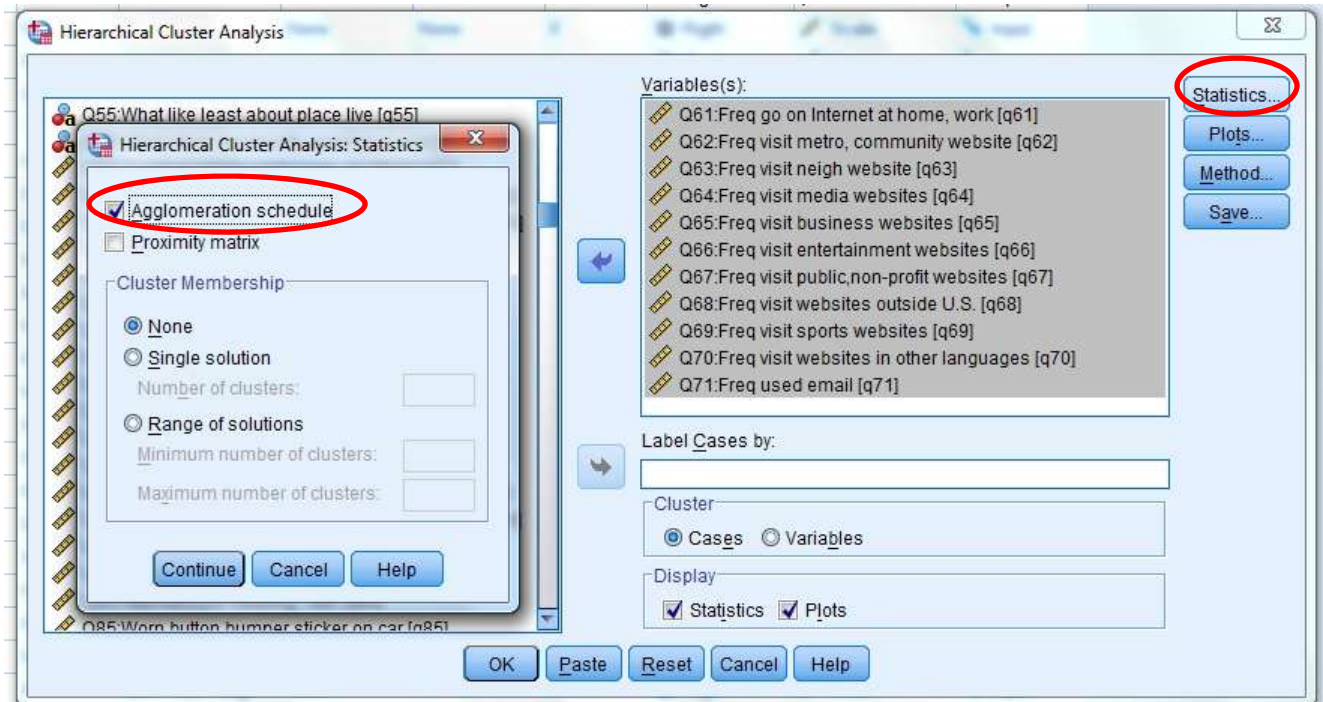


→ Select your Internal **Variables** for analysis

(Q. 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71)



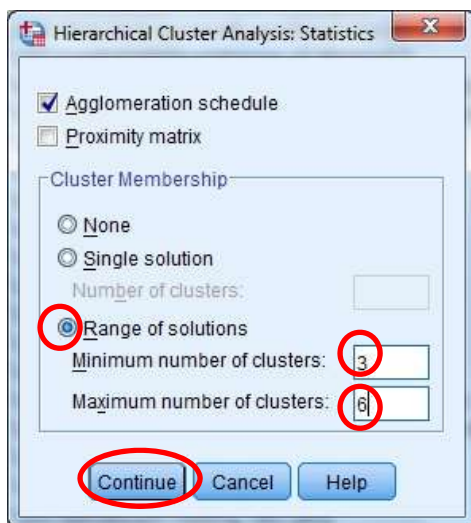
→Click “Statistics” Box



→Make sure that the “Agglomeration Schedule” box is checked.

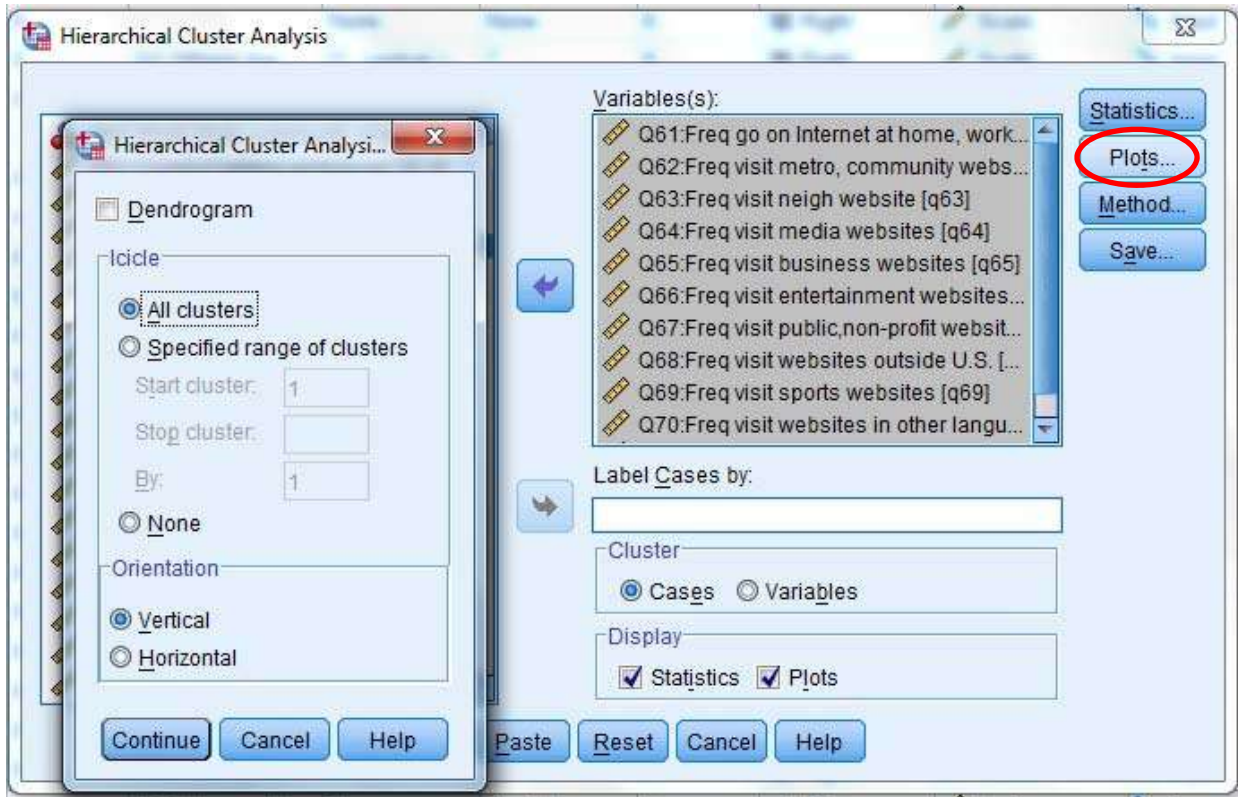
→Then, under Cluster Membership, check the circle “Range of Solutions”.

→Indicate your minimum number of clusters and the maximum number of clusters. (3 to 6 or 4 to 7 is common)

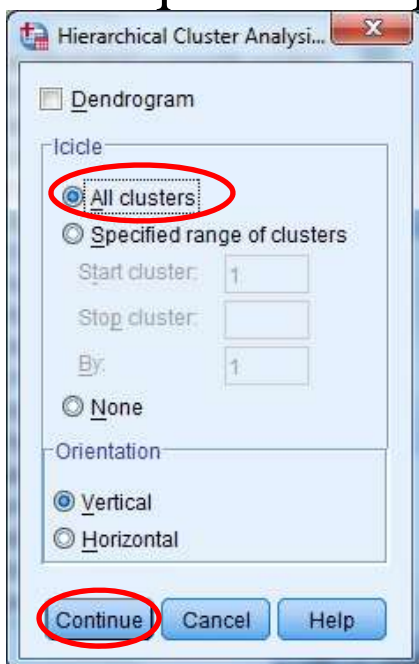


Then click “Continue”.

→ Click “Plots” Box

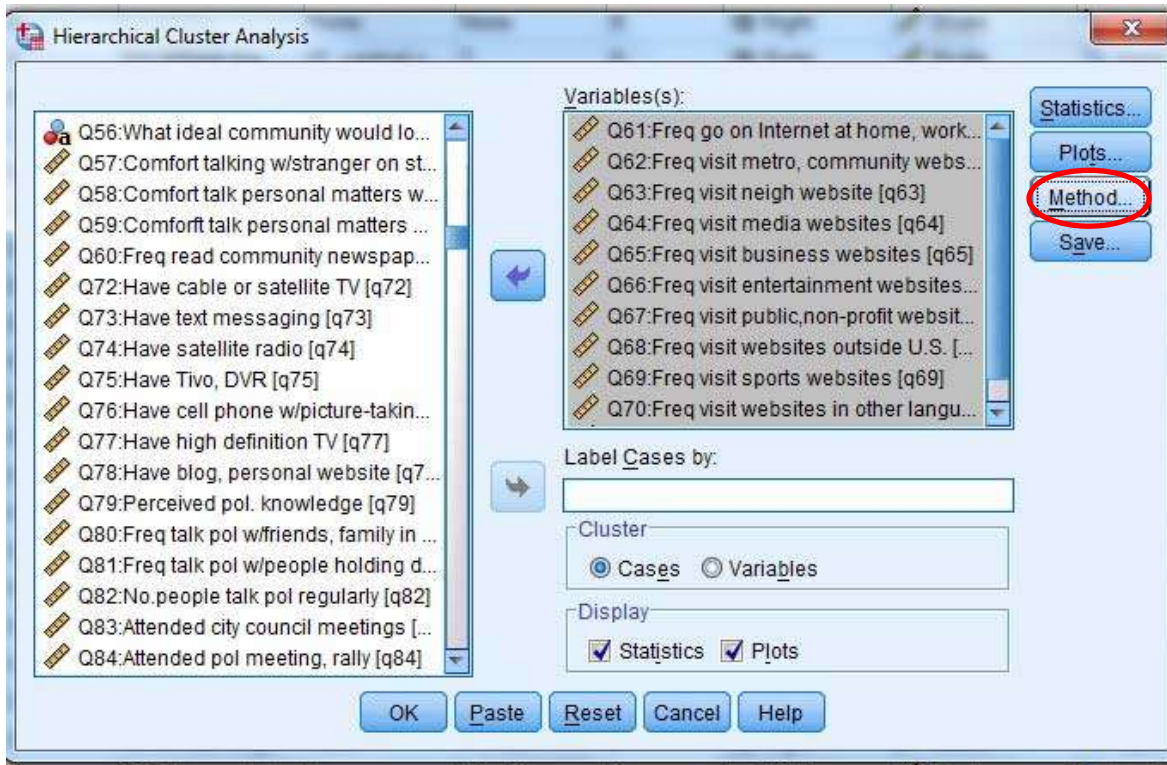


→ Note that you must select either the “Dendrogram” box or something under “Icicle”. We ran Icicle, **All Clusters**. SPSS forces you to proceed, though you are not required to report for five stats assignment.

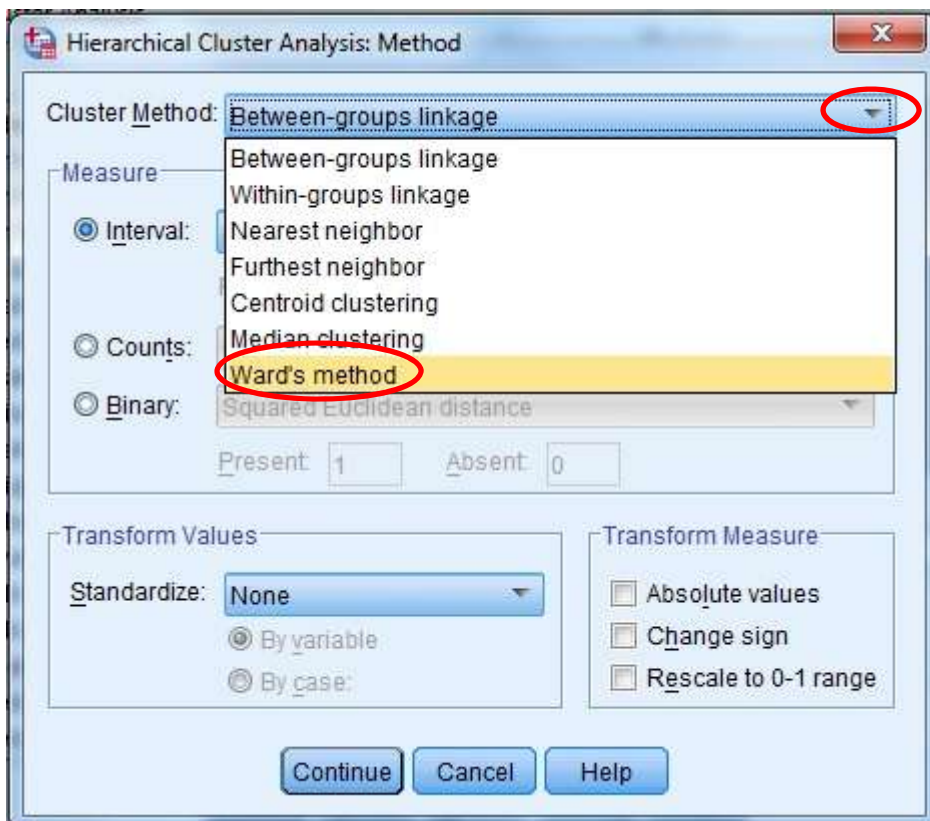


Then click “Continue”.

