

A Sensitivity Analysis of a Model for Parenting Risk and Resilience, Social-emotional Readiness, and Reading Achievement in Kindergarten Children from Low-income Families Model by Smith-Adcock, Leite, Kaya and Amatea

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BASED ON PAPER: A Model for Parenting Risk and Resilience, Social-emotional Readiness, and Reading Achievement in Kindergarten Children from Low-income Families Model

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SENSITIVITY ANALYSIS USING SEMsens

This example sensitivity analysis uses the published data and model from Smith-Adcock, Leite, Kaya & Amatea(2019). We use the original data with categorical variables, set up the lavaan models for their original model and the sensitivity model, run the analysis, and view the results.

```
# Load lavaan and SEMsens packages
require(lavaan)
require(SEMsens)
set.seed(1)
```

Step 1 : Load data with names and indicate categorical variables

Smith-Adcock et. al (2019) shared the raw data and codebook, so we load the data with their names, and create names for categorical variables.

```
smith10.use <- data(smith19.use, package = "SEMsens")

#Indicate the ordinal variables and then factorize these variables
factornames <- c("P2BEPARN", "P2CHDOES", "P2HRDWRM", "P2FLTRAP", "P2FEELAN", "P2CHHARD",
  "P2MOREWK", "P2HITCHO", "P2HITAP0", "P2HITPRV", "P2HITWAR", "P2ATTENB",
  "P2ATTENP", "P2PARADV", "P2PARGRP", "P2ATTENS", "P2VOLUNT", "P2FUNDERS",
  "P2TVRULE", "P2TVRUL3", "P2TVRUL2", "P1TELLST", "P1SINGSO", "P1HELPAR",
  "P1CHORES", "P1GAMES", "P1NATURE", "P1BUILD", "P1SPORT", "P2LIBRAR",
  "P2CONCRT", "P2MUSEUM", "P2ZOO")
```

Step 2: Define the models

The SEMsens package requires both an original model and a sensitivity model using the lavaan model syntax. We first mimic the original Mplus model based on the article, and then adding phantom variables (phantom1, phantom2, etc.) for every latent variable into that model to create sensitivity model.

Note: Since we have categorical variables in the model, while the `lavaan` package did not allow for multiple imputation for missing data with categorical variables, so we have a close mimic model, but not a perfect replication of the model in the original article.

```
#A model mimicked from the original model in Smith-Adcock et al. (2019).
modell1 <- "
  # regressions
  C2RSCALE~T2LEARN+T2EXTERN+T2INTERN+T2CONTRO+T2INTERP+f1+f2+f3+f4+f5+f6
  T2LEARN~f1 +f2 +f3 +f4 +f5 +f6
  T2EXTERN~f1 +f2 +f3 +f4 +f5 +f6
  T2INTERN~f1 +f2 +f3 +f4 +f5 +f6
  T2CONTRO~f1 +f2 +f3 +f4 +f5 +f6
  T2INTERP~f1 +f2 +f3 +f4 +f5 +f6

  # latent variables
  f1=~P2BEPARN+P2CHDOES+P2HRDWRM+P2FLTRAP+P2FEELAN+P2CHHARD+P2MOREWK
  f2=~P2HITCHO+P2HITAPO+P2HITPRV+P2HITWAR
  f3=~P2ATTENB+P2ATTENP+P2PARADV+P2PARGRP+P2ATTENS+P2VOLUNT+P2FUNDERS
  f4=~P2TVRULE+P2TVRUL3+P2TVRUL2
  f5=~P1TELLST+P1SINGSO+P1HELPAR+P1CHORES+P1GAMES+P1NATURE+P1BUILD+P1SPORT
  f6=~P2LIBRAR+P2CONCRT+P2MUSEUM+P2ZOO

  # residual correlations
  T2LEARN ~~ T2EXTERN+T2INTERN+T2CONTRO+T2INTERP
  T2EXTERN ~~ T2INTERN+T2CONTRO+T2INTERP
  T2INTERN ~~ T2CONTRO+T2INTERP
  T2CONTRO ~~ T2INTERP

  f1 ~~ f2+f3+f4+f5+f6
  f2 ~~ f3+f4+f5+f6
  f3 ~~ f4+f5+f6
  f4 ~~ f5+f6
  f5 ~~ f6
  "

#The sensitivity model
#This sensitivity model used 6 phantom variables for a quicker result
sens.modell1 <- '
  # regressions
  C2RSCALE~T2LEARN+T2EXTERN+T2INTERN+T2CONTRO+T2INTERP+f1+f2+f3+f4+f5+f6
  T2LEARN~f1 +f2 +f3 +f4 +f5 +f6
  T2EXTERN~f1 +f2 +f3 +f4 +f5 +f6
  T2INTERN~f1 +f2 +f3 +f4 +f5 +f6
  T2CONTRO~f1 +f2 +f3 +f4 +f5 +f6
  T2INTERP~f1 +f2 +f3 +f4 +f5 +f6

  # latent variable definitions
  f1=~P2BEPARN+P2CHDOES+P2HRDWRM+P2FLTRAP+P2FEELAN+P2CHHARD+P2MOREWK
```

```

f2=~P2HITCHO+P2HITAP0+P2HITPRV+P2HITWAR
f3=~P2ATTENB+P2ATTENP+P2PARADV+P2PARGRP+P2ATTENS+P2VOLUNT+P2FUNDERS
f4=~P2TVRULE+P2TVRUL3+P2TVRUL2
f5=~P1TELLST+P1SINGS0+P1HELPAR+P1CHORES+P1GAMES+P1NATURE+P1BUILD+P1SPORT
f6=~P2LIBRAR+P2CONCRT+P2MUSEUM+P2ZOO

# residual correlations
T2LEARN ~~ T2EXTERN+T2INTERN+T2CONTR0+T2INTERP
T2EXTERN ~~ T2INTERN+T2CONTR0+T2INTERP
T2INTERN ~~ T2CONTR0+T2INTERP
T2CONTR0 ~~ T2INTERP

f1 ~~ f2+f3+f4+f5+f6
f2 ~~ f3+f4+f5+f6
f3 ~~ f4+f5+f6
f4 ~~ f5+f6
f5 ~~ f6

# phantom variables
T2LEARN ~ phantom1*phantom
T2EXTERN ~ phantom2*phantom
C2RSCALE ~ phantom3*phantom

f3 ~ phantom4*phantom
f4 ~ phantom5*phantom
f5 ~ phantom6*phantom

phantom =~ 0 # added for mean of zero
phantom ~~ 1*phantom # added for unit variance

```

Step 3: Identify paths of interest

Before running the analysis, it is recommended to identify the rows in the lavaan parameter table that include the paths we are interested in looking at in the analysis. The rows that we are interested will be used for the next step.

```

old.model = model1
old.out = sem(model = model1, data = smith19.use, estimator="WLSMV", ordered = factornames)
summary(old.out, standardized=TRUE)

```

```

## lavaan 0.6-9 ended normally after 213 iterations
##
##      Estimator                      DWLS
##      Optimization method          NLMINB
##      Number of model parameters      174
##
##                                     Used      Total
##      Number of observations          2466      3444
##
## Model Test User Model:
##                                     Standard      Robust

