

December 6, 2007
SC705: Advanced Statistics
Instructor: Natasha Sarkisian
Class notes: Interpreting SEM Results

Some Useful Output Options

These are specified in the OU command. Some of them regulate what is included in the output:

RS - Outputs residuals, standardized residuals, QQ-plot, and fitted covariance matrix.

EF - Outputs total and indirect effects.

MI - Outputs modification indices.

SS - Outputs the standardized solution.

SC - Outputs the completely standardized solution.

ALL - Outputs all the results.

ND=<number> -- Specifies the number of decimals for the results; default ND=2

Other options allow you to print the results into separate files:

<option> = <filename>

Options correspond to the names of matrices, e.g. LX, LY, BE, GA, PH, PS, etc. The folder name of the text file may be omitted if the text file and the LISREL syntax file are in the same folder.

NP=<number> -- Specifies the number of decimals for external text files to be produced; default:

NP=3

OU command also includes some estimation options, e.g.:

IT=<number> -- Specifies the maximum number of iterations for the iterative algorithm; default:

IT=five times the number of free parameters.

AD=<number> -- Specifies the iteration number at which the admissibility of the solution will be checked and the iterations will stop if the check fails; default: AD=20. This check may be turned off with the specification AD=OFF.

AM - Invokes the automatic model modification procedure. If this option is present, the program will modify the model sequentially by freeing at each step the fixed or constrained parameter that has the largest modification index. You should be really careful with this option, however, because the resulting model will be atheoretical.

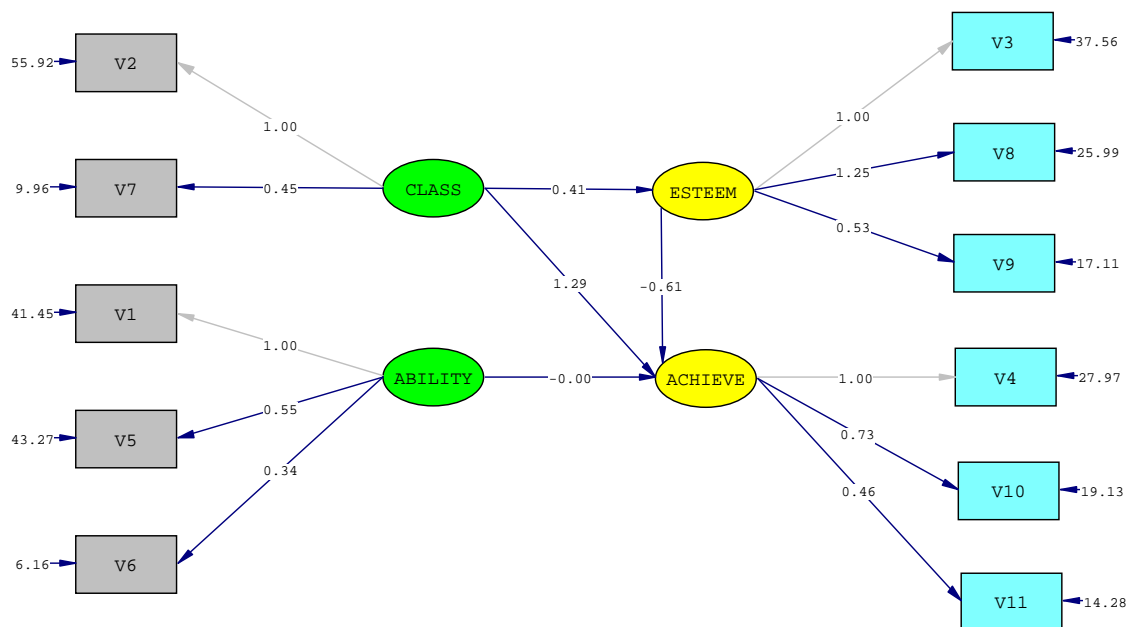
We've seen the output of MI and RS options already; let's see what EF, SS and SC give us:

```
DA NI=11 NO=414 MA=CM
LA
V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11
KM SY
1.00
.345 1.00
.287 .377 1.00
.252 .579 .114 1.00
.637 .335 .253 .255 1.00
.768 .339 .302 .278 .600 1.00
.254 .703 .337 .591 .312 .313 1.00
.166 .429 .724 .143 .264 .216 .364 1.00
.104 .411 .506 .142 .199 .163 .551 .630 1.00
```

```

.247 .601 .202 .880 .288 .309 .621 .290 .199 1.00
.208 .526 .127 .827 .253 .231 .676 .155 .234 .808 1.00
SD
13.9 13.4 10.0 15.9 9.4 4.9 5.9 11.1 5.9 11.8 7.9
SE
3 8 9 4 10 11 2 7 1 5 6
MO NX=5 NK=2 NY=6 NE=2 LX=FU, FI LY=FU, FI PH=SY,FR PS=DI,FR TD=DI,FR TE=DI,FR
BE=FU,FI GA=FU,FR
LK
CLASS ABILITY
LE
ESTEEM ACHIEVE
FR LX 2 1 LX 4 2 LX 5 2 LY 2 1 LY 3 1 LY 5 2 LY 6 2 BE 2 1
FI GA 1 2
VA 1.0 LX 1 1 LX 3 2 LY 1 1 LY 4 2
PD
OU EF SC SS