→ Click “Method” Box

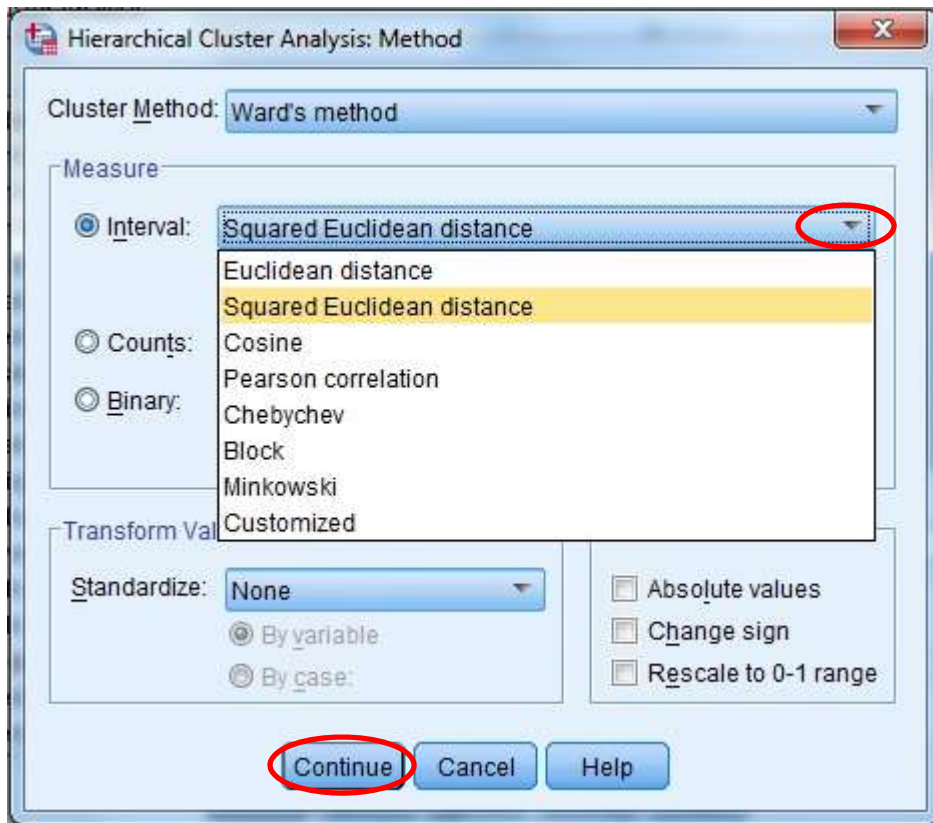


→ From “Cluster Method” drop down arrow → Select “Ward’s Method”



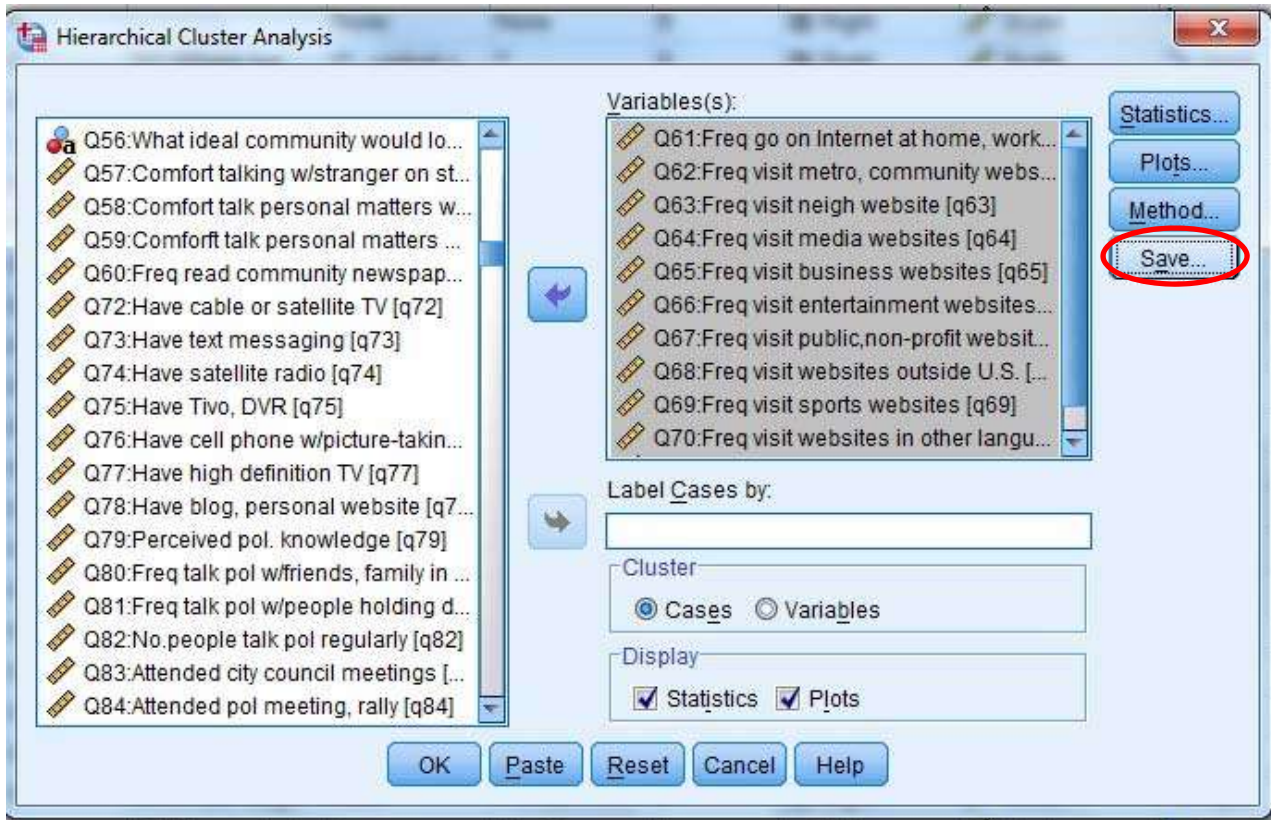
→ Under “Measure”, select “**Interval**” circle.

→ From drop down arrow select “**Squared Euclidean Distance**”

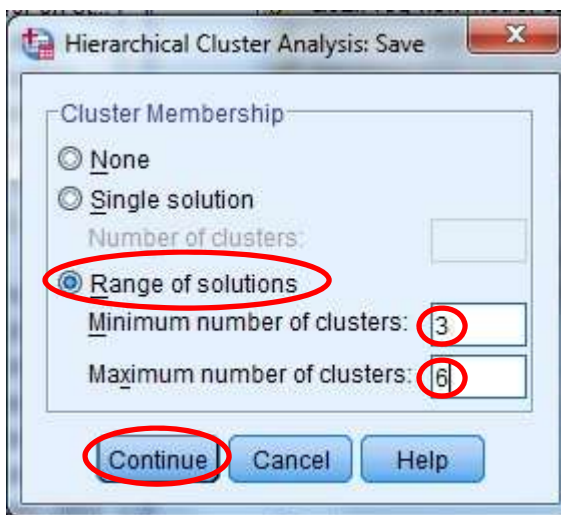


Then click “**Continue**”.

→ Click “Save” Box

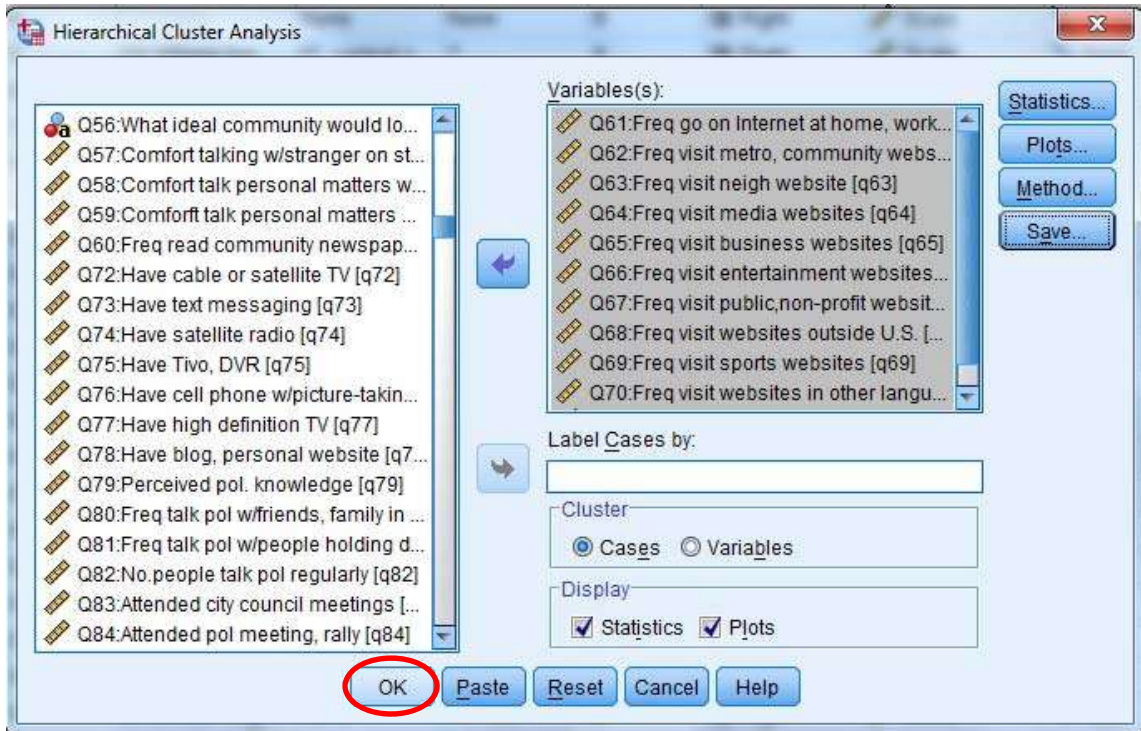


→ Under “**Cluster Membership**” select the circle “**Range of Solutions**”. Type 3 into “Minimum number of clusters” box and type 6 into “Maximum number of clusters” box.



Then click “Continue”.

→ Click “OK” Box



Note: This point marks the end of the actual Cluster procedure in SPSS as indicated by our Syntax below. The Hierarchical Cluster Analysis procedure has produced an **Agglomerative Schedule** and a **Cluster Membership Table** in SPSS output. This procedure has also created and saved at the end of the dataset new nominal variables. In our specific example a 3-cluster variable, a 4-cluster variable, a 5-cluster variable, and a 6-cluster variable.

GET

```
FILE='E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class
041014 Dataset with clusters post dr n.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
CLUSTER q61 q62 q63 q64 q65 q66 q67 q68 q69 q70 q71
/METHOD WARD
/MEASURE=SEUCLID
/PRINT SCHEDULE CLUSTER(3,6)
/PLOT VICICLE
/SAVE CLUSTER(3,6).
```

