FactBeer.sas and Annotated Output

```sas
options pageno=min nodate options formdlim='-';
title 'Factor Analysis with Factor Scores Analyzed Within SAS'; run;
DATA BEER;
INPUT COST SIZE ALCOHOL REPUTAT COLOR AROMA TASTE ses group;CARDS;
90 80 70 20 50 70 60 2 1
75 95 100 50 55 40 65 1 1
10 15 20 85 40 30 50 4 2
100 70 50 30 75 60 80 3 2
20 10 25 35 30 35 45 4 1
50 100 100 30 90 75 100 3 1
5 15 15 75 20 10 25 2 1
65 30 35 80 80 60 90 6 2
95 95 100 0 80 70 95 2 1
85 80 70 40 60 50 65 2 1
0 0 20 30 80 90 100 8 2
10 25 10 100 50 40 60 5 2
80 70 50 50 40 20 50 1 1
25 35 30 40 45 30 65 3 2
5 10 15 65 50 65 85 7 2
20 5 10 40 60 50 95 7 2
70 60 70 75 10 15 25 0 1
50 15 20 50 10 5 50 2 1
75 50 95 40 0 0 40 0 1
15 10 25 30 95 80 100 8 2
80 90 100 50 20 . 40 0 1
;
Proc Factor METHOD=PRINIT REORDER ROTATE=VARIMAX
  PRIORS=SMC NFACTORS=2 RES;
  var cost size alcohol reputat color aroma taste; run;
DATA alpha; SET Beer; NegRep = -1*reputat;
Proc Corr nomiss nosimple nocorr alpha; Var color taste aroma negrep;
  Title 'Alpha for unit weighed AQ scale'; run;
Proc Corr nomiss nosimple nocorr alpha; Var color taste aroma;
  Title 'Alpha for AQ After Dumping the Reputation Variable'; run;
Proc Factor Data = Beer METHOD=PRINIT MSA REORDER ROTATE=VARIMAX
  PRIORS=SMC NFACTORS=2 RES OUT=DRINKME; var cost size alcohol color aroma
taste;
  Title 'Factor Analysis Without the Reputation Variable'; run;
Proc TTest; Class Group; Var Factor1 Factor2 SES;
   Title 'Comparing the Groups on the Factors'; run;
Proc Reg; Model SES = Factor1 Factor2 / stb;
   Title 'Predicting SES From the Factor Scores'; run;
Quit;
```

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Prior Communality Estimates: SMC
Initially the communality estimates are set equal to the R^2 between each variable and all others.

COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
0.73827957	0.91237071	0.86624871	0.49900339	0.92159937	0.85659243	0.88110840

Strike 1 against the reputation variable.

Preliminary Eigenvalues: Total = 5.67520258 Average = 0.81074323
Replacing the main diagonal of the correlation matrix with the SMCs eliminated 7-5.675 = 1.325 standardized units of unique variance.

	Eigenvalue	Difference	Proportion	Cumulative
1	3.13194493	0.66038240	0.5519	0.5519
2	2.47156254	2.27831311	0.4355	0.9874
3	0.19324943	0.15846194	0.0341	1.0214
4	0.03478749	0.03683286	0.0061	1.0275
5	-.00204537	0.06158917	-0.0004	1.0272
6	-.06363454	0.02702738	-0.0112	1.0160
7	-.09066191		-0.0160	1.0000

2 factors will be retained by the NFACTOR criterion.

Now for some fine-tuning of the communalities. On the 7th iteration, the largest change in a communality is so small (.0008) that the iterative procedure stops.

Iteration	Change			Communalities			
1	0.0859	0.74071	0.91012	0.86478	0.41315	0.91020	0.87357	0.89097
2	0.0212	0.74328	0.91155	0.86557	0.39193	0.90384	0.88376	0.89671
3	0.0056	0.74455	0.91269	0.86595	0.38677	0.89948	0.88940	0.89958
4	0.0031	0.74508	0.91332	0.86599	0.38549	0.89651	0.89255	0.90101
5	0.0020	0.74528	0.91367	0.86592	0.38518	0.89454	0.89436	0.90175
6	0.0013	0.74536	0.91386	0.86583	0.38511	0.89328	0.89542	0.90214
7	0.0008	0.74539	0.91398	0.86575	0.38509	0.89249	0.89606	0.90236

If you sum .74539 through .90236 in the last row above, you get 5.601. Since we have seven variables, there are seven standardized units of variance with which to deal. We have eliminated the unique variance, leaving us with 5.601 units of common variance. The proportion of the variance which is common is 5.601/7 = .80. Notice the low communality for the reputation variable.