```

```

##      Test Statistic                1250.335    1283.613
##      Degrees of freedom                642        642
##      P-value (Chi-square)              0.000        0.000
##      Scaling correction factor          1.123
##      Shift parameter                    170.602
##      simple second-order correction
##
## Parameter Estimates:
##
##      Standard errors                Robust.sem
##      Information                    Expected
##      Information saturated (h1) model    Unstructured
##
## Latent Variables:
##      Estimate  Std.Err  z-value  P(>|z|)  Std.lv  Std.all
## f1 =~
##      P2BEPARN      1.000
##      P2CHDOES      1.267    0.062    20.337    0.000    0.690    0.690
##      P2HRDWRM      0.889    0.059    15.004    0.000    0.484    0.484
##      P2FLTRAP      1.306    0.066    19.707    0.000    0.711    0.711
##      P2FEELAN      1.161    0.062    18.712    0.000    0.632    0.632
##      P2CHHARD      1.353    0.073    18.616    0.000    0.737    0.737
##      P2MOREWK      1.214    0.060    20.309    0.000    0.661    0.661
## f2 =~
##      P2HITCHO      1.000
##      P2HITAPO      0.943    0.062    15.244    0.000    0.724    0.724
##      P2HITPRV      0.775    0.052    14.778    0.000    0.595    0.595
##      P2HITWAR      0.951    0.068    13.961    0.000    0.730    0.730
## f3 =~
##      P2ATTENB      1.000
##      P2ATTENP      0.869    0.075    11.636    0.000    0.490    0.490
##      P2PARADV      0.691    0.096     7.230    0.000    0.390    0.390
##      P2PARGRP      0.669    0.074     9.043    0.000    0.377    0.377
##      P2ATTENS      1.102    0.083    13.305    0.000    0.621    0.621
##      P2VOLUNT      1.110    0.084    13.266    0.000    0.626    0.626
##      P2FUNDERS      0.928    0.077    12.090    0.000    0.523    0.523
## f4 =~
##      P2TVRULE      1.000
##      P2TVRUL3      0.923    0.049    18.812    0.000    0.767    0.767
##      P2TVRUL2      0.969    0.056    17.397    0.000    0.805    0.805
## f5 =~
##      P1TELLST      1.000
##      P1SINGSO      0.849    0.045    18.743    0.000    0.496    0.496
##      P1HELPAR      0.904    0.044    20.671    0.000    0.528    0.528
##      P1CHORES      0.710    0.047    15.210    0.000    0.415    0.415
##      P1GAMES       1.024    0.045    22.755    0.000    0.599    0.599
##      P1NATURE      0.944    0.045    20.986    0.000    0.552    0.552
##      P1BUILD       0.916    0.043    21.075    0.000    0.536    0.536
##      P1SPORT       0.821    0.043    19.015    0.000    0.480    0.480
## f6 =~
##      P2LIBRAR      1.000
##      P2CONCRT      0.936    0.081    11.560    0.000    0.555    0.555
##      P2MUSEUM      1.031    0.085    12.126    0.000    0.611    0.611
##      P2ZOO         0.858    0.077    11.196    0.000    0.508    0.508

```

```

##
## Regressions:
##      Estimate  Std.Err  z-value  P(>|z|)  Std.lv  Std.all
## C2RSCALE ~
##   T2LEARN      6.046    0.290   20.841   0.000    6.046    0.485
##   T2EXTERN     0.589    0.363    1.623   0.105    0.589    0.045
##   T2INTERN     0.058    0.306    0.190   0.849    0.058    0.004
##   T2CONTRO    -1.077    0.481   -2.237   0.025   -1.077   -0.079
##   T2INTERP    -0.340    0.395   -0.862   0.389   -0.340   -0.025
##   f1          -0.271    0.396   -0.685   0.494   -0.148   -0.017
##   f2          -0.540    0.320   -1.688   0.091   -0.415   -0.048
##   f3           2.306    0.532    4.338   0.000    1.301    0.150
##   f4           0.458    0.278    1.646   0.100    0.381    0.044
##   f5           0.026    0.401    0.064   0.949    0.015    0.002
##   f6          -0.964    0.630   -1.529   0.126   -0.571   -0.066
## T2LEARN ~
##   f1          -0.149    0.033   -4.522   0.000   -0.081   -0.116
##   f2          -0.035    0.028   -1.254   0.210   -0.027   -0.038
##   f3           0.137    0.048    2.847   0.004    0.077    0.111
##   f4           0.004    0.025    0.180   0.857    0.004    0.005
##   f5           0.050    0.033    1.506   0.132    0.029    0.042
##   f6          -0.036    0.052   -0.684   0.494   -0.021   -0.031
## T2EXTERN ~
##   f1           0.195    0.031    6.260   0.000    0.106    0.158
##   f2           0.030    0.026    1.145   0.252    0.023    0.035
##   f3          -0.148    0.045   -3.268   0.001   -0.084   -0.125
##   f4           0.010    0.024    0.416   0.677    0.008    0.012
##   f5           0.036    0.033    1.093   0.274    0.021    0.031
##   f6           0.032    0.052    0.616   0.538    0.019    0.028
## T2INTERN ~
##   f1           0.007    0.026    0.251   0.802    0.004    0.006
##   f2           0.032    0.022    1.448   0.148    0.025    0.045
##   f3          -0.053    0.036   -1.469   0.142   -0.030   -0.055
##   f4           0.009    0.019    0.482   0.630    0.008    0.014
##   f5          -0.001    0.026   -0.054   0.957   -0.001   -0.002
##   f6          -0.030    0.040   -0.757   0.449   -0.018   -0.033
## T2CONTRO ~
##   f1          -0.168    0.030   -5.616   0.000   -0.091   -0.145
##   f2          -0.017    0.025   -0.679   0.497   -0.013   -0.021
##   f3           0.134    0.044    3.061   0.002    0.076    0.120
##   f4          -0.000    0.023   -0.005   0.996   -0.000   -0.000
##   f5          -0.004    0.031   -0.125   0.900   -0.002   -0.004
##   f6          -0.057    0.050   -1.147   0.252   -0.034   -0.053
## T2INTERP ~
##   f1          -0.160    0.030   -5.351   0.000   -0.087   -0.137
##   f2          -0.020    0.025   -0.814   0.415   -0.016   -0.025
##   f3           0.176    0.043    4.056   0.000    0.100    0.157
##   f4          -0.003    0.023   -0.131   0.896   -0.002   -0.004
##   f5           0.021    0.030    0.675   0.500    0.012    0.019
##   f6          -0.062    0.047   -1.317   0.188   -0.037   -0.058
##
## Covariances:
##      Estimate  Std.Err  z-value  P(>|z|)  Std.lv  Std.all
## .T2LEARN ~~