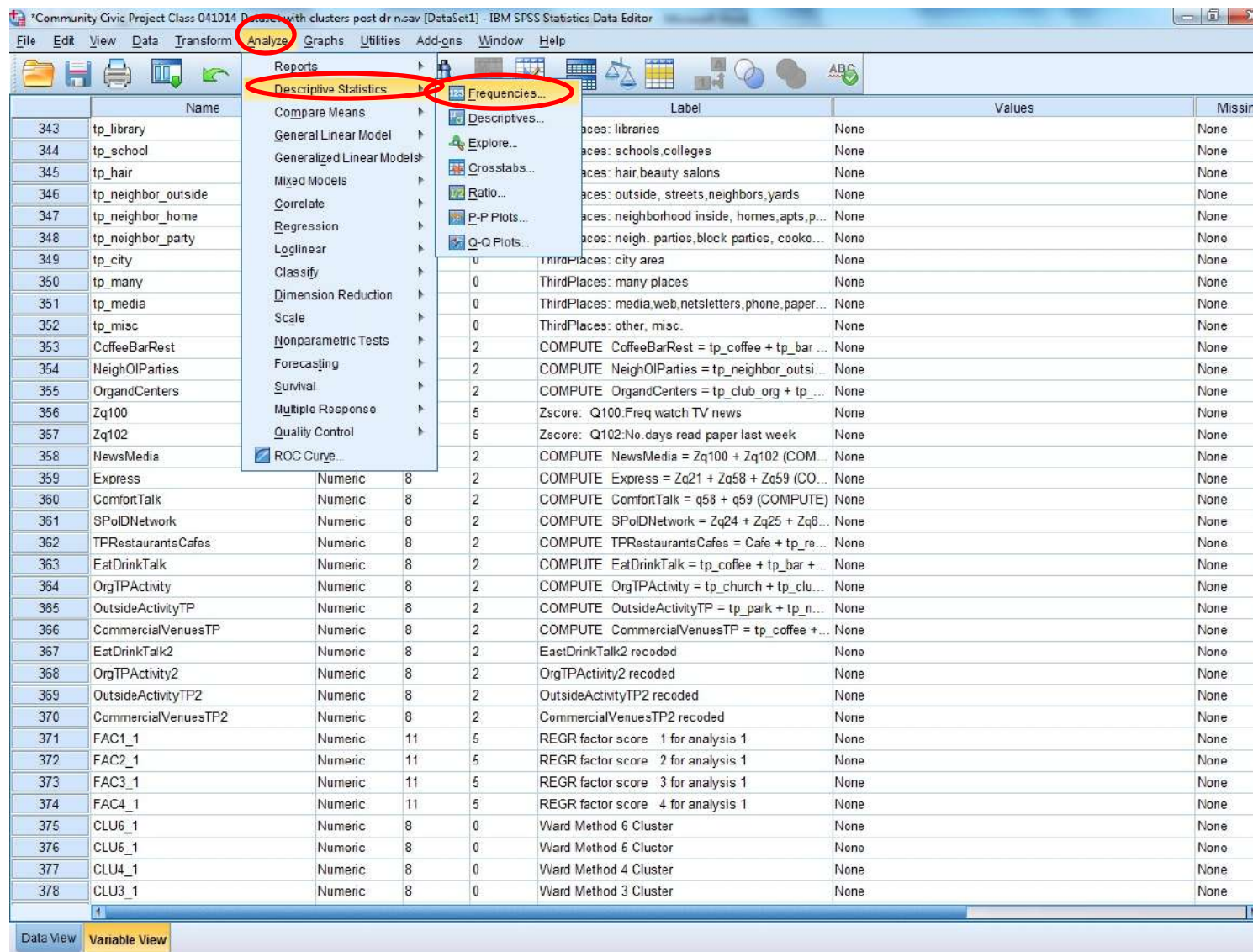
The screenshot shows the SPSS Data Editor window with the following data table:

	Name	Type	Width	Decimals	Label
375	CLU6_1	Numeric	8	0	Ward Method 6 Cluster
376	CLU5_1	Numeric	8	0	Ward Method 5 Cluster
377	CLU4_1	Numeric	8	0	Ward Method 4 Cluster
378	CLU3_1	Numeric	8	0	Ward Method 3 Cluster

Further Frequencies and ANOVA analysis procedures will help decide which cluster solution to ultimately select.

Now we examine the cluster groupings.

Analyze → Descriptive Statistics → Frequencies



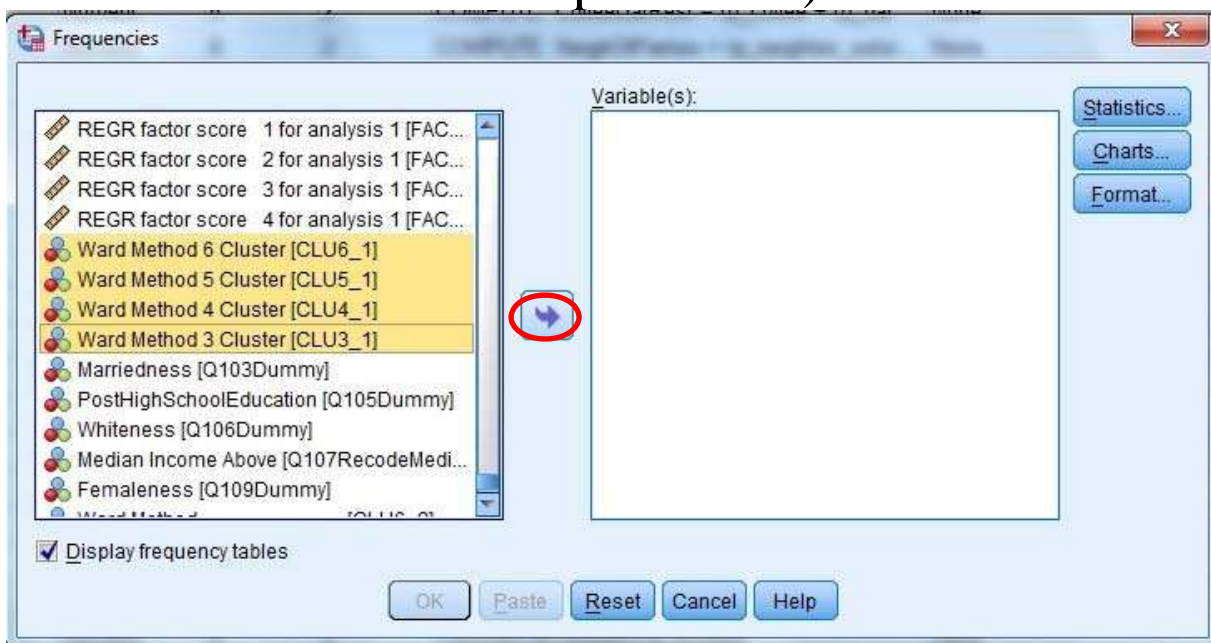
→ Select the **cluster variables**. These are the newly created variables that will be at bottom of SPSS list.

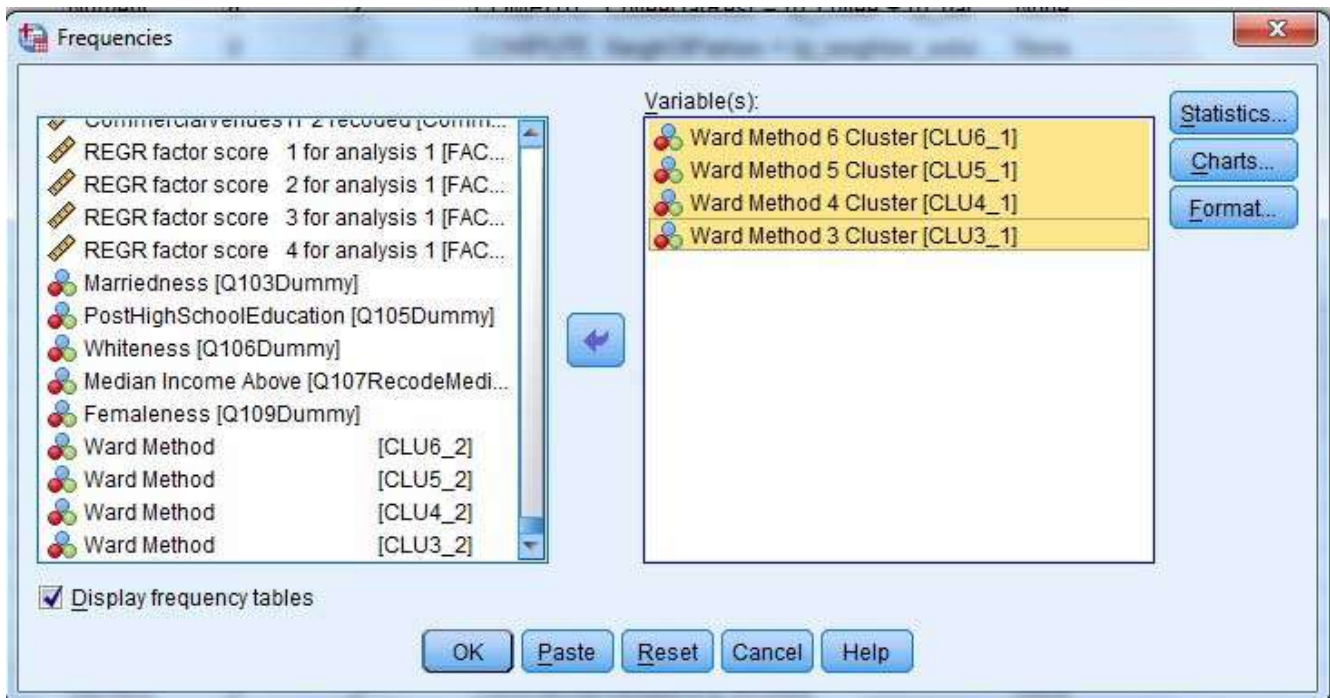
“Ward Method [Clus6_1]” (Note we changed name in label to **Ward Method 6 Cluster** so easier to identify distinctions in SPSS output charts)

“Ward Method [Clus5_1]” (Note we changed name in label to **Ward Method 5 Cluster** so easier to identify distinctions in SPSS output charts)

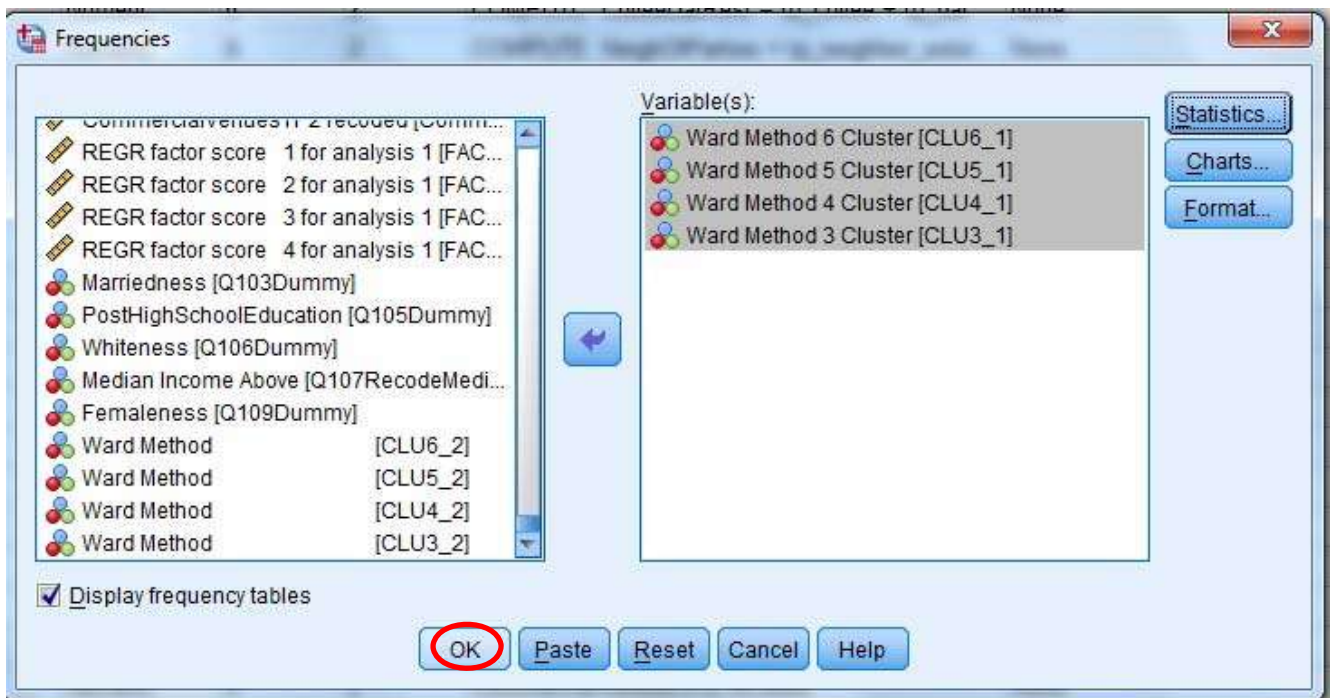
“Ward Method [Clus4_1]” (Note we changed name in label to **Ward Method 4 Cluster** so easier to identify distinctions in SPSS output charts)

“Ward Method [Clus3_1]” (Note we changed name in label to **Ward Method 3 Cluster** so easier to identify distinctions in SPSS output charts)