Convergence criterion satisfied.

Eigenvalues of the Reduced Correlation Matrix: Total = 5.601 Average = 0.80014261

	Eigenvalue	Difference	Proportion	Cumulative
1	3.12341821	0.64572100	0.5577	0.5577

2	2.47769721	2.34512807	0.4424	1.0000
3	0.13256914	0.09183035	0.0237	1.0237
4	0.04073880	0.02115710	0.0073	1.0310
5	0.01958169	0.08869326	0.0035	1.0345
6	-.06911156	0.05478365	-0.0123	1.0221
7	-.12389521		-0.0221	1.0000

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Factor Pattern

These are the loadings prior to rotation. For each factor, if you square and then sum the loadings you obtain the eigenvalue for that factor.

	Factor1	Factor2
COLOR	0.78465	-0.52613
AROMA	0.75917	-0.56543
TASTE	0.73549	-0.60118
REPUTAT	-0.61434	-0.08763
ALCOHOL	0.59541	0.71501
COST	0.49364	0.70831
SIZE	0.64409	0.70649

This is prior to rotation. Factor 1 is everything else versus reputation. Factor 2 is Cheap Drunk versus Aesthetic Quality.

Variance Explained by Each Factor

Factor1	Factor2
3.1234182	2.4776972

3.123 + 2.478 = 5.601. By retaining only two factors, we have captured 5.601 standardized units of the common variance, which is 100% of the common variance. We have captured 5.601/7 = 80% of the total variance.

Final Communality Estimates: Total = 5.601115

COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
0.74538861	0.91397623	0.86575041	0.38509439	0.89248541	0.89605890	0.90236148

Notice the low communality of reputation. 1-.385 = 61.5% of its variance is unique.

Residual Correlations With ==Uniqueness== on the Diagonal

	COST	SIZE	ALCOHOL	==REPUTAT==	COLOR	AROMA	TASTE
COST	0.25461	0.01350	-0.03295	-0.04022	0.00333	-0.02046	-0.00116
SIZE	0.01350	0.08602	0.01495	0.06527	0.04528	0.00810	-0.02321
ALCOHOL	-0.03295	0.01495	0.13425	-0.03471	-0.01884	-0.00354	0.00373
REPUTAT	-0.04022	0.06527	-0.03471	==0.61491==	0.06415	-0.02588	-0.04377
COLOR	0.00333	0.04528	-0.01884	0.06415	0.10751	0.01557	0.01003
AROMA	-0.02046	0.00810	-0.00354	-0.02588	0.01557	0.10394	-0.02806
TASTE	-0.00116	-0.02321	0.00373	-0.04377	0.01003	-0.02806	0.09764

From the factor solution, the original correlation matrix (among the variables) is reproduced. For a good solution the reproduced correlation matrix will be very similar to the original correlation matrix. The elements in the matrix above are the differences between the original correlation matrix and the reproduced correlation matrix. We want these to be small.

Root Mean Square Off-Diagonal Residuals: Overall = 0.03076137

COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
0.02351006	0.03492867	0.02196769	0.04792968	0.03384833	0.01913133	0.02365473

These are averages of the off-diagonal elements for each variable. For cost, SQRT[(.0135² + .03295² + .04022² + .00333² + .02046² + .00116²)/6] = .0235.