```

##	.T2EXTERN	-0.213	0.011	-19.226	0.000	-0.213	-0.474
##	.T2INTERN	-0.126	0.008	-15.626	0.000	-0.126	-0.338
##	.T2CONTRO	0.273	0.013	21.404	0.000	0.273	0.640
##	.T2INTERP	0.294	0.013	22.440	0.000	0.294	0.690
##	.T2EXTERN ~~						
##	.T2INTERN	0.097	0.007	14.364	0.000	0.097	0.271
##	.T2CONTRO	-0.285	0.011	-25.661	0.000	-0.285	-0.700
##	.T2INTERP	-0.235	0.010	-22.582	0.000	-0.235	-0.579
##	.T2INTERN ~~						
##	.T2CONTRO	-0.085	0.007	-11.986	0.000	-0.085	-0.252
##	.T2INTERP	-0.109	0.007	-15.324	0.000	-0.109	-0.323
##	.T2CONTRO ~~						
##	.T2INTERP	0.301	0.012	24.684	0.000	0.301	0.780
##	f1 ~~						
##	f2	0.038	0.015	2.596	0.009	0.090	0.090
##	f3	-0.048	0.010	-4.903	0.000	-0.156	-0.156
##	f4	-0.015	0.015	-1.005	0.315	-0.033	-0.033
##	f5	-0.064	0.009	-6.772	0.000	-0.201	-0.201
##	f6	-0.038	0.012	-3.128	0.002	-0.119	-0.119
##	f2 ~~						
##	f3	0.082	0.016	5.055	0.000	0.190	0.190
##	f4	0.112	0.025	4.559	0.000	0.176	0.176
##	f5	0.016	0.014	1.080	0.280	0.035	0.035
##	f6	0.029	0.018	1.639	0.101	0.064	0.064
##	f3 ~~						
##	f4	0.105	0.018	5.975	0.000	0.224	0.224
##	f5	0.083	0.011	7.360	0.000	0.250	0.250
##	f6	0.171	0.017	9.952	0.000	0.511	0.511
##	f4 ~~						
##	f5	0.073	0.015	4.763	0.000	0.151	0.151
##	f6	0.142	0.021	6.844	0.000	0.289	0.289
##	f5 ~~						
##	f6	0.138	0.014	9.651	0.000	0.398	0.398
##							
##	Intercepts:						
##		Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
##	.P2BEPARN	0.000				0.000	0.000
##	.P2CHDOES	0.000				0.000	0.000
##	.P2HRDWRM	0.000				0.000	0.000
##	.P2FLTRAP	0.000				0.000	0.000
##	.P2FEELAN	0.000				0.000	0.000
##	.P2CHHARD	0.000				0.000	0.000
##	.P2MOREWK	0.000				0.000	0.000
##	.P2HITCHO	0.000				0.000	0.000
##	.P2HITAPO	0.000				0.000	0.000
##	.P2HITPRV	0.000				0.000	0.000
##	.P2HITWAR	0.000				0.000	0.000
##	.P2ATTENB	0.000				0.000	0.000
##	.P2ATTENP	0.000				0.000	0.000
##	.P2PARADV	0.000				0.000	0.000
##	.P2PARGRP	0.000				0.000	0.000
##	.P2ATTENS	0.000				0.000	0.000
##	.P2VOLUNT	0.000				0.000	0.000
##	.P2FUNDERS	0.000				0.000	0.000

##	.P2TVRULE	0.000				0.000	0.000
##	.P2TVRUL3	0.000				0.000	0.000
##	.P2TVRUL2	0.000				0.000	0.000
##	.P1TELLST	0.000				0.000	0.000
##	.P1SINGSO	0.000				0.000	0.000
##	.P1HELPAR	0.000				0.000	0.000
##	.P1CHORES	0.000				0.000	0.000
##	.P1GAMES	0.000				0.000	0.000
##	.P1NATURE	0.000				0.000	0.000
##	.P1BUILD	0.000				0.000	0.000
##	.P1SPORT	0.000				0.000	0.000
##	.P2LIBRAR	0.000				0.000	0.000
##	.P2CONCRT	0.000				0.000	0.000
##	.P2MUSEUM	0.000				0.000	0.000
##	.P2ZOO	0.000				0.000	0.000
##	.C2RSCALE	13.381	1.714	7.805	0.000	13.381	1.541
##	.T2LEARN	3.006	0.015	205.268	0.000	3.006	4.313
##	.T2EXTERN	1.716	0.017	99.092	0.000	1.716	2.566
##	.T2INTERN	1.620	0.014	119.690	0.000	1.620	2.958
##	.T2CONTR0	3.102	0.014	229.397	0.000	3.102	4.901
##	.T2INTERP	3.037	0.013	232.253	0.000	3.037	4.787
##	f1	0.000				0.000	0.000
##	f2	0.000				0.000	0.000
##	f3	0.000				0.000	0.000
##	f4	0.000				0.000	0.000
##	f5	0.000				0.000	0.000
##	f6	0.000				0.000	0.000
##							
##	Thresholds:						
##		Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
##	P2BEPARN t1	-0.642	0.027	-23.588	0.000	-0.642	-0.642
##	P2BEPARN t2	0.043	0.025	1.691	0.091	0.043	0.043
##	P2BEPARN t3	0.282	0.026	11.019	0.000	0.282	0.282
##	P2CHDOES t1	-0.174	0.025	-6.842	0.000	-0.174	-0.174
##	P2CHDOES t2	1.063	0.031	34.090	0.000	1.063	1.063
##	P2CHDOES t3	1.392	0.036	38.149	0.000	1.392	1.392
##	P2HRDWRM t1	0.581	0.027	21.635	0.000	0.581	0.581
##	P2HRDWRM t2	1.236	0.034	36.709	0.000	1.236	1.236
##	P2HRDWRM t3	1.634	0.042	38.668	0.000	1.634	1.634
##	P2FLTRAP t1	0.864	0.029	29.805	0.000	0.864	0.864
##	P2FLTRAP t2	1.445	0.038	38.437	0.000	1.445	1.445
##	P2FLTRAP t3	1.713	0.045	38.415	0.000	1.713	1.713
##	P2FEELAN t1	0.626	0.027	23.082	0.000	0.626	0.626
##	P2FEELAN t2	1.899	0.051	37.073	0.000	1.899	1.899
##	P2FEELAN t3	2.352	0.077	30.470	0.000	2.352	2.352
##	P2CHHARD t1	1.177	0.033	35.937	0.000	1.177	1.177
##	P2CHHARD t2	1.749	0.046	38.233	0.000	1.749	1.749
##	P2CHHARD t3	2.110	0.061	34.479	0.000	2.110	2.110
##	P2MOREWK t1	0.630	0.027	23.199	0.000	0.630	0.630
##	P2MOREWK t2	1.269	0.034	37.090	0.000	1.269	1.269
##	P2MOREWK t3	1.558	0.040	38.722	0.000	1.558	1.558
##	P2HITCHO t1	1.351	0.036	37.852	0.000	1.351	1.351
##	P2HITAPO t1	0.574	0.027	21.400	0.000	0.574	0.574
##	P2HITPRV t1	0.439	0.026	16.773	0.000	0.439	0.439