```



[Other output omitted]

Standardized Solution

	LAMBDA-Y	
	ESTEEM	ACHIEVE
V3	7.90	- -
V8	9.86	- -
V9	4.21	- -
V4	- -	14.99
V10	- -	10.96
V11	- -	6.94

	LAMBDA-X	
	CLASS	ABILITY
V2	11.12	- -
V7	4.99	- -
V1	- -	12.32
V5	- -	6.71
V6	- -	4.22

BETA

	ESTEEM	ACHIEVE
ESTEEM	- -	- -
ACHIEVE	-0.32	- -

GAMMA

	CLASS	ABILITY
ESTEEM	0.58	- -
ACHIEVE	0.96	0.00

Correlation Matrix of ETA and KSI

	ESTEEM	ACHIEVE	CLASS	ABILITY
ESTEEM	1.00			
ACHIEVE	0.24	1.00		
CLASS	0.58	0.77	1.00	
ABILITY	0.26	0.34	0.45	1.00

PSI

Note: This matrix is diagonal.

	ESTEEM	ACHIEVE
	0.66	0.34

Regression Matrix ETA on KSI (Standardized)

	CLASS	ABILITY
ESTEEM	0.58	- -
ACHIEVE	0.77	0.00

DA NI=11 NO=414 MA=CM

Completely Standardized Solution

LAMBDA-Y

	ESTEEM	ACHIEVE
V3	0.79	- -
V8	0.89	- -
V9	0.71	- -
V4	- -	0.94
V10	- -	0.93
V11	- -	0.88

LAMBDA-X

	CLASS	ABILITY
V2	0.83	- -
V7	0.84	- -
V1	- -	0.89
V5	- -	0.71
V6	- -	0.86

BETA

	ESTEEM	ACHIEVE
ESTEEM	- -	- -
ACHIEVE	-0.32	- -

GAMMA

	CLASS	ABILITY
ESTEEM	0.58	- -
ACHIEVE	0.96	0.00

Correlation Matrix of ETA and KSI

	ESTEEM	ACHIEVE	CLASS	ABILITY
ESTEEM	1.00			
ACHIEVE	0.24	1.00		
CLASS	0.58	0.77	1.00	
ABILITY	0.26	0.34	0.45	1.00

PSI

Note: This matrix is diagonal.