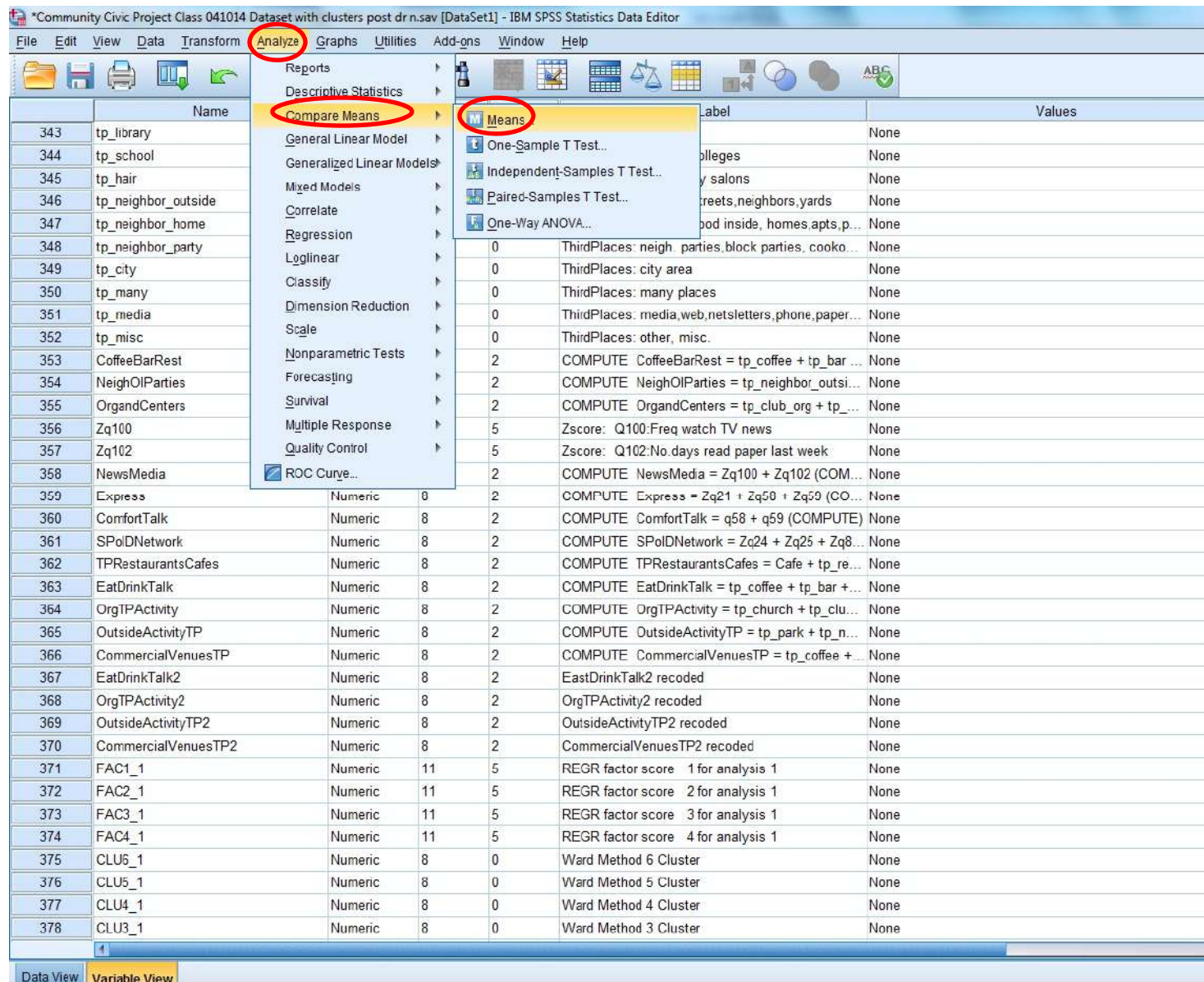


→ Click “OK” Box



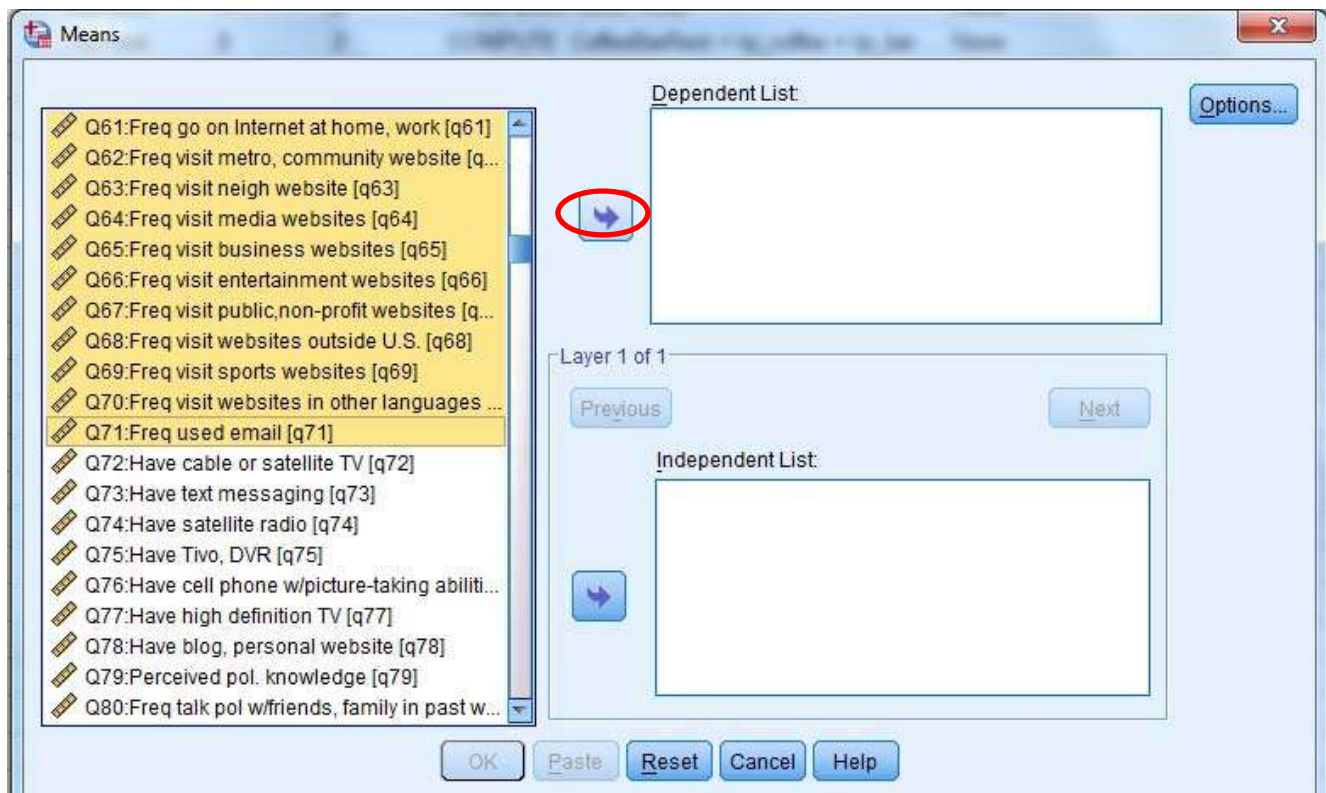
Run Means (with ANOVA tests) to compare means among the clusters.

Analyze → Compare Means → Means



→ Select the 11 total **Internal Variables** and enter into the “**Dependent List**”

Q.61-71 for our example.



→ Also select the 9 total **External Variables** and enter into the “**Dependent List.**”

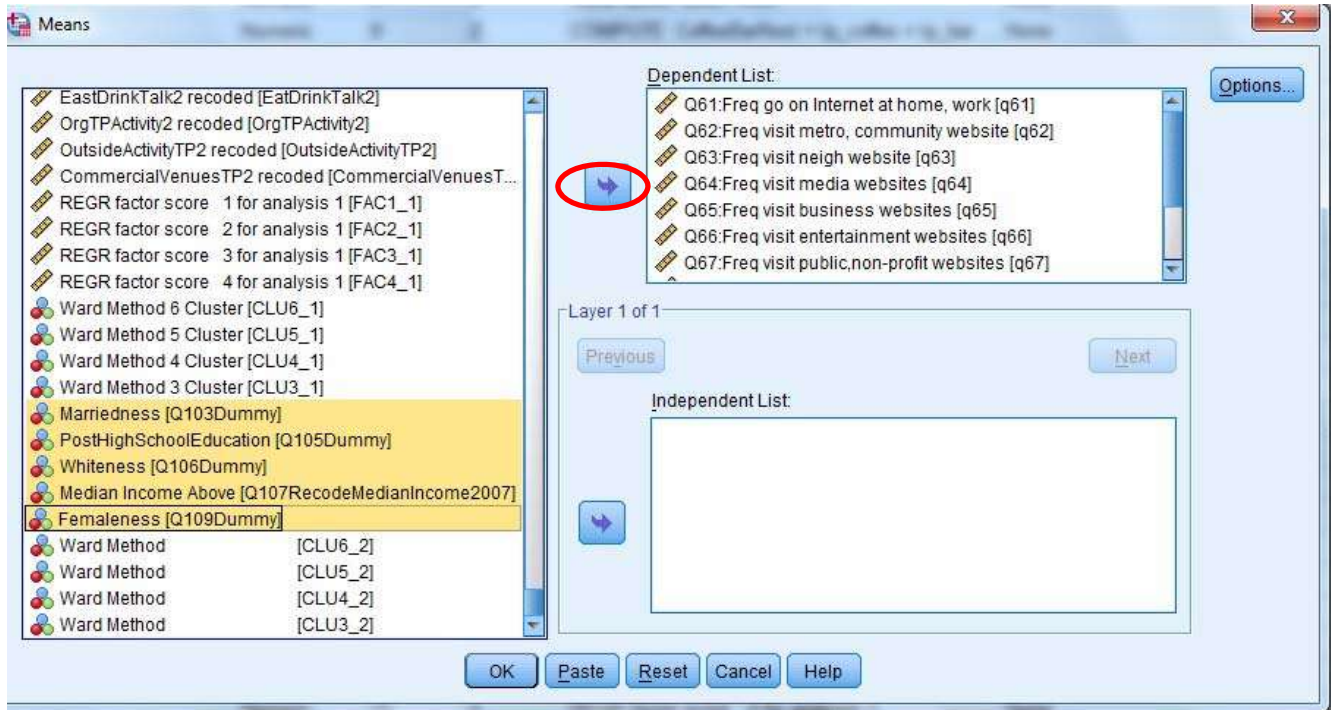
Q1, Q2, Q104

ComputeCosmo (scale composed of standardized Q97 and Q98)

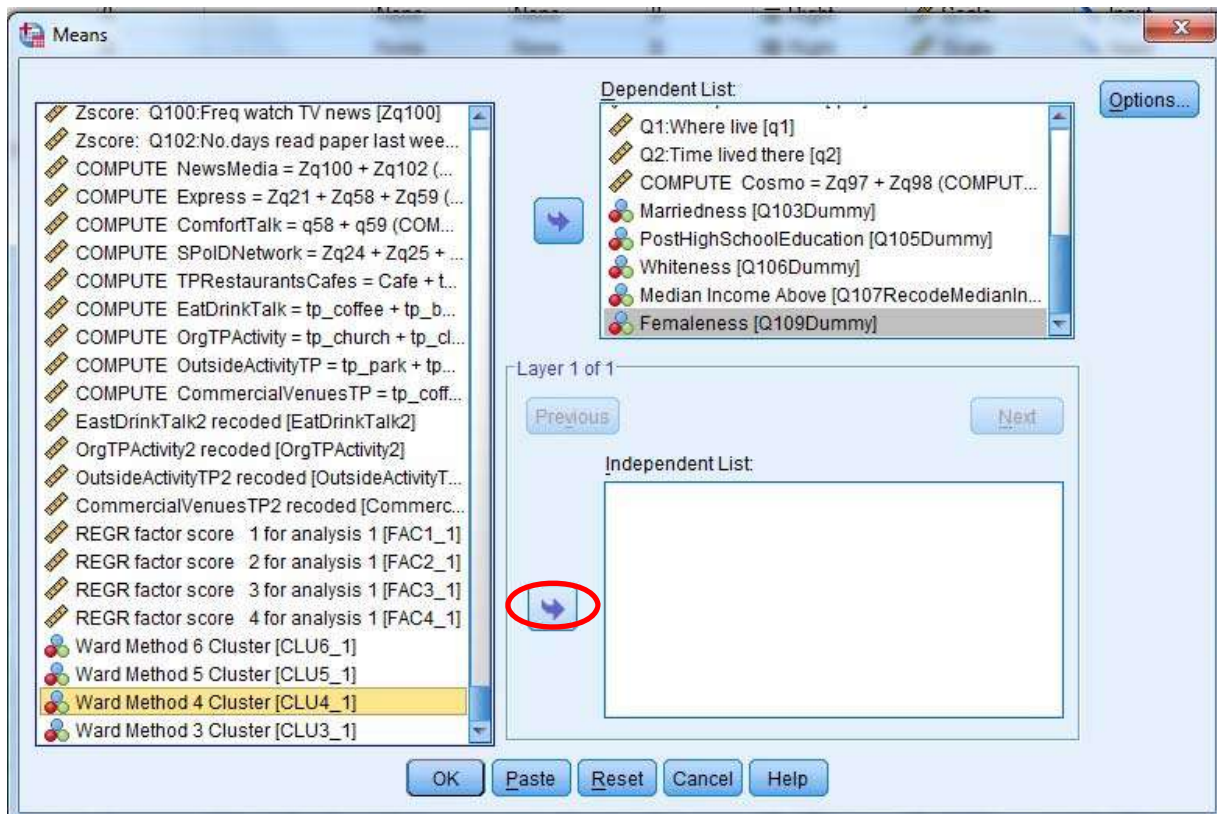
And the following dummied variables:

Marriedness, PostHighSchoolEducation, Whiteness, MedianIncome Above, Femaleness.