##	P2HITWAR t1	1.086	0.031	34.509	0.000	1.086	1.086
##	P2ATTENB t1	-0.159	0.025	-6.279	0.000	-0.159	-0.159
##	P2ATTENP t1	0.656	0.027	24.015	0.000	0.656	0.656
##	P2PARADV t1	1.630	0.042	38.675	0.000	1.630	1.630
##	P2PARGRP t1	-0.666	0.027	-24.324	0.000	-0.666	-0.666
##	P2ATTENS t1	0.004	0.025	0.161	0.872	0.004	0.004
##	P2VOLUNT t1	0.610	0.027	22.575	0.000	0.610	0.610
##	P2FUNDRS t1	0.221	0.025	8.691	0.000	0.221	0.221
##	P2TVRULE t1	-0.971	0.030	-32.271	0.000	-0.971	-0.971
##	P2TVRUL3 t1	-0.027	0.025	-1.087	0.277	-0.027	-0.027
##	P2TVRUL2 t1	-0.923	0.030	-31.214	0.000	-0.923	-0.923
##	P1TELLST t1	-1.311	0.035	-37.514	0.000	-1.311	-1.311
##	P1TELLST t2	0.035	0.025	1.369	0.171	0.035	0.035
##	P1TELLST t3	0.735	0.028	26.361	0.000	0.735	0.735
##	P1SINGSO t1	-1.457	0.038	-38.487	0.000	-1.457	-1.457
##	P1SINGSO t2	-0.464	0.026	-17.687	0.000	-0.464	-0.464
##	P1SINGSO t3	0.102	0.025	4.026	0.000	0.102	0.102
##	P1HELPAR t1	-1.181	0.033	-35.995	0.000	-1.181	-1.181
##	P1HELPAR t2	0.042	0.025	1.651	0.099	0.042	0.042
##	P1HELPAR t3	0.744	0.028	26.627	0.000	0.744	0.744
##	P1CHORES t1	-1.608	0.042	-38.709	0.000	-1.608	-1.608
##	P1CHORES t2	-0.639	0.027	-23.471	0.000	-0.639	-0.639
##	P1CHORES t3	-0.124	0.025	-4.911	0.000	-0.124	-0.124
##	P1GAMES t1	-1.512	0.039	-38.659	0.000	-1.512	-1.512
##	P1GAMES t2	-0.119	0.025	-4.710	0.000	-0.119	-0.119
##	P1GAMES t3	0.700	0.028	25.327	0.000	0.700	0.700
##	P1NATURE t1	-0.476	0.026	-18.084	0.000	-0.476	-0.476
##	P1NATURE t2	0.700	0.028	25.327	0.000	0.700	0.700
##	P1NATURE t3	1.358	0.036	37.911	0.000	1.358	1.358
##	P1BUILD t1	-0.763	0.028	-27.158	0.000	-0.763	-0.763
##	P1BUILD t2	0.358	0.026	13.862	0.000	0.358	0.358
##	P1BUILD t3	1.022	0.031	33.330	0.000	1.022	1.022
##	P1SPORT t1	-1.109	0.032	-34.887	0.000	-1.109	-1.109
##	P1SPORT t2	-0.054	0.025	-2.134	0.033	-0.054	-0.054
##	P1SPORT t3	0.626	0.027	23.082	0.000	0.626	0.626
##	P2LIBRAR t1	0.268	0.026	10.497	0.000	0.268	0.268
##	P2CONCRT t1	0.534	0.027	20.062	0.000	0.534	0.534
##	P2MUSEUM t1	0.829	0.029	28.920	0.000	0.829	0.829
##	P2ZOO t1	0.375	0.026	14.461	0.000	0.375	0.375

##

Variances:

##		Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
##	.P2BEPARN	0.704				0.704	0.704
##	.P2CHDOES	0.524				0.524	0.524
##	.P2HRDWRM	0.766				0.766	0.766
##	.P2FLTRAP	0.494				0.494	0.494
##	.P2FEELAN	0.601				0.601	0.601
##	.P2CHHARD	0.457				0.457	0.457
##	.P2MOREWK	0.563				0.563	0.563
##	.P2HITCHO	0.411				0.411	0.411
##	.P2HITAPO	0.476				0.476	0.476
##	.P2HITPRV	0.646				0.646	0.646
##	.P2HITWAR	0.467				0.467	0.467
##	.P2ATTENB	0.682				0.682	0.682

##	.P2ATTENP	0.760				0.760	0.760
##	.P2PARADV	0.848				0.848	0.848
##	.P2PARGRP	0.858				0.858	0.858
##	.P2ATTENS	0.614				0.614	0.614
##	.P2VOLUNT	0.608				0.608	0.608
##	.P2FUNDERS	0.726				0.726	0.726
##	.P2TVRULE	0.309				0.309	0.309
##	.P2TVRUL3	0.412				0.412	0.412
##	.P2TVRUL2	0.352				0.352	0.352
##	.P1TELLST	0.658				0.658	0.658
##	.P1SINGSO	0.754				0.754	0.754
##	.P1HELPER	0.721				0.721	0.721
##	.P1CHORES	0.828				0.828	0.828
##	.P1GAMES	0.641				0.641	0.641
##	.P1NATURE	0.696				0.696	0.696
##	.P1BUILD	0.713				0.713	0.713
##	.P1SPORT	0.769				0.769	0.769
##	.P2LIBRAR	0.649				0.649	0.649
##	.P2CONCRT	0.692				0.692	0.692
##	.P2MUSEUM	0.626				0.626	0.626
##	.P2ZOO	0.741				0.741	0.741
##	.C2RSCALE	60.494	1.537	39.371	0.000	60.494	0.803
##	.T2LEARN	0.470	0.018	26.106	0.000	0.470	0.968
##	.T2EXTERN	0.429	0.013	32.729	0.000	0.429	0.959
##	.T2INTERN	0.298	0.008	38.491	0.000	0.298	0.993
##	.T2CONTR0	0.387	0.014	27.726	0.000	0.387	0.965
##	.T2INTERP	0.385	0.014	27.826	0.000	0.385	0.956
##	f1	0.296	0.024	12.551	0.000	1.000	1.000
##	f2	0.589	0.061	9.696	0.000	1.000	1.000
##	f3	0.318	0.034	9.248	0.000	1.000	1.000
##	f4	0.691	0.049	13.969	0.000	1.000	1.000
##	f5	0.342	0.022	15.270	0.000	1.000	1.000
##	f6	0.351	0.039	8.903	0.000	1.000	1.000
##							
##	Scales y*:						
##		Estimate	Std.Err	z-value	P(> z)	Std.lv	Std.all
##	P2BEPARN	1.000				1.000	1.000
##	P2CHDOES	1.000				1.000	1.000
##	P2HRDWRM	1.000				1.000	1.000
##	P2FLTRAP	1.000				1.000	1.000
##	P2FEELAN	1.000				1.000	1.000
##	P2CHHARD	1.000				1.000	1.000
##	P2MOREWK	1.000				1.000	1.000
##	P2HITCHO	1.000				1.000	1.000
##	P2HITAPO	1.000				1.000	1.000
##	P2HITPRV	1.000				1.000	1.000
##	P2HITWAR	1.000				1.000	1.000
##	P2ATTENB	1.000				1.000	1.000
##	P2ATTENP	1.000				1.000	1.000
##	P2PARADV	1.000				1.000	1.000
##	P2PARGRP	1.000				1.000	1.000
##	P2ATTENS	1.000				1.000	1.000
##	P2VOLUNT	1.000				1.000	1.000
##	P2FUNDERS	1.000				1.000	1.000