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Partial Correlations Controlling Factors

	COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
COST	1.00000	0.09122	-0.17820	-0.10165	0.02012	-0.12576	-0.00736
SIZE	0.09122	1.00000	0.13909	0.28379	0.47082	0.08563	-0.25321
ALCOHOL	-0.17820	0.13909	1.00000	-0.12082	-0.15684	-0.03001	0.03254
REPUTAT	-0.10165	0.28379	-0.12082	1.00000	0.24948	-0.10238	-0.17863
COLOR	0.02012	0.47082	-0.15684	0.24948	1.00000	0.14725	0.09793
AROMA	-0.12576	0.08563	-0.03001	-0.10238	0.14725	1.00000	-0.27849
TASTE	-0.00736	-0.25321	0.03254	-0.17863	0.09793	-0.27849	1.00000

Each of the off-diagonal elements shows the correlation between one variable and another after removing from each variable the variance captured by the two factors. Ideally all of the elements in this matrix will be small.

Root Mean Square Off-Diagonal Partials: Overall = 0.18443030

COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
0.10542283	0.25862472	0.12400194	0.18712792	0.23811443	0.14931572	0.17525417

These are averages of the off-diagonal elements for each variable. For cost, SQRT[(.09122² + .1782² + .10165² + .02012² + .12576² + .00736²)/6] = .1054.

```
                        The FACTOR Procedure
                        Rotation Method: Varimax

                    Orthogonal Transformation Matrix

                                      1                2

                    1           0.78851          0.61502
                    2          -0.61502          0.78851



                        Rotated Factor Pattern
```

These are the loadings after rotation.

```
                              Factor1          Factor2

        TASTE           0.94968          -0.02170
        AROMA           0.94637           0.02106
        COLOR           0.94228           0.06771
        SIZE            0.07337           0.95320
        ALCOHOL         0.02974           0.92998
        COST           -0.04638           0.86211
        REPUTAT        -0.43052          -0.44693
```

One generally is not happy when a variable loads moderately on two factors but not very well on either.

```
                    Variance Explained by Each Factor
```
These are the sums of squared loadings after rotation.
```
                          Factor1          Factor2

                        2.8791761        2.7219393
```

Final Communality Estimates: Total = 5.601115 - same as before rotation

COST	SIZE	ALCOHOL	REPUTAT	COLOR	AROMA	TASTE
0.74538861	0.91397623	0.86575041	0.38509439	0.89248541	0.89605890	0.90236148

If we created a unit-weighed scale score from the color, taste, aroma, and reputation (negatively weighted) variables, what would the item analysis look like?

The CORR Procedure

4 Variables: COLOR   TASTE   AROMA   NegRep

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.886401
Standardized	0.884389

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables Correlation with Total	Alpha	Standardized Variables Correlation with Total	Alpha
COLOR	0.859013	0.810187	0.855846	0.808945
TASTE	0.879173	0.806773	0.873020	0.801949
AROMA	0.880661	0.802087	0.875726	0.800841
NegRep	0.433431	0.961259	0.434772	0.962033

The reputation variable is not well correlated with the total score produced by summing the scores on the other variables on the AQ scale. Deleting the reputation variable would increase Cronbach's alpha considerably (to .96). Strike 2 on the reputation variable.

The CORR Procedure

3 Variables: COLOR   TASTE   AROMA

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.961259
Standardized	0.962033

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables	
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
COLOR	0.937050	0.929449	0.936994	0.930616
TASTE	0.908118	0.951790	0.907786	0.952189
AROMA	0.912775	0.946335	0.911773	0.949267

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Partial Correlations Controlling all other Variables

	COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
COST	1.00000	0.53644	-0.05025	-0.16991	-0.06632	0.18330
SIZE	0.53644	1.00000	0.80662	0.53818	-0.09640	-0.48212
ALCOHOL	-0.05025	0.80662	1.00000	-0.45773	0.13447	0.39119
COLOR	-0.16991	0.53818	-0.45773	1.00000	0.54461	0.67350
AROMA	-0.06632	-0.09640	0.13447	0.54461	1.00000	0.17405
TASTE	0.18330	-0.48212	0.39119	0.67350	0.17405	1.00000

It is generally considered undesirable for one variable to be sharing variance with one other variable that is not shared with the remaining variables. Accordingly, we are pleased if the off-diagonal elements in this matrix are small. Look at the size variable. It has high partial correlations most of the other variables.