ESTEEM	ACHIEVE
0.66	0.34

THETA-EPS

V3	V8	V9	V4	V10	V11
0.38	0.21	0.49	0.11	0.14	0.23

THETA-DELTA

V2	V7	V1	V5	V6
0.31	0.29	0.21	0.49	0.26

Regression Matrix ETA on KSI (Standardized)

	CLASS	ABILITY
ESTEEM	0.58	- -
ACHIEVE	0.77	0.00

DA NI=11 NO=414 MA=CM

Total and Indirect Effects

Total Effects of KSI on ETA

	CLASS	ABILITY
ESTEEM	0.41 (0.04) 9.83	- -
ACHIEVE	1.04 (0.08) 13.72	0.00 (0.06) -0.03

Indirect Effects of KSI on ETA

	CLASS	ABILITY
	-----	-----
ESTEEM	- -	- -
ACHIEVE	-0.25	- -
	(0.06)	
	-4.52	

Total Effects of ETA on ETA

	ESTEEM	ACHIEVE
	-----	-----
ESTEEM	- -	- -
ACHIEVE	-0.61	- -
	(0.11)	
	-5.52	

Largest Eigenvalue of B*B' (Stability Index) is 0.373

Total Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	1.00	- -
V8	1.25	- -
	(0.07)	
	16.97	
V9	0.53	- -
	(0.04)	
	14.60	
V4	-0.61	1.00
	(0.11)	
	-5.52	
V10	-0.45	0.73
	(0.08)	(0.02)
	-5.52	34.47
V11	-0.28	0.46
	(0.05)	(0.02)
	-5.49	29.44

Indirect Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	- -	- -
V8	- -	- -
V9	- -	- -
V4	-0.61	- -
	(0.11)	
	-5.52	
V10	-0.45	- -
	(0.08)	
	-5.52	
V11	-0.28	- -
	(0.05)	
	-5.49	

Total Effects of KSI on Y

	CLASS	ABILITY
	-----	-----
V3	0.41	- -

	(0.04)		
	9.83		
V8	0.52	- -	
	(0.05)		
	10.45		
V9	0.22	- -	
	(0.02)		
	9.42		
V4	1.04	0.00	
	(0.08)	(0.06)	
	13.72	-0.03	
V10	0.76	0.00	
	(0.06)	(0.04)	
	13.60	-0.03	
V11	0.48	0.00	
	(0.04)	(0.03)	
	13.19	-0.03	

DA NI=11 NO=414 MA=CM

Standardized Total and Indirect Effects

Standardized Total Effects of KSI on ETA

	CLASS	ABILITY
	-----	-----
ESTEEM	0.58	- -
ACHIEVE	0.77	0.00

Standardized Indirect Effects of KSI on ETA

	CLASS	ABILITY
	-----	-----
ESTEEM	- -	- -
ACHIEVE	-0.19	- -

Standardized Total Effects of ETA on ETA

	ESTEEM	ACHIEVE
	-----	-----
ESTEEM	- -	- -
ACHIEVE	-0.32	- -

Standardized Total Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	7.90	- -
V8	9.86	- -
V9	4.21	- -
V4	-4.83	14.99
V10	-3.53	10.96
V11	-2.23	6.94

Completely Standardized Total Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	0.79	- -
V8	0.89	- -
V9	0.71	- -
V4	-0.30	0.94
V10	-0.30	0.93
V11	-0.28	0.88

Standardized Indirect Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	- -	- -
V8	- -	- -
V9	- -	- -
V4	-4.83	- -
V10	-3.53	- -
V11	-2.23	- -

Completely Standardized Indirect Effects of ETA on Y

	ESTEEM	ACHIEVE
	-----	-----
V3	- -	- -
V8	- -	- -
V9	- -	- -
V4	-0.30	- -
V10	-0.30	- -
V11	-0.28	- -

Standardized Total Effects of KSI on Y

	CLASS	ABILITY
	-----	-----
V3	4.60	- -
V8	5.74	- -
V9	2.45	- -
V4	11.57	-0.02
V10	8.46	-0.02
V11	5.35	-0.01

Completely Standardized Total Effects of KSI on Y

	CLASS	ABILITY
	-----	-----
V3	0.46	- -
V8	0.52	- -
V9	0.41	- -
V4	0.73	0.00
V10	0.72	0.00
V11	0.68	0.00

Time used: 0.016 Seconds