##	P2TVRULE	1.000			1.000	1.000
##	P2TVRUL3	1.000			1.000	1.000
##	P2TVRUL2	1.000			1.000	1.000
##	P1TELLST	1.000			1.000	1.000
##	P1SINGSO	1.000			1.000	1.000
##	P1HELPAR	1.000			1.000	1.000
##	P1CHORES	1.000			1.000	1.000
##	P1GAMES	1.000			1.000	1.000
##	P1NATURE	1.000			1.000	1.000
##	P1BUILD	1.000			1.000	1.000
##	P1SPORT	1.000			1.000	1.000
##	P2LIBRAR	1.000			1.000	1.000
##	P2CONCRT	1.000			1.000	1.000
##	P2MUSEUM	1.000			1.000	1.000
##	P2ZOO	1.000			1.000	1.000

```
old.model.par <- standardizedSolution(old.out,type = "std.all")
old.model.par
```

##	lhs	op	rhs	est.std	se	z	pvalue	ci.lower	ci.upper
## 1	C2RSCALE	~	T2LEARN	0.485	0.023	21.425	0.000	0.441	0.530
## 2	C2RSCALE	~	T2EXTERN	0.045	0.028	1.622	0.105	-0.009	0.100
## 3	C2RSCALE	~	T2INTERN	0.004	0.019	0.190	0.849	-0.034	0.042
## 4	C2RSCALE	~	T2CONTRO	-0.079	0.035	-2.226	0.026	-0.148	-0.009
## 5	C2RSCALE	~	T2INTERP	-0.025	0.029	-0.862	0.388	-0.081	0.032
## 6	C2RSCALE	~	f1	-0.017	0.025	-0.685	0.493	-0.066	0.032
## 7	C2RSCALE	~	f2	-0.048	0.028	-1.692	0.091	-0.103	0.008
## 8	C2RSCALE	~	f3	0.150	0.033	4.478	0.000	0.084	0.215
## 9	C2RSCALE	~	f4	0.044	0.027	1.651	0.099	-0.008	0.096
## 10	C2RSCALE	~	f5	0.002	0.027	0.064	0.949	-0.051	0.055
## 11	C2RSCALE	~	f6	-0.066	0.043	-1.535	0.125	-0.150	0.018
## 12	T2LEARN	~	f1	-0.116	0.025	-4.636	0.000	-0.165	-0.067
## 13	T2LEARN	~	f2	-0.038	0.030	-1.255	0.210	-0.098	0.022
## 14	T2LEARN	~	f3	0.111	0.038	2.901	0.004	0.036	0.185
## 15	T2LEARN	~	f4	0.005	0.030	0.180	0.857	-0.053	0.063
## 16	T2LEARN	~	f5	0.042	0.028	1.506	0.132	-0.013	0.097
## 17	T2LEARN	~	f6	-0.031	0.045	-0.685	0.493	-0.118	0.057
## 18	T2EXTERN	~	f1	0.158	0.024	6.518	0.000	0.111	0.206
## 19	T2EXTERN	~	f2	0.035	0.030	1.146	0.252	-0.025	0.094
## 20	T2EXTERN	~	f3	-0.125	0.038	-3.336	0.001	-0.199	-0.052
## 21	T2EXTERN	~	f4	0.012	0.029	0.416	0.677	-0.046	0.070
## 22	T2EXTERN	~	f5	0.031	0.028	1.096	0.273	-0.025	0.087
## 23	T2EXTERN	~	f6	0.028	0.046	0.617	0.538	-0.062	0.118
## 24	T2INTERN	~	f1	0.006	0.026	0.251	0.802	-0.044	0.057
## 25	T2INTERN	~	f2	0.045	0.031	1.452	0.147	-0.016	0.105
## 26	T2INTERN	~	f3	-0.055	0.037	-1.476	0.140	-0.127	0.018
## 27	T2INTERN	~	f4	0.014	0.029	0.482	0.630	-0.042	0.070
## 28	T2INTERN	~	f5	-0.002	0.028	-0.054	0.957	-0.057	0.054
## 29	T2INTERN	~	f6	-0.033	0.043	-0.758	0.449	-0.118	0.052
## 30	T2CONTRO	~	f1	-0.145	0.025	-5.826	0.000	-0.193	-0.096
## 31	T2CONTRO	~	f2	-0.021	0.030	-0.679	0.497	-0.080	0.039
## 32	T2CONTRO	~	f3	0.120	0.038	3.130	0.002	0.045	0.195
## 33	T2CONTRO	~	f4	0.000	0.030	-0.005	0.996	-0.059	0.059
## 34	T2CONTRO	~	f5	-0.004	0.029	-0.125	0.900	-0.060	0.053