Kaiser's Measure of Sampling Adequacy: <mark>Overall MSA = 0.62770401</mark>
This overall MSA is mediocre, but that is not surprising with only six variables for two factors.

COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
0.78283560	<mark>0.51339471</mark>	0.57744290	0.56784302	0.81657477	0.63609944

A low MSA indicates that the correlations between the variable and other variables are unique (not shared with the remaining variables). The low MSA for the size variable is expected given its large partial correlation in the matrix above.

Prior Communality Estimates: SMC

COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
0.71987293	0.91132335	0.85902731	0.91716562	0.84370126	0.87267285

Preliminary Eigenvalues: Total = 5.12376332 Average = 0.85396055

	Eigenvalue	Difference	Proportion	Cumulative
1	2.74136033	0.29508813	0.5350	0.5350
2	2.44627220	2.41356026	0.4774	1.0125
3	0.03271194	0.02270857	0.0064	1.0188
4	0.01000337	0.04543235	0.0020	1.0208
5	-.03542898	0.03572656	-0.0069	1.0139
6	-.07115554		-0.0139	1.0000

2 factors will be retained by the NFACTOR criterion.

Iteration	Change		Communalities				
1	0.0274	0.72267	0.93873	0.85347	0.93493	0.86112	0.87671
2	0.0169	0.72179	0.95559	0.84666	0.94270	0.86811	0.87510
3	0.0112	0.72026	0.96681	0.84082	0.94654	0.87120	0.87262
4	0.0078	0.71887	0.97460	0.83632	0.94868	0.87270	0.87052
5	0.0055	0.71779	0.98013	0.83299	0.94997	0.87348	0.86899
6	0.0040	0.71698	0.98411	0.83055	0.95079	0.87393	0.86794
7	0.0029	0.71638	0.98698	0.82879	0.95133	0.87418	0.86724

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Iteration	Change		Communalities				
8	0.0021	0.71594	0.98907	0.82751	0.95169	0.87433	0.86677
9	0.0015	0.71562	0.99058	0.82659	0.95193	0.87442	0.86647
10	0.0011	0.71538	0.99168	0.82593	0.95209	0.87448	0.86627
11	0.0008	0.71520	0.99248	0.82545	0.95220	0.87451	0.86614

Convergence criterion satisfied.

```
         Eigenvalues of the Reduced Correlation Matrix: Total = 5.2258183  Average = 0.87096972

                    Eigenvalue    Difference    Proportion    Cumulative

              1      2.76329501    0.30061853      0.5288        0.5288
              2      2.46267648    2.42185259      0.4713        1.0000
              3      0.04082389    0.02391354      0.0078        1.0078
              4      0.01691035    0.03350888      0.0032        1.0111
              5     -.01659853    0.02469036     -0.0032        1.0079
              6     -.04128889                    -0.0079        1.0000


                                  Factor Pattern

                              Factor1         Factor2

                  COLOR        0.89387        -0.39140
                  AROMA        0.83105        -0.42879
                  TASTE        0.80519        -0.46669
                  SIZE         0.54426         0.83442
                  ALCOHOL      0.45128         0.78854
                  COST         0.35417         0.76796


                          Variance Explained by Each Factor

                              Factor1         Factor2

                             2.7632950       2.4626765


                    Final Communality Estimates: Total = 5.225971

          COST          SIZE       ALCOHOL        COLOR         AROMA         TASTE

       0.71520334    0.99248194    0.82544545    0.95219560    0.87450687    0.86613828
```

The FACTOR Procedure
Initial Factor Method: Iterated Principal Factor Analysis

Residual Correlations With Uniqueness on the Diagonal

```
                   COST         SIZE       ALCOHOL       COLOR         AROMA         TASTE

COST            0.28480     -0.00170      0.00203      0.00200      -0.01123      0.00931
SIZE           -0.00170      0.00752      0.00000      0.01905       0.00308     -0.02304
ALCOHOL         0.00203      0.00000      0.17455     -0.02260       0.00727      0.01642
COLOR           0.00200      0.01905     -0.02260      0.04780      -0.00194      0.00103
AROMA          -0.01123      0.00308      0.00727     -0.00194       0.12549      0.00096
TASTE           0.00931     -0.02304      0.01642      0.00103       0.00096      0.13386
```