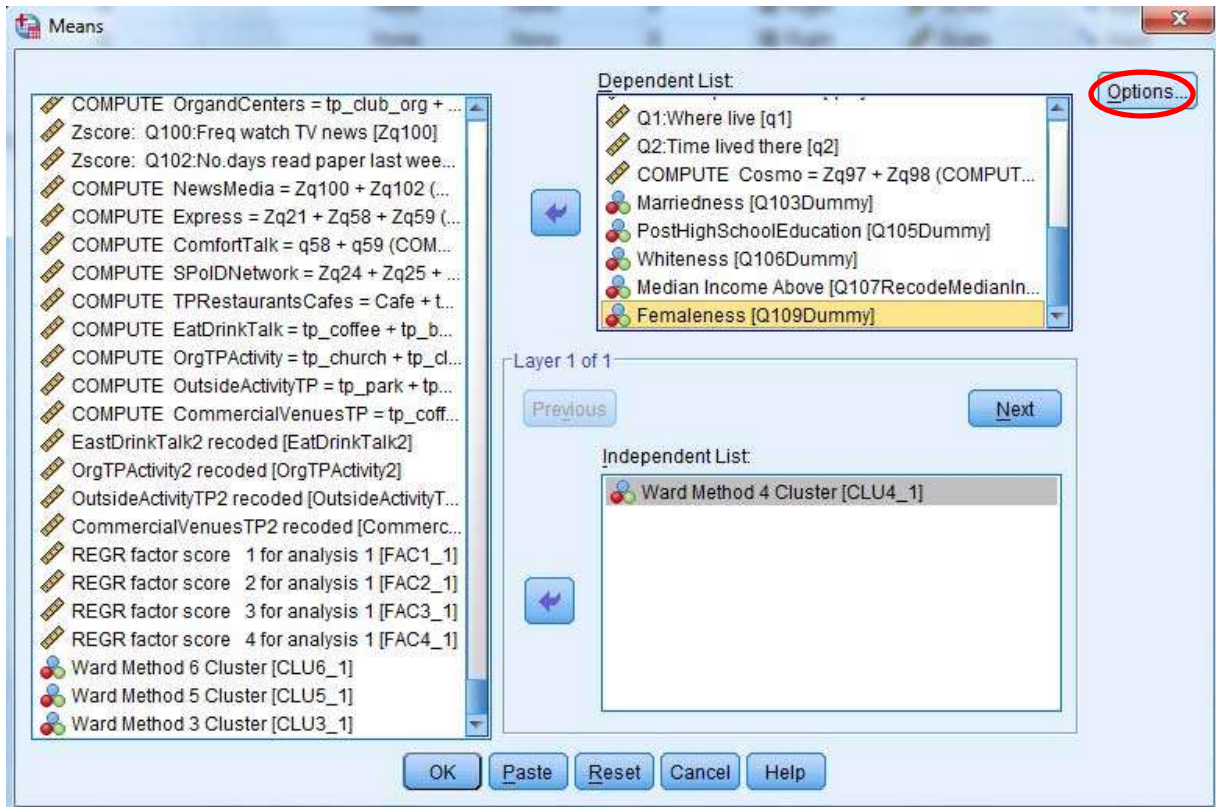
20 Total variables were entered in our “Dependent List”



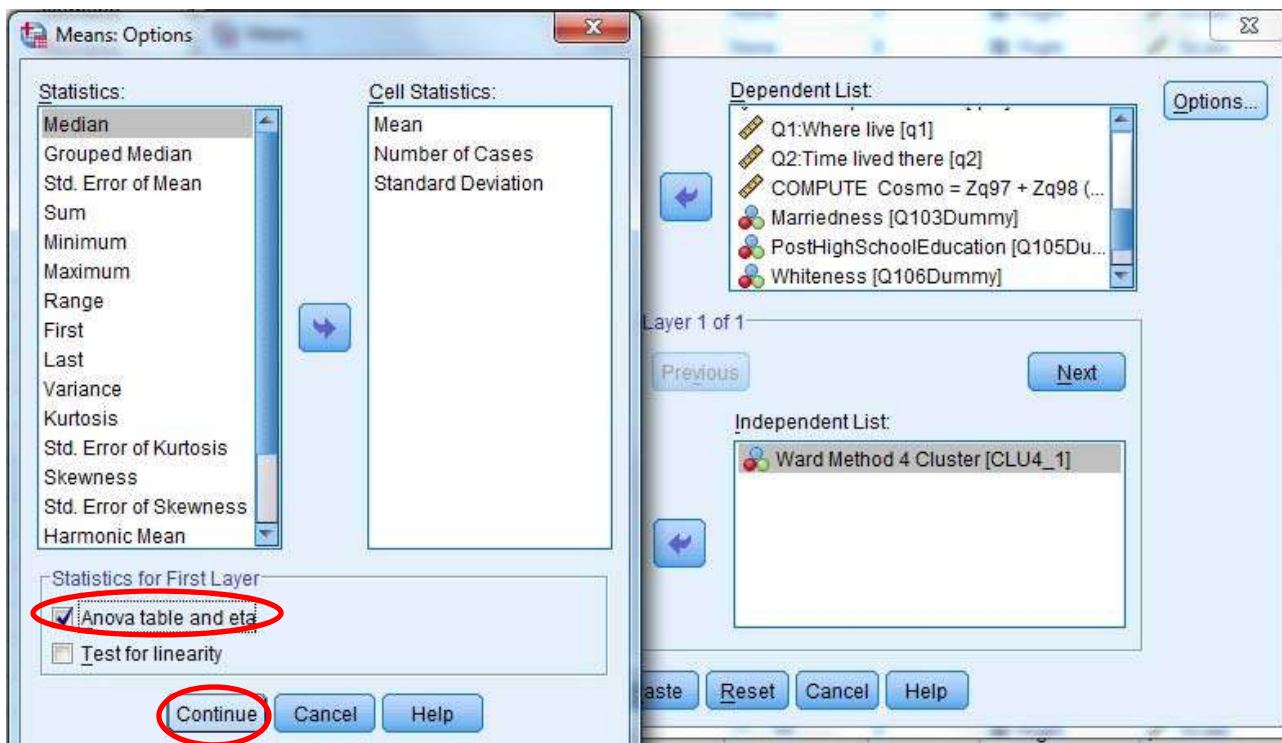
→ Select “Ward Method 4 Cluster” and enter into “Independent List”



→ Click “Options” Box

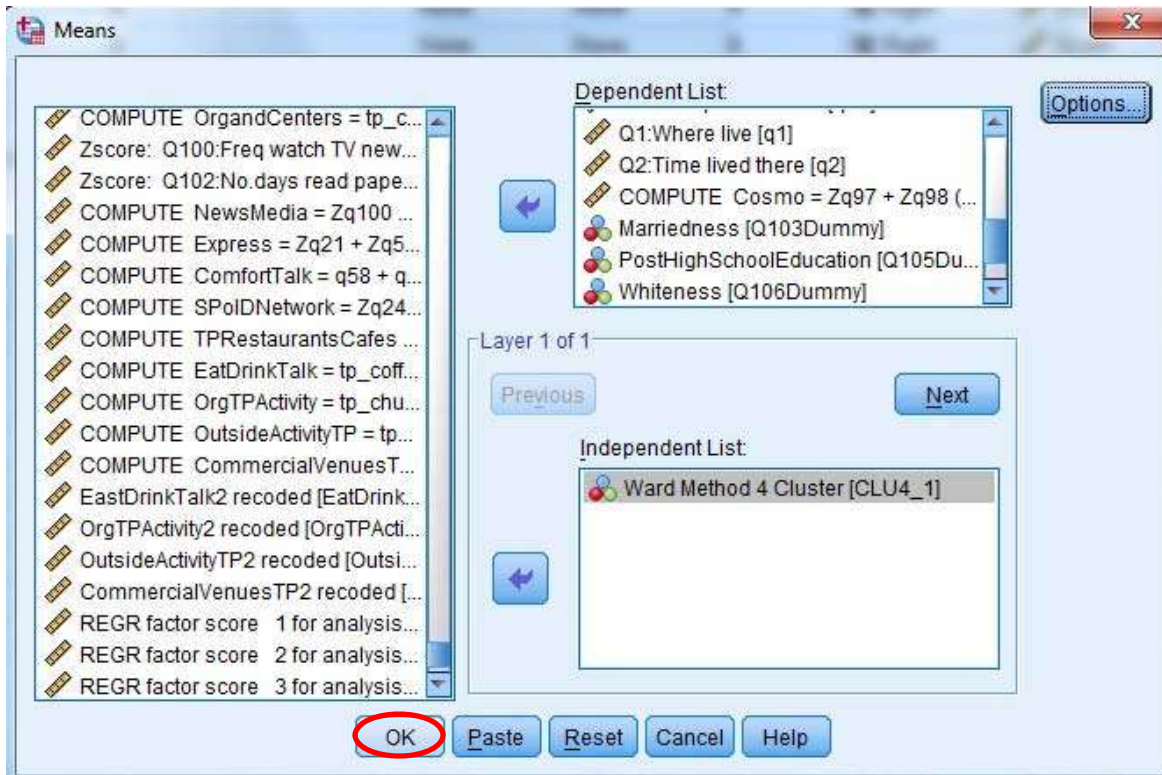


→ Check “ANOVA table and eta”

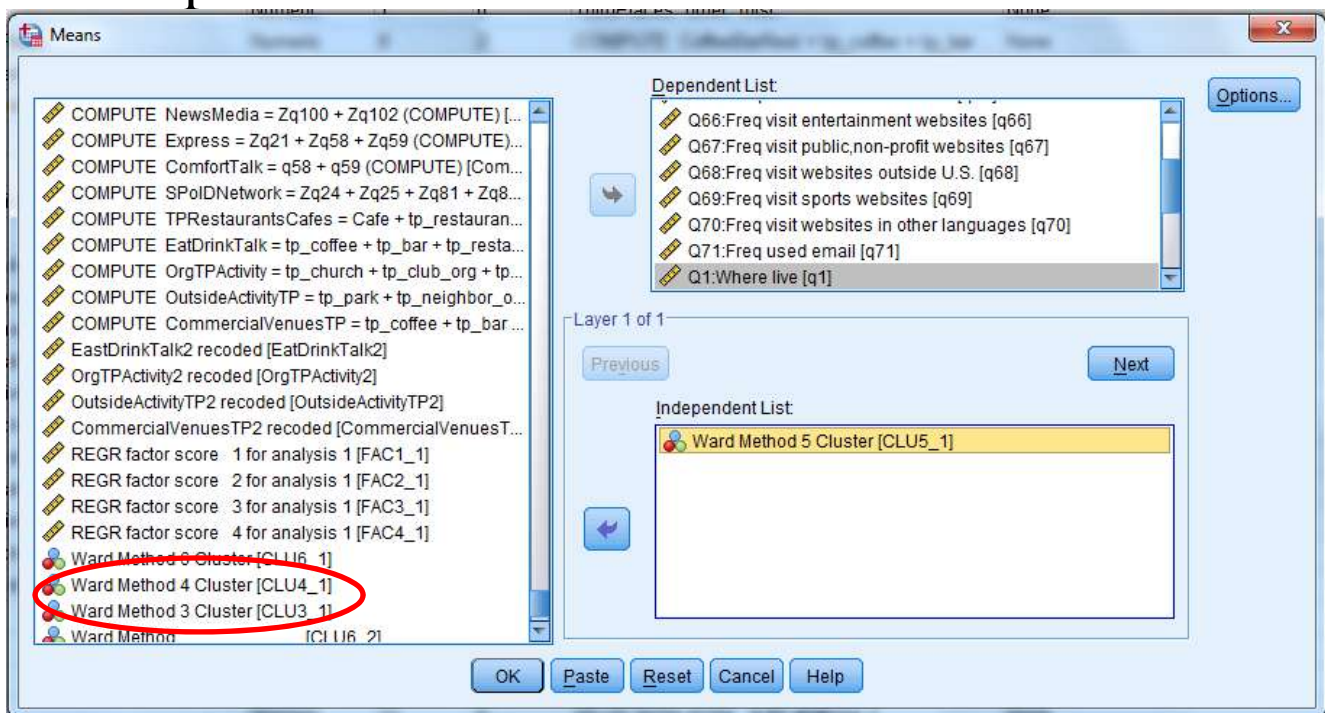


→ Then click “Continue”

→ Click “OK” to compare means



Note: You can re-run by changing out the “Independent List” to “Ward Method 6”, “Ward Method 5” and “Ward Method 3” to see ANOVA means comparison based upon various cluster numbers.