## 35	T2CONTRO	~	f6	-0.053	0.046	-1.150	0.250	-0.144	0.038
## 36	T2INTERP	~	f1	-0.137	0.025	-5.529	0.000	-0.186	-0.089
## 37	T2INTERP	~	f2	-0.025	0.030	-0.814	0.416	-0.084	0.035
## 38	T2INTERP	~	f3	0.157	0.037	4.210	0.000	0.084	0.230
## 39	T2INTERP	~	f4	-0.004	0.030	-0.131	0.896	-0.062	0.055
## 40	T2INTERP	~	f5	0.019	0.028	0.675	0.500	-0.036	0.074
## 41	T2INTERP	~	f6	-0.058	0.044	-1.324	0.185	-0.144	0.028
## 42	f1	==	P2BEPARN	0.544	0.022	25.101	0.000	0.502	0.587
## 43	f1	==	P2CHDOES	0.690	0.019	36.425	0.000	0.653	0.727
## 44	f1	==	P2HRDWRM	0.484	0.026	18.369	0.000	0.433	0.536
## 45	f1	==	P2FLTRAP	0.711	0.023	30.642	0.000	0.666	0.757
## 46	f1	==	P2FEELAN	0.632	0.023	27.515	0.000	0.587	0.677
## 47	f1	==	P2CHHARD	0.737	0.026	28.233	0.000	0.686	0.788
## 48	f1	==	P2MOREWK	0.661	0.022	30.009	0.000	0.618	0.704
## 49	f2	==	P2HITCHO	0.768	0.040	19.391	0.000	0.690	0.845
## 50	f2	==	P2HITAPO	0.724	0.026	27.769	0.000	0.673	0.775
## 51	f2	==	P2HITPRV	0.595	0.028	21.461	0.000	0.541	0.650
## 52	f2	==	P2HITWAR	0.730	0.034	21.364	0.000	0.663	0.797
## 53	f3	==	P2ATTENB	0.564	0.030	18.497	0.000	0.504	0.624
## 54	f3	==	P2ATTENP	0.490	0.033	14.971	0.000	0.426	0.554
## 55	f3	==	P2PARADV	0.390	0.049	7.947	0.000	0.293	0.486
## 56	f3	==	P2PARGRP	0.377	0.036	10.349	0.000	0.306	0.449
## 57	f3	==	P2ATTENS	0.621	0.029	21.247	0.000	0.564	0.679
## 58	f3	==	P2VOLUNT	0.626	0.031	20.400	0.000	0.566	0.686
## 59	f3	==	P2FUNDERS	0.523	0.031	17.105	0.000	0.463	0.583
## 60	f4	==	P2TVRULE	0.831	0.030	27.938	0.000	0.773	0.889
## 61	f4	==	P2TVRUL3	0.767	0.025	30.268	0.000	0.717	0.817
## 62	f4	==	P2TVRUL2	0.805	0.030	26.967	0.000	0.747	0.864
## 63	f5	==	P1TELLST	0.585	0.019	30.540	0.000	0.547	0.622
## 64	f5	==	P1SINGSO	0.496	0.021	23.154	0.000	0.454	0.538
## 65	f5	==	P1HELPAR	0.528	0.020	26.965	0.000	0.490	0.567
## 66	f5	==	P1CHORES	0.415	0.023	17.675	0.000	0.369	0.461
## 67	f5	==	P1GAMES	0.599	0.019	31.491	0.000	0.562	0.636
## 68	f5	==	P1NATURE	0.552	0.020	27.965	0.000	0.513	0.590
## 69	f5	==	P1BUILD	0.536	0.019	27.846	0.000	0.498	0.573
## 70	f5	==	P1SPORT	0.480	0.020	23.556	0.000	0.440	0.520
## 71	f6	==	P2LIBRAR	0.593	0.033	17.806	0.000	0.528	0.658
## 72	f6	==	P2CONCRT	0.555	0.034	16.295	0.000	0.488	0.621
## 73	f6	==	P2MUSEUM	0.611	0.034	17.999	0.000	0.545	0.678
## 74	f6	==	P2ZOO	0.508	0.033	15.355	0.000	0.444	0.573
## 75	T2LEARN	~~	T2EXTERN	-0.474	0.015	-31.483	0.000	-0.503	-0.444
## 76	T2LEARN	~~	T2INTERN	-0.338	0.017	-19.877	0.000	-0.371	-0.305
## 77	T2LEARN	~~	T2CONTRO	0.640	0.012	53.526	0.000	0.617	0.664
## 78	T2LEARN	~~	T2INTERP	0.690	0.011	63.190	0.000	0.669	0.712
## 79	T2EXTERN	~~	T2INTERN	0.271	0.016	16.707	0.000	0.239	0.303
## 80	T2EXTERN	~~	T2CONTRO	-0.700	0.010	-71.226	0.000	-0.719	-0.680
## 81	T2EXTERN	~~	T2INTERP	-0.579	0.013	-44.553	0.000	-0.605	-0.554
## 82	T2INTERN	~~	T2CONTRO	-0.252	0.019	-13.476	0.000	-0.289	-0.215
## 83	T2INTERN	~~	T2INTERP	-0.323	0.017	-18.685	0.000	-0.357	-0.290
## 84	T2CONTRO	~~	T2INTERP	0.780	0.008	99.334	0.000	0.765	0.795
## 85	f1	~~	f2	0.090	0.034	2.647	0.008	0.023	0.157
## 86	f1	~~	f3	-0.156	0.031	-5.120	0.000	-0.216	-0.096
## 87	f1	~~	f4	-0.033	0.033	-1.006	0.314	-0.099	0.032
## 88	f1	~~	f5	-0.201	0.028	-7.248	0.000	-0.255	-0.147

## 89	f1	~~	f6	-0.119	0.037	-3.170	0.002	-0.192	-0.045
## 90	f2	~~	f3	0.190	0.035	5.347	0.000	0.120	0.259
## 91	f2	~~	f4	0.176	0.037	4.773	0.000	0.103	0.248
## 92	f2	~~	f5	0.035	0.032	1.084	0.278	-0.028	0.098
## 93	f2	~~	f6	0.064	0.039	1.648	0.099	-0.012	0.141
## 94	f3	~~	f4	0.224	0.034	6.586	0.000	0.157	0.290
## 95	f3	~~	f5	0.250	0.030	8.359	0.000	0.192	0.309
## 96	f3	~~	f6	0.511	0.035	14.490	0.000	0.442	0.580
## 97	f4	~~	f5	0.151	0.031	4.892	0.000	0.090	0.211
## 98	f4	~~	f6	0.289	0.038	7.524	0.000	0.214	0.364
## 99	f5	~~	f6	0.398	0.033	12.069	0.000	0.333	0.462
## 100	P2BEPARN		t1	-0.642	0.027	-23.588	0.000	-0.696	-0.589
## 101	P2BEPARN		t2	0.043	0.025	1.691	0.091	-0.007	0.092
## 102	P2BEPARN		t3	0.282	0.026	11.019	0.000	0.232	0.332
## 103	P2CHDOES		t1	-0.174	0.025	-6.842	0.000	-0.223	-0.124
## 104	P2CHDOES		t2	1.063	0.031	34.090	0.000	1.002	1.124
## 105	P2CHDOES		t3	1.392	0.036	38.149	0.000	1.321	1.464
## 106	P2HRDWRM		t1	0.581	0.027	21.635	0.000	0.528	0.634
## 107	P2HRDWRM		t2	1.236	0.034	36.709	0.000	1.170	1.302
## 108	P2HRDWRM		t3	1.634	0.042	38.668	0.000	1.551	1.717
## 109	P2FLTRAP		t1	0.864	0.029	29.805	0.000	0.807	0.921
## 110	P2FLTRAP		t2	1.445	0.038	38.437	0.000	1.371	1.519
## 111	P2FLTRAP		t3	1.713	0.045	38.415	0.000	1.625	1.800
## 112	P2FEELAN		t1	0.626	0.027	23.082	0.000	0.573	0.679
## 113	P2FEELAN		t2	1.899	0.051	37.073	0.000	1.798	1.999
## 114	P2FEELAN		t3	2.352	0.077	30.470	0.000	2.201	2.504
## 115	P2CHHARD		t1	1.177	0.033	35.937	0.000	1.113	1.241
## 116	P2CHHARD		t2	1.749	0.046	38.233	0.000	1.659	1.839
## 117	P2CHHARD		t3	2.110	0.061	34.479	0.000	1.990	2.230
## 118	P2MOREWK		t1	0.630	0.027	23.199	0.000	0.577	0.683
## 119	P2MOREWK		t2	1.269	0.034	37.090	0.000	1.202	1.336
## 120	P2MOREWK		t3	1.558	0.040	38.722	0.000	1.479	1.637
## 121	P2HITCHO		t1	1.351	0.036	37.852	0.000	1.281	1.421
## 122	P2HITAPO		t1	0.574	0.027	21.400	0.000	0.521	0.626
## 123	P2HITPRV		t1	0.439	0.026	16.773	0.000	0.387	0.490
## 124	P2HITWAR		t1	1.086	0.031	34.509	0.000	1.025	1.148
## 125	P2ATTENB		t1	-0.159	0.025	-6.279	0.000	-0.209	-0.110
## 126	P2ATTENP		t1	0.656	0.027	24.015	0.000	0.603	0.710
## 127	P2PARADV		t1	1.630	0.042	38.675	0.000	1.548	1.713
## 128	P2PARGRP		t1	-0.666	0.027	-24.324	0.000	-0.720	-0.613
## 129	P2ATTENS		t1	0.004	0.025	0.161	0.872	-0.045	0.054
## 130	P2VOLUNT		t1	0.610	0.027	22.575	0.000	0.557	0.663
## 131	P2FUNDRS		t1	0.221	0.025	8.691	0.000	0.171	0.271
## 132	P2TVRULE		t1	-0.971	0.030	-32.271	0.000	-1.030	-0.912
## 133	P2TVRUL3		t1	-0.027	0.025	-1.087	0.277	-0.077	0.022
## 134	P2TVRUL2		t1	-0.923	0.030	-31.214	0.000	-0.981	-0.865
## 135	P1TELLST		t1	-1.311	0.035	-37.514	0.000	-1.380	-1.243
## 136	P1TELLST		t2	0.035	0.025	1.369	0.171	-0.015	0.084
## 137	P1TELLST		t3	0.735	0.028	26.361	0.000	0.680	0.790
## 138	P1SINGSO		t1	-1.457	0.038	-38.487	0.000	-1.531	-1.383
## 139	P1SINGSO		t2	-0.464	0.026	-17.687	0.000	-0.516	-0.413
## 140	P1SINGSO		t3	0.102	0.025	4.026	0.000	0.052	0.151
## 141	P1HELPAR		t1	-1.181	0.033	-35.995	0.000	-1.245	-1.117
## 142	P1HELPAR		t2	0.042	0.025	1.651	0.099	-0.008	0.091