Root Mean Square Off-Diagonal Residuals: Overall = 0.01144829

COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
0.00669149	0.01346044	0.01294145	0.01328375	0.00621624	0.01333566

Partial Correlations Controlling Factors

	COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
COST	1	-0.0367853	0.00908576	0.01714239	-0.0594178	0.04768832
SIZE	-0.0367853	1	0.00003907	1.00466319	0.10042137	-0.7262125
ALCOHOL	0.00908576	0.00003907	1	-0.2473947	0.04910961	0.10744614
COLOR	0.01714239	1.00466319	-0.2473947	1	-0.0250117	0.01289638
AROMA	-0.0594178	0.10042137	0.04910961	-0.0250117	1	0.00744472
TASTE	0.04768832	-0.7262125	0.10744614	0.01289638	0.00744472	1

I have been unable to figure out how SAS is coming up with this *pr* > 1.

Root Mean Square Off-Diagonal Partials: Overall = 0.32968260

COST	SIZE	ALCOHOL	COLOR	AROMA	TASTE
0.03881810	0.55644771	0.12267281	0.46295529	0.05780604	0.32906690

The FACTOR Procedure
Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2
1	0.88200	0.47125
2	-0.47125	0.88200

Rotated Factor Pattern

	Factor1	Factor2
COLOR	0.97284	0.07602
AROMA	0.93505	0.01344
TASTE	0.93011	-0.03217
SIZE	0.08682	0.99244
ALCOHOL	0.02643	0.90816
COST	-0.04953	0.84425

Variance Explained by Each Factor

Factor1   Factor2

```
                    2.6965342         2.5294372


              Final Communality Estimates: Total = 5.225971

        COST          SIZE        ALCOHOL        COLOR         AROMA          TASTE

   0.71520334     0.99248194     0.82544545    0.95219560    0.87450687    0.86613828

    ------------------------------------------------------------------------------------
```

```
                          The FACTOR Procedure
                          Rotation Method: Varimax

                 Scoring Coefficients Estimated by Regression



            Squared Multiple Correlations of the Variables with Each Factor

                        Factor1          Factor2

                        0.9730618       1.0051832



                     Standardized Scoring Coefficients

                               Factor1         Factor2

                 COLOR        0.68079002     -0.3791165
                 AROMA        0.21001162      0.01930102
                 TASTE        0.13616979      0.26405965
                 SIZE        -0.1661799       1.15418711
                 ALCOHOL      0.10650846     -0.1004969
                 COST         0.01312553     -0.0141647
```

Notice that when computing factor scores, color and size contribute a lot more than any of the other variables. These could serve as good substitutes for the factor scores.

                            Comparing the Groups on the Factors   12

```
                          The TTEST Procedure

                 Variable:   Factor1 - Aesthetic Quality

        group        N      Mean     Std Dev     Std Err     Minimum      Maximum

    1 students*      11    -0.4130    1.0006      0.3017      -1.6324      1.2879
    2 faculty         9     0.5048    0.7338      0.2446      -0.4469      1.6294
    Diff (1-2)             -0.9178    0.8919      0.4009
*undergraduate

  group       Method          Mean      95% CL Mean      Std Dev     95% CL Std Dev

   1                        -0.4130   -1.0852  0.2592     1.0006     0.6991  1.7559
```

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
2		0.5048	-0.0592	1.0688	0.7338	0.4956	1.4057
Diff (1-2)	Pooled	-0.9178	-1.7600	-0.0756	0.8919	0.6739	1.3190
Diff (1-2)	Satterthwaite	-0.9178	-1.7343	-0.1013			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	18	-2.29	0.0344
<mark>Satterthwaite</mark>	<mark>Unequal</mark>	<mark>17.835</mark>	<mark>-2.36</mark>	<mark>0.0297</mark>