III. Running SPSS

Cluster Analysis Output

NOTE: Original SPSS Output is 60 pages. Version included in this packet has been reformatted and redacted for presentation clarity.

```
GET
  FILE='E:\Spring 2014\COM 731\Cluster Analysis\Community Civic Project Class Unchanged Data from website 040314.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
CLUSTER  q61 q62 q63 q64 q65 q66 q67 q68 q69 q70 q71
/METHOD WARD
/MEASURE=SEUCLID
/PRINT SCHEDULE CLUSTER(3,6)
/PLOT DENDROGRAM VICICLE
/SAVE CLUSTER(3,6).
```

```
RECODE q103 (1=1) (ELSE=0) INTO Q103Dummy.
VARIABLE LABELS  Q103Dummy 'Marriedness'.
EXECUTE.
RECODE q105 (4 thru 6=1) (1 thru 3=0) INTO Q105Dummy.
VARIABLE LABELS  Q105Dummy 'PostHighSchoolEducation'.
EXECUTE.
```

```
SAVE OUTFILE='E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014 '+
'Dataset with clusters post dr n.sav'
/COMPRESSED.
```

```
RECODE q106 (2=1) (ELSE=0) INTO Q106Dummy.
VARIABLE LABELS  Q106Dummy 'Whiteness'.
EXECUTE.
```

```
DATASET ACTIVATE DataSet1.
```

```
SAVE OUTFILE='E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014 '+
'Dataset with clusters post dr n.sav'
/COMPRESSED.
```

```
RECODE q107 (1 thru 5=0) (6 thru 9=1) INTO Q107RecodeMedianIncome2007.
VARIABLE LABELS  Q107RecodeMedianIncome2007 'Median Income Above'.
EXECUTE.
```

```
DATASET ACTIVATE DataSet1.
```

```
SAVE OUTFILE='E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014 '+
'Dataset with clusters post dr n.sav'
/COMPRESSED.
```

```
RECODE q109 (2=1) (ELSE=0) INTO Q109Dummy.
VARIABLE LABELS  Q109Dummy 'Femaleness'.
EXECUTE.
```

Cluster

[DataSet1] E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014
Dataset with clusters post dr n.sav

Case Processing Summary^{a,b}

Cases					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
296	62.1	181	37.9	477	100.0

a. Squared Euclidean Distance used

b. Ward Linkage

Ward Linkage

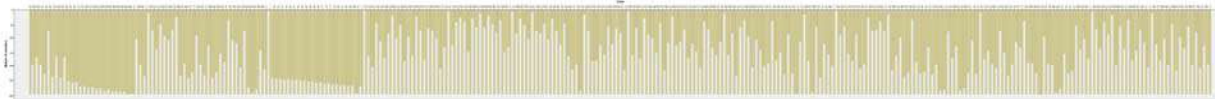
Agglomeration Schedule (NOTE: Total of 9 pages output created in SPSS, only first & last included here)

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	129	476	.000	0	0	72
2	400	454	.000	0	0	4
3	111	411	.000	0	0	71
4	27	400	.000	0	2	10
5	97	399	.000	0	0	28
6	269	394	.000	0	0	19
7	262	382	.000	0	0	20
8	285	375	.000	0	0	120
9	362	364	.000	0	0	10
10	27	362	.000	4	9	12
11	360	361	.000	0	0	12
12	27	360	.000	10	11	18
13	300	358	.000	0	0	18
14	36	320	.000	0	0	107
15	301	319	.000	0	0	17
16	225	312	.000	0	0	22
17	23	301	.000	0	15	106
18	27	300	.000	12	13	23
19	186	269	.000	0	6	24
20	75	262	.000	0	7	99
21	213	228	.000	0	0	23
22	200	225	.000	0	16	73
23	27	213	.000	18	21	26
24	186	204	.000	19	0	155
25	147	164	.000	0	0	26
26	27	147	.000	23	25	29
27	92	113	.000	0	0	29
28	6	97	.000	0	5	31
29	27	92	.000	26	27	41
30	88	89	.000	0	0	31
31	6	88	.000	28	30	33
32	78	86	.000	0	0	33
33	6	78	.000	31	32	35
34	76	77	.000	0	0	35
35	6	76	.000	33	34	37
36	70	71	.000	0	0	37
37	6	70	.000	35	36	40
38	66	69	.000	0	0	40
39	60	68	.000	0	0	41
40	6	66	.000	37	38	43
41	27	60	.000	29	39	44
42	58	59	.000	0	0	43
43	6	58	.000	40	42	46
44	27	56	.000	41	0	133
45	46	48	.000	0	0	46
46	6	46	.000	43	45	48
47	41	42	.000	0	0	48
48	6	41	.000	46	47	50
49	30	31	.000	0	0	50
50	6	30	.000	48	49	52
51	25	26	.000	0	0	52
52	6	25	.000	50	51	53
53	6	7	.000	52	0	293
54	127	463	.500	0	0	76
55	242	433	1.000	0	0	133
56	342	404	1.500	0	0	74

237	157	330	692.879	127	141	270
238	162	468	706.379	0	0	271
239	359	439	719.879	0	0	277
240	137	192	733.379	0	212	263
241	4	38	747.862	215	199	251
242	5	285	762.562	177	120	281
243	54	153	777.520	205	206	273
244	52	368	792.520	159	96	266
245	20	219	808.517	235	220	280
246	9	10	824.980	192	201	262
247	142	397	841.480	194	0	269
248	160	223	858.230	200	197	276
249	122	272	875.158	231	228	274
250	83	403	892.492	216	0	264
251	4	112	910.125	241	193	285
252	124	159	927.925	189	219	268
253	36	65	945.792	135	224	268
254	135	471	964.363	210	137	278
255	154	355	983.566	179	208	270
256	227	325	1002.899	0	172	272
257	183	234	1022.566	207	234	279
258	195	419	1042.232	151	0	271
259	99	133	1062.694	233	232	275
260	32	104	1083.294	222	229	273
261	18	67	1104.611	209	203	263
262	9	37	1127.065	246	218	288
263	18	137	1150.798	261	240	281
264	51	83	1175.631	166	250	277
265	11	47	1202.238	221	204	274
266	12	52	1229.238	230	244	279
267	14	139	1256.735	217	198	282
268	36	124	1284.243	253	252	280
269	142	388	1313.143	247	211	287
270	154	157	1345.107	255	237	275
271	162	195	1379.741	238	258	272
272	162	227	1415.857	271	256	283
273	32	54	1455.517	260	243	282
274	11	122	1495.728	265	249	286
275	99	154	1536.058	259	270	284
276	63	160	1578.915	236	248	278
277	51	359	1628.331	264	239	283
278	63	135	1678.403	276	254	291
279	12	183	1732.036	266	257	285
280	20	36	1793.615	245	268	287
281	5	18	1856.386	242	263	284
282	14	32	1923.354	267	273	288
283	51	162	1994.104	277	272	290
284	5	99	2066.722	281	275	292
285	4	12	2144.789	251	279	289
286	11	17	2224.372	274	223	293
287	20	142	2316.688	280	269	290
288	9	14	2422.273	262	282	289
289	4	9	2573.508	285	288	294
290	20	51	2780.192	287	283	291
291	20	63	2992.914	290	278	292
292	5	20	3255.964	284	291	294
293	6	11	3592.550	53	286	295
294	4	5	3961.880	289	292	295
295	4	6	5896.797	294	293	0

Cluster Membership (NOTE: Total of 8 pages of output created in SPSS, only first included here)

Case	6 Clusters	5 Clusters	4 Clusters	3 Clusters
4	1	1	1	1
5	2	2	2	2
6	3	3	3	3
7	3	3	3	3
9	1	1	1	1
10	1	1	1	1
11	4	4	4	3
12	1	1	1	1
14	1	1	1	1
15	2	2	2	2
16	1	1	1	1
17	4	4	4	3
18	2	2	2	2
20	5	5	2	2
23	1	1	1	1
24	1	1	1	1
25	3	3	3	3
26	3	3	3	3
27	4	4	4	3
30	3	3	3	3
31	3	3	3	3
32	1	1	1	1
33	1	1	1	1
34	4	4	4	3
36	5	5	2	2
37	1	1	1	1
38	1	1	1	1
39	1	1	1	1
41	3	3	3	3
42	3	3	3	3
44	4	4	4	3
46	3	3	3	3
47	4	4	4	3
48	3	3	3	3
49	1	1	1	1
51	5	5	2	2
52	1	1	1	1
53	1	1	1	1
54	1	1	1	1
56	4	4	4	3
58	3	3	3	3
59	3	3	3	3
60	4	4	4	3
61	1	1	1	1
63	6	5	2	2
65	5	5	2	2
66	3	3	3	3
67	2	2	2	2
68	4	4	4	3
69	3	3	3	3
70	3	3	3	3
71	3	3	3	3
72	4	4	4	3
74	1	1	1	1
75	1	1	1	1
76	3	3	3	3
77	3	3	3	3
78	3	3	3	3



(NOTE: Vertical Icicle Chart does not print legibly due to its size. View Icicle chart directly in SPSS output)

```
FREQUENCIES VARIABLES=CLU6_1 CLU5_1 CLU4_1 CLU3_1
/ORDER=ANALYSIS.
```

Frequencies

[DataSet1] E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014
Dataset with clusters post dr n.sav

Statistics

		Ward Method 6 Cluster	Ward Method 5 Cluster	Ward Method 4 Cluster	Ward Method 3 Cluster
N	Valid	296	296	296	296
	Missing	181	181	181	181

Frequency Tables

Ward Method 6 Cluster

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	94	19.7	31.8	31.8
	2	52	10.9	17.6	49.3
	3	24	5.0	8.1	57.4
	4	60	12.6	20.3	77.7
	5	45	9.4	15.2	92.9
	6	21	4.4	7.1	100.0
Total		296	62.1	100.0	
Missing	System	181	37.9		
Total		477	100.0		

Ward Method 5 Cluster

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	94	19.7	31.8	31.8
	2	52	10.9	17.6	49.3
	3	24	5.0	8.1	57.4
	4	60	12.6	20.3	77.7
	5	66	13.8	22.3	100.0
	Total		296	62.1	100.0
Missing	System	181	37.9		
Total		477	100.0		

Ward Method 4 Cluster

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	94	19.7	31.8	31.8
	2	118	24.7	39.9	71.6
	3	24	5.0	8.1	79.7
	4	60	12.6	20.3	100.0
	Total		296	62.1	100.0
Missing	System	181	37.9		
Total		477	100.0		

Ward Method 3 Cluster

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	94	19.7	31.8	31.8
	2	118	24.7	39.9	71.6
	3	84	17.6	28.4	100.0
	Total		296	62.1	100.0
Missing	System	181	37.9		
Total		477	100.0		

MEANS TABLES=q61 q62 q63 q64 q65 q66 q67 q68 q69 q70 q71 q1 q2 Cosmo Q103Dummy q104 Q105Dummy Q106Dummy Q107RecodeMedianIncome2007 Q109Dummy BY CLU4_1
 /CELLS MEAN COUNT STDDEV
 /STATISTICS ANOVA.

(NOTE: We ran means counts ANOVA for CLU6_1, CLU5_1, CLU4_1, and CLU3_1 but are only showing the SPSS Output for CLU4_1 for this class presentation handout as we ultimately went with a 4 Cluster Group.)

Means Using 4 Cluster Groups

[DataSet1] E:\Spring 2014\COM 731\Cluster Analysis\SPSS\Community Civic Project Class 041014 Dataset with clusters post dr n.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Q61:Freq go on Internet at home, work * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q62:Freq visit metro, community website * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q63:Freq visit neigh website * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q64:Freq visit media websites * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q65:Freq visit business websites * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q66:Freq visit entertainment websites * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q67:Freq visit public,non-profit websites * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q68:Freq visit websites outside U.S. * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q69:Freq visit sports websites * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q70:Freq visit websites in other languages * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q71:Freq used email * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q1:Where live * Ward Method 4 Cluster	290	60.8%	187	39.2%	477	100.0%
Q2:Time lived there * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
COMPUTE Cosmo = Zq97 + Zq98 (COMPUTE) * Ward Method 4 Cluster	287	60.2%	190	39.8%	477	100.0%
Marriedness * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Q104:Age * Ward Method 4 Cluster	285	59.7%	192	40.3%	477	100.0%
PostHighSchoolEducation * Ward Method 4 Cluster	285	59.7%	192	40.3%	477	100.0%
Whiteness * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%
Median Income Above * Ward Method 4 Cluster	243	50.9%	234	49.1%	477	100.0%
Femaleness * Ward Method 4 Cluster	296	62.1%	181	37.9%	477	100.0%

Report

Ward Method 4 Cluster		Q61:Freq go on Internet at home, work	Q62:Freq visit metro, community website	Q63:Freq visit neigh website
1	Mean	4.33	1.34	1.31
	N	94	94	94
	Std. Deviation	.897	.727	.790
2	Mean	4.57	2.20	1.59
	N	118	118	118
	Std. Deviation	.710	1.369	1.104
3	Mean	.00	.00	.00
	N	24	24	24
	Std. Deviation	.000	.000	.000
4	Mean	2.17	1.17	1.18
	N	60	60	60
	Std. Deviation	1.330	.557	.701
Total	Mean	3.64	1.54	1.29
	N	296	296	296
	Std. Deviation	1.680	1.175	.976

Report

Ward Method 4 Cluster		Q64:Freq visit media websites	Q65:Freq visit business websites	Q66:Freq visit entertainment websites
1	Mean	1.83	2.20	1.95
	N	94	94	94
	Std. Deviation	1.151	1.316	1.425
2	Mean	3.35	3.49	2.66
	N	118	118	118
	Std. Deviation	1.284	1.382	1.469
3	Mean	.00	.00	.00
	N	24	24	24
	Std. Deviation	.000	.000	.000
4	Mean	1.37	1.27	1.32
	N	60	60	60
	Std. Deviation	.736	.482	.537
Total	Mean	2.19	2.35	1.95
	N	296	296	296
	Std. Deviation	1.512	1.602	1.465

Report

Ward Method 4 Cluster		Q67:Freq visit public,non-profit websites	Q68:Freq visit websites outside U.S.	Q69:Freq visit sports websites
1	Mean	1.69	1.21	1.34
	N	94	94	94
	Std. Deviation	1.164	.717	.648
2	Mean	2.03	1.57	2.36
	N	118	118	118
	Std. Deviation	1.326	1.136	1.522
3	Mean	.00	.00	.00
	N	24	24	24
	Std. Deviation	.000	.000	.000
4	Mean	1.10	1.05	1.07
	N	60	60	60
	Std. Deviation	.303	.287	.312
Total	Mean	1.57	1.22	1.58
	N	296	296	296
	Std. Deviation	1.216	.930	1.260

Report

Ward Method 4 Cluster		Q70:Freq visit websites in other languages	Q71:Freq used email	Q1:Where live
1	Mean	1.11	4.65	3.67
	N	94	94	91
	Std. Deviation	.518	.599	1.764
2	Mean	1.35	4.04	3.15
	N	118	118	116
	Std. Deviation	.990	1.386	1.731
3	Mean	.00	.00	3.63
	N	24	24	24
	Std. Deviation	.000	.000	2.060
4	Mean	1.03	1.57	3.68
	N	60	60	59
	Std. Deviation	.181	.831	1.889
Total	Mean	1.10	3.41	3.46
	N	296	296	290
	Std. Deviation	.777	1.816	1.811