## 143	P1HELPAR		t3	0.744	0.028	26.627	0.000	0.690	0.799
## 144	P1CHORES		t1	-1.608	0.042	-38.709	0.000	-1.689	-1.526
## 145	P1CHORES		t2	-0.639	0.027	-23.471	0.000	-0.692	-0.585
## 146	P1CHORES		t3	-0.124	0.025	-4.911	0.000	-0.174	-0.075
## 147	P1GAMES		t1	-1.512	0.039	-38.659	0.000	-1.588	-1.435
## 148	P1GAMES		t2	-0.119	0.025	-4.710	0.000	-0.169	-0.070
## 149	P1GAMES		t3	0.700	0.028	25.327	0.000	0.645	0.754
## 150	P1NATURE		t1	-0.476	0.026	-18.084	0.000	-0.527	-0.424
## 151	P1NATURE		t2	0.700	0.028	25.327	0.000	0.645	0.754
## 152	P1NATURE		t3	1.358	0.036	37.911	0.000	1.288	1.429
## 153	P1BUILD		t1	-0.763	0.028	-27.158	0.000	-0.818	-0.708
## 154	P1BUILD		t2	0.358	0.026	13.862	0.000	0.308	0.409
## 155	P1BUILD		t3	1.022	0.031	33.330	0.000	0.962	1.083
## 156	P1SPORT		t1	-1.109	0.032	-34.887	0.000	-1.171	-1.046
## 157	P1SPORT		t2	-0.054	0.025	-2.134	0.033	-0.103	-0.004
## 158	P1SPORT		t3	0.626	0.027	23.082	0.000	0.573	0.679
## 159	P2LIBRAR		t1	0.268	0.026	10.497	0.000	0.218	0.319
## 160	P2CONCRT		t1	0.534	0.027	20.062	0.000	0.481	0.586
## 161	P2MUSEUM		t1	0.829	0.029	28.920	0.000	0.773	0.885
## 162	P2ZOO		t1	0.375	0.026	14.461	0.000	0.324	0.425
## 163	P2BEPARN	~~	P2BEPARN	0.704	0.024	29.802	0.000	0.657	0.750
## 164	P2CHDOES	~~	P2CHDOES	0.524	0.026	20.052	0.000	0.473	0.575
## 165	P2HRDWRM	~~	P2HRDWRM	0.766	0.026	29.988	0.000	0.716	0.816
## 166	P2FLTRAP	~~	P2FLTRAP	0.494	0.033	14.970	0.000	0.430	0.559
## 167	P2FEELAN	~~	P2FEELAN	0.601	0.029	20.680	0.000	0.544	0.657
## 168	P2CHHARD	~~	P2CHHARD	0.457	0.038	11.897	0.000	0.382	0.533
## 169	P2MOREWK	~~	P2MOREWK	0.563	0.029	19.344	0.000	0.506	0.620
## 170	P2HITCHO	~~	P2HITCHO	0.411	0.061	6.756	0.000	0.292	0.530
## 171	P2HITAP0	~~	P2HITAP0	0.476	0.038	12.623	0.000	0.402	0.550
## 172	P2HITPRV	~~	P2HITPRV	0.646	0.033	19.545	0.000	0.581	0.710
## 173	P2HITWAR	~~	P2HITWAR	0.467	0.050	9.355	0.000	0.369	0.565
## 174	P2ATTENB	~~	P2ATTENB	0.682	0.034	19.823	0.000	0.614	0.749
## 175	P2ATTENP	~~	P2ATTENP	0.760	0.032	23.689	0.000	0.697	0.823
## 176	P2PARADV	~~	P2PARADV	0.848	0.038	22.217	0.000	0.773	0.923
## 177	P2PARGRP	~~	P2PARGRP	0.858	0.028	31.179	0.000	0.804	0.912
## 178	P2ATTENS	~~	P2ATTENS	0.614	0.036	16.884	0.000	0.543	0.685
## 179	P2VOLUNT	~~	P2VOLUNT	0.608	0.038	15.819	0.000	0.533	0.683
## 180	P2FUNDRS	~~	P2FUNDRS	0.726	0.032	22.685	0.000	0.663	0.789
## 181	P2TVRULE	~~	P2TVRULE	0.309	0.049	6.252	0.000	0.212	0.406
## 182	P2TVRUL3	~~	P2TVRUL3	0.412	0.039	10.602	0.000	0.336	0.488
## 183	P2TVRUL2	~~	P2TVRUL2	0.352	0.048	7.320	0.000	0.258	0.446
## 184	P1TELLST	~~	P1TELLST	0.658	0.022	29.408	0.000	0.614	0.702
## 185	P1SINGSO	~~	P1SINGSO	0.754	0.021	35.457	0.000	0.712	0.796
## 186	P1HELPAR	~~	P1HELPAR	0.721	0.021	34.842	0.000	0.680	0.762
## 187	P1CHORES	~~	P1CHORES	0.828	0.019	42.483	0.000	0.790	0.866
## 188	P1GAMES	~~	P1GAMES	0.641	0.023	28.149	0.000	0.597	0.686
## 189	P1NATURE	~~	P1NATURE	0.696	0.022	31.941	0.000	0.653	0.738
## 190	P1BUILD	~~	P1BUILD	0.713	0.021	34.595	0.000	0.673	0.753
## 191	P1SPORT	~~	P1SPORT	0.769	0.020	39.295	0.000	0.731	0.808
## 192	P2LIBRAR	~~	P2LIBRAR	0.649	0.039	16.427	0.000	0.571	0.726
## 193	P2CONCRT	~~	P2CONCRT	0.692	0.038	18.333	0.000	0.618	0.766
## 194	P2MUSEUM	~~	P2MUSEUM	0.626	0.042	15.095	0.000	0.545	0.708
## 195	P2ZOO	~~	P2ZOO	0.741	0.034	22.019	0.000	0.675	0.807
## 196	C2RSKALE	~~	C2RSKALE	0.803	0.014	57.073	0.000	0.775	0.830