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	10	8	1.86	0.3912

Variable: <mark>Factor2 - Cheap Drunk</mark>

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
1	11	<mark>0.5412</mark>	0.9411	0.2837	-0.9991	1.5596
2	9	<mark>-0.6615</mark>	0.6208	0.2069	-1.3704	0.6706
Diff (1-2)		1.2027	0.8144	0.3660		

group	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1		0.5412	-0.0910	1.1734	0.9411	0.6575	1.6515
2		-0.6615	-1.1386	-0.1843	0.6208	0.4193	1.1893
Diff (1-2)	Pooled	1.2027	0.4336	1.9717	0.8144	0.6154	1.2044
Diff (1-2)	Satterthwaite	1.2027	0.4629	1.9425			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	18	3.29	0.0041
<mark>Satterthwaite</mark>	<mark>Unequal</mark>	<mark>17.336</mark>	<mark>3.42</mark>	<mark>0.0032</mark>

Comparing the Groups on the Factors   13

The TTEST Procedure

Variable: Factor2

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	10	8	2.30	0.2510

Variable: <mark>ses</mark>

group	N	Mean	Std Dev	Std Err	Minimum	Maximum
1	12	1.5833	1.2401	0.3580	0	4.0000

```
           2              9        5.6667     2.0000      0.6667      3.0000      8.0000
        Diff (1-2)                -4.0833     1.6045      0.7075

     group        Method             Mean        95% CL Mean      Std Dev      95% CL Std Dev

     1                              1.5833     0.7954    2.3713     1.2401     0.8785    2.1056
     2                              5.6667     4.1293    7.2040     2.0000     1.3509    3.8315
     Diff (1-2)   Pooled          -4.0833    -5.5642   -2.6024     1.6045     1.2202    2.3436
     Diff (1-2)   Satterthwaite   -4.0833    -5.7245   -2.4422

                 Method            Variances       DF      t Value      Pr > |t|

                 Pooled            Equal           19       -5.77       <.0001
                 Satterthwaite     Unequal      12.522      -5.40        0.0001

                          Equality of Variances

                 Method        Num DF    Den DF    F Value    Pr > F

                 Folded F         8        11        2.60     0.1440

-------------------------------------------------------------------------------------


                       Predicting SES From the Factor Scores                         14

                             The REG Procedure

                 Number of Observations Read                    21
                 Number of Observations Used                    20
                 Number of Observations with Missing Values      1


                          Descriptive Statistics

                                              Uncorrected                   Standard
          Variable          Sum          Mean          SS      Variance     Deviation

          Intercept      20.00000      1.00000      20.00000         0             0
          Factor1      -2.2204E-16   -1.1102E-17     18.48817     0.97306       0.98644
          Factor2      1.11022E-15   5.55112E-17     19.09848     1.00518       1.00259
          ses           70.00000      3.50000     368.00000     6.47368       2.54434


                                Correlation

          Variable          Factor1          Factor2            ses

          Factor1           1.0000          -0.0070          0.6647
          Factor2          -0.0070           1.0000         -0.7161
          ses               0.6647          -0.7161          1.0000

-------------------------------------------------------------------------------------


                       Predicting SES From the Factor Scores                         15

                             The REG Procedure
                               Model: MODEL1
```

```
                         Dependent Variable: ses

              Number of Observations Read                    21
              Number of Observations Used                    20
              Number of Observations with Missing Values      1


                           Analysis of Variance

                                    Sum of          Mean
         Source              DF    Squares        Square    F Value    Pr > F

         Model                2   116.60150      58.30075    154.90    <.0001
         Error               17     6.39850       0.37638
         Corrected Total     19   123.00000


              Root MSE              0.61350    R-Square     0.9480
              Dependent Mean        3.50000    Adj R-Sq     0.9419
              Coeff Var            17.52857


                           Parameter Estimates

                     Parameter      Standard                        Standardized
         Variable   DF    Estimate       Error    t Value   Pr > |t|     Estimate

         Intercept   1     3.50000     0.13718      25.51    <.0001             0
         Factor1     1     1.70171     0.14268      11.93    <.0001       0.65975
         Factor2     1    -1.80546     0.14039     -12.86    <.0001      -0.71144
```

If you were interested in how the reputation variable is related to the groups or to SES, you could include it in the t tests or the multiple regression. You would find that it is not well related to either the grouping variable or SES.