Report

Ward Method 4 Cluster		Q2:Time lived there	COMPUTE Cosmo = Zq97 + Zq98	Marriedness	Q104:Age
1	Mean	3.81	.2830	.6596	4.22
	N	94	93	94	92
	Std. Deviation	1.821	1.38035	.47639	1.511
2	Mean	3.70	.1990	.5593	4.11
	N	118	113	118	113
	Std. Deviation	1.635	1.48692	.49859	1.365
3	Mean	4.92	-.5742	.3333	5.65
	N	24	23	24	23
	Std. Deviation	2.448	2.04787	.48154	1.722
4	Mean	3.73	-.5777	.5500	4.04
	N	60	58	60	57
	Std. Deviation	2.066	1.81856	.50169	1.792
Total	Mean	3.84	.0073	.5709	4.25
	N	296	287	296	285
	Std. Deviation	1.879	1.61130	.49578	1.583

Report

Ward Method 4 Cluster		PostHighSchool Education	Whiteness	Median Income Above	Femaleness
1	Mean	.7826	.8191	.5696	.5532
	N	92	94	79	94
	Std. Deviation	.41473	.38696	.49829	.49983
2	Mean	.8584	.7203	.5347	.4068
	N	113	118	101	118
	Std. Deviation	.35019	.45075	.50129	.49333
3	Mean	.3913	.7917	.0667	.5417
	N	23	24	15	24
	Std. Deviation	.49901	.41485	.25820	.50898
4	Mean	.5614	.6167	.3333	.5167
	N	57	60	48	60
	Std. Deviation	.50063	.49030	.47639	.50394
Total	Mean	.7368	.7365	.4774	.4865
	N	285	296	243	296
	Std. Deviation	.44112	.44128	.50052	.50066

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Q61:Freq go on Internet at home, work * Ward Method 4 Cluster	Between Groups	(Combined)	594.527	3	198.176	243.071	.000
	Within Groups		238.068	292	.815		
	Total		832.595	295			
Q62:Freq visit metro, community website * Ward Method 4 Cluster	Between Groups	(Combined)	120.955	3	40.318	41.084	.000
	Within Groups		286.558	292	.981		
	Total		407.514	295			
Q63:Freq visit neigh website * Ward Method 4 Cluster	Between Groups	(Combined)	51.502	3	17.167	21.842	.000
	Within Groups		229.511	292	.786		
	Total		281.014	295			
Q64:Freq visit media websites * Ward Method 4 Cluster	Between Groups	(Combined)	326.059	3	108.686	91.206	.000
	Within Groups		347.964	292	1.192		
	Total		674.024	295			
Q65:Freq visit business websites * Ward Method 4 Cluster	Between Groups	(Combined)	358.774	3	119.591	87.656	.000
	Within Groups		398.384	292	1.364		
	Total		757.159	295			
Q66:Freq visit entertainment websites * Ward Method 4 Cluster	Between Groups	(Combined)	174.977	3	58.326	37.173	.000
	Within Groups		458.158	292	1.569		
	Total		633.135	295			
Q67:Freq visit public,non-profit websites * Ward Method 4 Cluster	Between Groups	(Combined)	99.193	3	33.064	28.622	.000
	Within Groups		337.318	292	1.155		
	Total		436.510	295			
Q68:Freq visit websites outside U.S. * Ward Method 4 Cluster	Between Groups	(Combined)	51.731	3	17.244	24.737	.000
	Within Groups		203.552	292	.697		
	Total		255.284	295			
Q69:Freq visit sports websites * Ward Method 4 Cluster	Between Groups	(Combined)	152.163	3	50.721	46.885	.000
	Within Groups		315.891	292	1.082		
	Total		468.054	295			
Q70:Freq visit websites in other languages * Ward Method 4 Cluster	Between Groups	(Combined)	36.535	3	12.178	25.109	.000
	Within Groups		141.624	292	.485		
	Total		178.159	295			
Q71:Freq used email * Ward Method 4 Cluster	Between Groups	(Combined)	674.415	3	224.805	219.589	.000
	Within Groups		298.936	292	1.024		
	Total		973.351	295			
Q1:Where live * Ward Method 4 Cluster	Between Groups	(Combined)	18.879	3	6.293	1.937	.124
	Within Groups		929.125	286	3.249		
	Total		948.003	289			
Q2:Time lived there * Ward Method 4 Cluster	Between Groups	(Combined)	30.799	3	10.266	2.966	.032
	Within Groups		1010.739	292	3.461		
	Total		1041.537	295			
COMPUTE Cosmo = Zq97 + Zq98 (COMPUTE) * Ward Method 4 Cluster	Between Groups	(Combined)	38.845	3	12.948	5.207	.002
	Within Groups		703.691	283	2.487		
	Total		742.535	286			
Marriedness * Ward Method 4 Cluster	Between Groups	(Combined)	2.136	3	.712	2.954	.033
	Within Groups		70.374	292	.241		
	Total		72.510	295			
QI04:Age * Ward Method 4 Cluster	Between Groups	(Combined)	50.285	3	16.762	7.120	.000
	Within Groups		661.525	281	2.354		
	Total		711.811	284			
PostHighSchoolEducation * Ward Method 4 Cluster	Between Groups	(Combined)	6.363	3	2.121	12.188	.000
	Within Groups		48.900	281	.174		
	Total		55.263	284			
Whiteness * Ward Method 4 Cluster	Between Groups	(Combined)	1.608	3	.536	2.802	.040
	Within Groups		55.838	292	.191		
	Total		57.446	295			
Median Income Above * Ward Method 4 Cluster	Between Groups	(Combined)	4.530	3	1.510	6.433	.000
	Within Groups		56.096	239	.235		
	Total		60.626	242			
Femaleness * Ward Method 4 Cluster	Between Groups	(Combined)	1.296	3	.432	1.736	.160
	Within Groups		72.650	292	.249		
	Total		73.946	295			

Measures of Association

	Eta	Eta Squared
Q61:Freq go on Internet at home, work * Ward Method 4 Cluster	.845	.714
Q62:Freq visit metro, community website * Ward Method 4 Cluster	.545	.297
Q63:Freq visit neigh website * Ward Method 4 Cluster	.428	.183
Q64:Freq visit media websites * Ward Method 4 Cluster	.696	.484
Q65:Freq visit business websites * Ward Method 4 Cluster	.688	.474
Q66:Freq visit entertainment websites * Ward Method 4 Cluster	.526	.276
Q67:Freq visit public,non-profit websites * Ward Method 4 Cluster	.477	.227
Q68:Freq visit websites outside U.S. * Ward Method 4 Cluster	.450	.203
Q69:Freq visit sports websites * Ward Method 4 Cluster	.570	.325
Q70:Freq visit websites in other languages * Ward Method 4 Cluster	.453	.205
Q71:Freq used email * Ward Method 4 Cluster	.832	.693
Q1:Where live * Ward Method 4 Cluster	.141	.020
Q2:Time lived there * Ward Method 4 Cluster	.172	.030
COMPUTE Cosmo = Zq97 + Zq98 (COMPUTE) * Ward Method 4 Cluster	.229	.052
Marriedness * Ward Method 4 Cluster	.172	.029
QI04:Age * Ward Method 4 Cluster	.266	.071
PostHighSchoolEducation * Ward Method 4 Cluster	.339	.115
Whiteness * Ward Method 4 Cluster	.167	.028
Median Income Above * Ward Method 4 Cluster	.273	.075
Femaleness * Ward Method 4 Cluster	.132	.018

IV. Tabling Results

Table 1. Agglomeration Coefficient Analysis

Number of Clusters after combining	Coefficient Previous Step	Coefficient This Step	Change	% Change in Heterogeneity
7	2780.192	2573.508	206.684	8.031 %
6	2992.914	2780.192	212.722	7.651 %
5	3255.964	2992.914	263.026	8.788 %
4	3592.550	3255.964	336.586	10.338 %
3	3961.880	3592.550	369.330	10.280 %
2	5896.797	3961.880	1934.917	48.838 %
1		5896.797		

Table 2. Cluster Profiling

Cluster Name (4 Cluster)	Utilitarian User	Websurfer	NonUser	LowUser	Total	F	Sig
Variable	1(94)	2(118)	3(24)	4(60)	296		
Internal Variables							
Q61 Frequency of Internet use	4.33	4.57	0	2.17	3.64	243.07	<.001
Q62 Visit community sites	1.34	2.20	0	1.17	1.54	41.08	<.001
Q63 Visit neighborhood sites	1.31	1.59	0	1.18	1.29	21.84	<.001
Q64 Visit media sites	1.83	3.35	0	1.37	2.19	91.21	<.001
Q65 Visit business sites	2.20	3.49	0	1.27	2.35	87.66	<.001
Q66 Visit entertainment sites	1.95	2.66	0	1.32	1.95	37.17	<.001
Q67 Visit non-profit sites	1.69	2.03	0	1.10	1.57	28.62	<.001
Q68 Visit foreign sites	1.21	1.57	0	1.05	1.22	24.74	<.001
Q69 Visit sports sites	1.34	2.36	0	1.07	1.58	46.89	<.001
Q70 Visit sites non-English	1.11	1.35	0	1.03	1.10	25.11	<.001
Q71 Frequency of email use	4.65	4.04	0	1.57	3.41	219.59	<.001
External Variables							
Q1 Where live	3.67	3.15	3.63	3.68	3.46	1.94	.124
Q2 Time lived there	3.81	3.70	4.92	3.73	3.84	2.97	.032
Q104Age	4.22	4.11	5.65	4.04	4.25	7.12	<.001
Cosmopolitan	.2830	.1990	-.5742	-.5777	.0073	5.20	.002
Married	.6596	.5593	.3330	.5500	.5709	2.95	.033
Post High School Ed.	.7826	.8584	.3913	.5614	.7368	12.29	<.001
Whiteness	.8191	.7203	.7917	.6167	.7365	2.80	.040
Median Income+	.5696	.5347	.0667	.3333	.4774	6.43	<.001
Femaleness	.5532	.4068	.5417	.5167	.4865	1.74	.160

V. Write-up

The class' National Community Survey (2005-2006) known as "Community/Civic Project" data set conducted by Dr. Jeffres was chosen for cluster analysis. This original data set contained 397 cases. Eleven internal variables were selected on the basis of Internet Use frequency questions from the survey. All internal variables (questions Q61 through Q71) used the same measurement system, with scores on a scale ranging 0 to 5, where 0 indicates one has never gone on the Internet and 5 indicates use several times a day. Thus, none of the internal variables were standardized prior to running the cluster analysis.

A hierarchical agglomerative cluster analysis was performed using SPSS to discover potential groupings of each of the participants. Ultimately a four cluster solution was chosen using Ward's Method with a squared Euclidian distances approach. The choice of four clusters was supported by a visual examination of the changes in the agglomeration coefficients table and graph.

ANOVA analysis was conducted to examine the mean differences among the four clusters with regard to all eleven internal variables. The clusters have been named: Cluster 1: Utilitarian User, Cluster 2: Websurfer, Cluster 3: Nonuser, and Cluster 4: Low User (See Table 2 on page 34).

To further profile these four clusters, ANOVA analysis was conducted to test the significance of the differences among the four clusters against nine external variables that included:

- Q1. Where live?
- Q2. How long have you lived there?
- Q4. Age?
- Cosmopolitaness
- Marital Status
- Post High School Education
- Whiteness
- Above Median Income
- Femaleness

Explanation of Recode Decisions

Q1 (Which of the following best describes where you live?) was not recoded or standardized because the response selections progressed from urban to rural, functioning somewhat like a scale we described as "Where Live." Perhaps where subjects lived could be relevant to how they clustered.

Q97 (I enjoy learning about other peoples and cultures) and Q98 (I think of myself as a citizen of the world) were already recoded and standardized into a scale called "Cosmopolitaness" (Cosmo= ZQ97 + Zq98) which we used as it appeared in the data set. It implies level of worldliness and interest in other customs, lifestyles, or communities.

Q103 was recoded as a dummy "Married" with married =1, unmarried = 0. Q105 (How much formal education have you completed?) was recoded into a dummy that categorized responses into college = 1, no college = 0. Any response indicating attendance was included in the college category. Q106 race was recoded as dummy white = 1, nonwhite = 0, "Whiteness." Q109 gender was recoded to dummy 0=all others and 1=female, "Femaleness".

Q107 Income was recoded to dummy median income+ = 1, below median = 0, labeled "Median Income+". According to U.S. Census estimates from 2007, the median income at the time of this survey (2006) was \$48,451. Therefore, to approximate that median as the dividing point for the variable, 1 = responses include 6, 7, 8, 9; and, 0 = 1, 2, 3, 4, 5.¹

Cluster Analysis

Outputs containing three through six clusters were examined, with four clusters selected for complete analysis. See appendices for tables and graphs that informed our decision. Cluster 1 is labeled Utilitarian User because of high means for email use and frequency of Internet use, with some moderate use of business websites. Cluster 2 is labeled Websurfer, with high means for frequency of Internet and email use, and moderate use of multiple websites on diverse topics. Cluster 3 consists of

¹ Source <http://www.census.gov/prod/2007pubs/acs-08.pdf> \$48,451

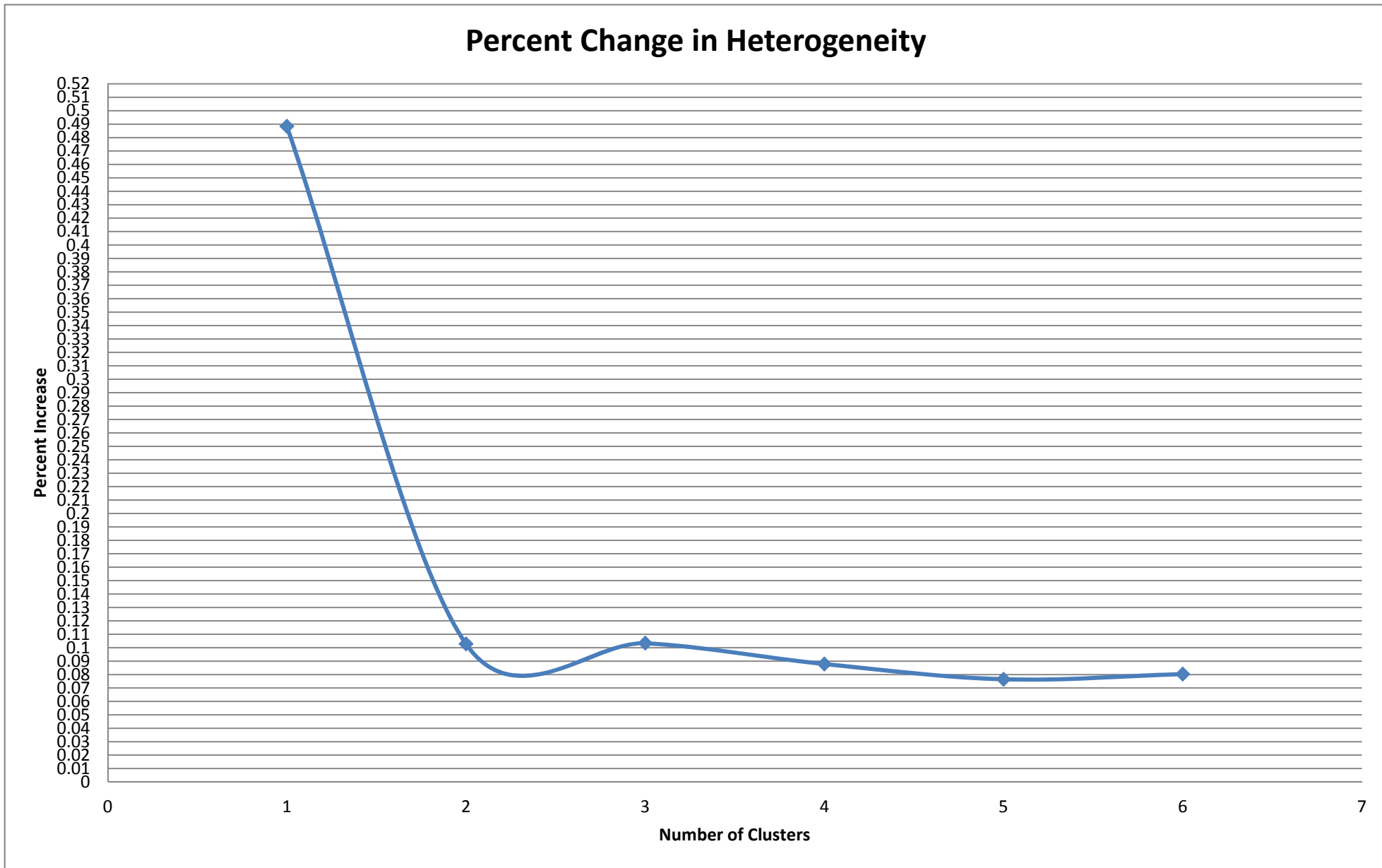
twenty four subjects who identified themselves as not using the Internet. Cluster 4, Low User recorded low means across internal variables. All internal variables were significant at $p < .001$.

ANOVA analysis of the four clusters revealed significance among external variables, except "Where Live" and Femaleness. Time lived in the subject's home, married subjects, "Cosmopolitaness" and Whiteness were significant at $p < .05$. Age, college education and median income+ were significant at $p < .001$. Nonusers in Cluster 3 appeared to be older, less cosmopolitan, less likely to have attended college and white. They were less likely to earn median income or higher. Low Users in Cluster 4 also scored negatively on Cosmopolitaness (worldliness) but had a higher income and were least likely to be white.

Cluster 1, Utilitarian Users were predominantly white (81.91%), median income+ and tended toward Cosmopolitaness. Websurfers were similar to Cluster 1, but somewhat less white, less worldly, less married, but more educated.

Table 1 Agglomeration Coefficient Analysis Graph

(Note: data to create this is on page 34 of our packet)



Cluster Name (6 Cluster)	Utilitarian User	WebMarketer	Nonuser	LowUser	Urban Websurfer	Impersonal User	Total	F	Sig
Variable	1(94)	2(52)	3(24)	4(60)	5(45)	6(21)	296		
Internal Variables									
Q61 Frequency of Internet use	4.33	4.69	0	2.17	4.44	4.52	3.64	146.16	<.001
Q62 Visit community sites	1.34	2.50	0	1.17	2.29	1.29	1.54	31.54	<.001
Q63 Visit neighborhood sites	1.31	1.29	0	1.18	2.16	1.14	1.29	21.05	<.001
Q64 Visit media sites	1.83	3.87	0	1.37	2.91	3.00	2.19	63.07	<.001
Q65 Visit business sites	2.20	4.13	0	1.27	2.80	3.38	2.35	65.67	<.001
Q66 Visit entertainment sites	1.95	2.10	0	1.32	3.02	3.29	1.95	27.90	<.001
Q67 Visit non-profit sites	1.69	2.04	0	1.10	2.24	1.57	1.57	18.53	<.001
Q68 Visit foreign sites	1.21	1.19	0	1.05	2.20	1.14	1.22	26.88	<.001
Q69 Visit sports sites	1.34	1.40	0	1.07	3.62	2.00	1.58	81.98	<.001
Q70 Visit sites non-English	1.11	1.06	0	1.03	1.84	1.00	1.10	25.60	<.001
Q71 Frequency of email use	4.65	4.75	0	1.57	4.36	1.62	3.41	330.91	<.001
External Variables									
Q1 Where live	3.67	3.12	3.63	3.68	3.02	3.48	3.46	1.34	.247
Q2 Time lived there	3.81	3.63	4.92	3.73	3.44	4.43	3.84	2.625	.024
Q104Age	4.22	4.20	5.65	4.04	4.02	4.05	4.25	4.31	.001
Cosmopolitan	.2830	.6008	-.5742	-.5777	.2343	-.8110	.0073	5.69	<.001
Married	.6596	.5385	.3333	.5500	.5333	.6667	.5709	2.01	.077
Post High School Ed.	.7826	.8958	.3913	.5614	.8636	.7619	.7368	7.60	<.001
Whiteness	.8191	.6731	.7917	.6167	.6889	.9048	.7365	2.62	.025
Median Income+	.5696	.5610	.0667	.3333	.6000	.3500	.4774	4.65	<.001
Femaleness	.5532	.5769	.5417	.5167	.2889	.2381	.4865	3.34	.006

Cluster Name (5 Cluster)	Utilitarian User	WebMarketer	Nonuser	LowUser	Websurfer	Total	F	Sig
Variable	1(94)	2(52)	3(24)	4(60)	5(66)	296		
Internal Variables								
Q61 Frequency of Internet use	4.33	4.69	0	2.17	4.47	3.64	183.23	<.001
Q62 Visit community sites	1.34	2.50	0	1.17	1.97	1.54	33.748	<.001
Q63 Visit neighborhood sites	1.31	1.29	0	1.18	1.83	1.29	19.81	<.001
Q64 Visit media sites	1.83	3.87	0	1.37	2.94	2.19	79.05	<.001
Q65 Visit business sites	2.20	4.13	0	1.27	2.98	2.35	80.29	<.001
Q66 Visit entertainment sites	1.95	2.10	0	1.32	3.11	1.95	34.74	<.001
Q67 Visit non-profit sites	1.69	2.04	0	1.10	2.03	1.57	21.39	<.001
Q68 Visit foreign sites	1.21	1.19	0	1.05	1.86	1.22	24.77	<.001
Q69 Visit sports sites	1.34	1.40	0	1.07	3.11	1.58	74.26	<.001
Q70 Visit sites non-English	1.11	1.06	0	1.03	1.58	1.10	24.11	<.001
Q71 Frequency of email use	4.65	4.75	0	1.57	3.48	3.41	207.82	<.001
External Variables								
Q1 Where live	3.67	3.12	3.63	3.68	3.17	3.46	1.45	.216
Q2 Time lived there	3.81	3.63	4.92	3.73	3.76	3.84	2.25	.064
Q104Age	4.22	4.20	5.65	4.04	4.03	4.25	5.41	<.001
Cosmopolitan	.2830	.6008	-.5742	-.5777	-.1087	.0073	5.40	<.001
Married	.6596	.5385	.3333	.5500	.5758	.5709	2.25	.064
Post High School Ed.	.7826	.8958	.3913	.5614	.8308	.7368	9.30	<.001
Whiteness	.8191	.6731	.7917	.6167	.7576	.7365	2.37	.052
Median Income+	.5696	.5610	.0667	.3333	.5167	.4774	4.86	.001
Femaleness	.5532	.5769	.5417	.5167	.2727	.4865	4.15	.003

Cluster Name (4 Cluster)	Utilitarian User	Websurfer	NonUser	LowUser	Total	F	Sig
Variable	1(94)	2(118)	3(24)	4(60)	296		
Internal Variables							
Q61 Frequency of Internet use	4.33	4.57	0	2.17	3.64	243.07	<.001
Q62 Visit community sites	1.34	2.20	0	1.17	1.54	41.08	<.001
Q63 Visit neighborhood sites	1.31	1.59	0	1.18	1.29	21.84	<.001
Q64 Visit media sites	1.83	3.35	0	1.37	2.19	91.21	<.001
Q65 Visit business sites	2.20	3.49	0	1.27	2.35	87.66	<.001
Q66 Visit entertainment sites	1.95	2.66	0	1.32	1.95	37.17	<.001
Q67 Visit non-profit sites	1.69	2.03	0	1.10	1.57	28.62	<.001
Q68 Visit foreign sites	1.21	1.57	0	1.05	1.22	24.74	<.001
Q69 Visit sports sites	1.34	2.36	0	1.07	1.58	46.89	<.001
Q70 Visit sites non-English	1.11	1.35	0	1.03	1.10	25.11	<.001
Q71 Frequency of email use	4.65	4.04	0	1.57	3.41	219.59	<.001
External Variables							
Q1 Where live	3.67	3.15	3.63	3.68	3.46	1.94	.124
Q2 Time lived there	3.81	3.70	4.92	3.73	3.84	2.97	.032
Q104Age	4.22	4.11	5.65	4.04	4.25	7.12	<.001
Cosmopolitan	.2830	.1990	-.5742	-.5777	.0073	5.20	.002
Married	.6596	.5593	.3330	.5500	.5709	2.95	.033
Post High School Education	.7826	.8584	.3913	.5614	.7368	12.29	<.001
Whiteness	.8191	.7203	.7917	.6167	.7365	2.80	.040
Median Income+	.5696	.5347	.0667	.3333	.4774	6.43	<.001
Femaleness	.5532	.4068	.5417	.5167	.4865	1.74	.160

Cluster Name (3Cluster)	Utilitarian User	Websurfer	LowUser	Total	F	Sig
Variable	1(94)	2(118)	3(84)	296		
Internal Variables						
Q61 Frequency of Internet use	4.33	4.57	1.55	3.64	236.42	<.001
Q62 Visit community sites	1.34	2.20	.83	1.54	46.15	<.001
Q63 Visit neighborhood sites	1.31	1.59	.85	1.29	15.89	<.001
Q64 Visit media sites	1.83	3.35	.98	2.19	113.36	<.001
Q65 Visit business sites	2.20	3.49	.90	2.35	113.95	<.001
Q66 Visit entertainment sites	1.95	2.66	.94	1.95	43.62	<.001
Q67 Visit non-profit sites	1.69	2.03	.79	1.57	32.10	<.001
Q68 Visit foreign sites	1.21	1.57	.75	1.22	21.62	<.001
Q69 Visit sports sites	1.34	2.36	.76	1.58	21.62	<.001
Q70 Visit sites non-English	1.11	1.35	.74	1.10	57.95	<.001
Q71 Frequency of email use	4.65	4.04	1.12	3.41	16.70	<.001
External Variables						
Q1 Where live	3.67	3.15	3.66	3.46	2.91	.056
Q2 Time lived there	3.81	3.70	4.07	3.84	.962	.383
Q104Age	4.22	4.11	4.50	4.25	1.488	.228
Cosmopolitan	.2830	.1990	-.5767	.0073	7.84	<.001
Married	.6596	.5593	.4881	.5709	2.74	.066
Post High School Education	.7826	.8584	.5125	.7368	16.82	<.001
Whiteness	.8191	.7203	.6667	.7365	2.81	.062
Median Income+	.5696	.5347	.2698	.4774	7.84	.001
Femaleness	.5532	.4068	.5238	.4865	2.59	.077