##	197	T2LEARN	~~	T2LEARN	0.968	0.009	107.076	0.000	0.950	0.985
##	198	T2EXTERN	~~	T2EXTERN	0.959	0.010	95.652	0.000	0.939	0.978
##	199	T2INTERN	~~	T2INTERN	0.993	0.005	216.996	0.000	0.984	1.002
##	200	T2CONTR0	~~	T2CONTR0	0.965	0.010	99.939	0.000	0.946	0.984
##	201	T2INTERP	~~	T2INTERP	0.956	0.011	88.494	0.000	0.935	0.977
##	202	f1	~~	f1	1.000	0.000	NA	NA	1.000	1.000
##	203	f2	~~	f2	1.000	0.000	NA	NA	1.000	1.000
##	204	f3	~~	f3	1.000	0.000	NA	NA	1.000	1.000
##	205	f4	~~	f4	1.000	0.000	NA	NA	1.000	1.000
##	206	f5	~~	f5	1.000	0.000	NA	NA	1.000	1.000
##	207	f6	~~	f6	1.000	0.000	NA	NA	1.000	1.000
##	208	P2BEPARN	***	P2BEPARN	1.000	0.000	NA	NA	1.000	1.000
##	209	P2CHDOES	***	P2CHDOES	1.000	0.000	NA	NA	1.000	1.000
##	210	P2HRDWRM	***	P2HRDWRM	1.000	0.000	NA	NA	1.000	1.000
##	211	P2FLTRAP	***	P2FLTRAP	1.000	0.000	NA	NA	1.000	1.000
##	212	P2FEELAN	***	P2FEELAN	1.000	0.000	NA	NA	1.000	1.000
##	213	P2CHHARD	***	P2CHHARD	1.000	0.000	NA	NA	1.000	1.000
##	214	P2MOREWK	***	P2MOREWK	1.000	0.000	NA	NA	1.000	1.000
##	215	P2HITCHO	***	P2HITCHO	1.000	0.000	NA	NA	1.000	1.000
##	216	P2HITAP0	***	P2HITAP0	1.000	0.000	NA	NA	1.000	1.000
##	217	P2HITPRV	***	P2HITPRV	1.000	0.000	NA	NA	1.000	1.000
##	218	P2HITWAR	***	P2HITWAR	1.000	0.000	NA	NA	1.000	1.000
##	219	P2ATTENB	***	P2ATTENB	1.000	0.000	NA	NA	1.000	1.000
##	220	P2ATTENP	***	P2ATTENP	1.000	0.000	NA	NA	1.000	1.000
##	221	P2PARADV	***	P2PARADV	1.000	0.000	NA	NA	1.000	1.000
##	222	P2PARGRP	***	P2PARGRP	1.000	0.000	NA	NA	1.000	1.000
##	223	P2ATTENS	***	P2ATTENS	1.000	0.000	NA	NA	1.000	1.000
##	224	P2VOLUNT	***	P2VOLUNT	1.000	0.000	NA	NA	1.000	1.000
##	225	P2FUNDRS	***	P2FUNDRS	1.000	0.000	NA	NA	1.000	1.000
##	226	P2TVRULE	***	P2TVRULE	1.000	0.000	NA	NA	1.000	1.000
##	227	P2TVRUL3	***	P2TVRUL3	1.000	0.000	NA	NA	1.000	1.000
##	228	P2TVRUL2	***	P2TVRUL2	1.000	0.000	NA	NA	1.000	1.000
##	229	P1TELLST	***	P1TELLST	1.000	0.000	NA	NA	1.000	1.000
##	230	P1SINGSO	***	P1SINGSO	1.000	0.000	NA	NA	1.000	1.000
##	231	P1HELPAR	***	P1HELPAR	1.000	0.000	NA	NA	1.000	1.000
##	232	P1CHORES	***	P1CHORES	1.000	0.000	NA	NA	1.000	1.000
##	233	P1GAMES	***	P1GAMES	1.000	0.000	NA	NA	1.000	1.000
##	234	P1NATURE	***	P1NATURE	1.000	0.000	NA	NA	1.000	1.000
##	235	P1BUILD	***	P1BUILD	1.000	0.000	NA	NA	1.000	1.000
##	236	P1SPORT	***	P1SPORT	1.000	0.000	NA	NA	1.000	1.000
##	237	P2LIBRAR	***	P2LIBRAR	1.000	0.000	NA	NA	1.000	1.000
##	238	P2CONCRT	***	P2CONCRT	1.000	0.000	NA	NA	1.000	1.000
##	239	P2MUSEUM	***	P2MUSEUM	1.000	0.000	NA	NA	1.000	1.000
##	240	P2ZOO	***	P2ZOO	1.000	0.000	NA	NA	1.000	1.000
##	241	P2BEPARN	~1		0.000	0.000	NA	NA	0.000	0.000
##	242	P2CHDOES	~1		0.000	0.000	NA	NA	0.000	0.000
##	243	P2HRDWRM	~1		0.000	0.000	NA	NA	0.000	0.000
##	244	P2FLTRAP	~1		0.000	0.000	NA	NA	0.000	0.000
##	245	P2FEELAN	~1		0.000	0.000	NA	NA	0.000	0.000
##	246	P2CHHARD	~1		0.000	0.000	NA	NA	0.000	0.000
##	247	P2MOREWK	~1		0.000	0.000	NA	NA	0.000	0.000
##	248	P2HITCHO	~1		0.000	0.000	NA	NA	0.000	0.000
##	249	P2HITAP0	~1		0.000	0.000	NA	NA	0.000	0.000
##	250	P2HITPRV	~1		0.000	0.000	NA	NA	0.000	0.000

## 251	P2HITWAR	~1	0.000	0.000	NA	NA	0.000	0.000
## 252	P2ATTENB	~1	0.000	0.000	NA	NA	0.000	0.000
## 253	P2ATTENP	~1	0.000	0.000	NA	NA	0.000	0.000
## 254	P2PARADV	~1	0.000	0.000	NA	NA	0.000	0.000
## 255	P2PARGRP	~1	0.000	0.000	NA	NA	0.000	0.000
## 256	P2ATTENS	~1	0.000	0.000	NA	NA	0.000	0.000
## 257	P2VOLUNT	~1	0.000	0.000	NA	NA	0.000	0.000
## 258	P2FUNDERS	~1	0.000	0.000	NA	NA	0.000	0.000
## 259	P2TVRULE	~1	0.000	0.000	NA	NA	0.000	0.000
## 260	P2TVRUL3	~1	0.000	0.000	NA	NA	0.000	0.000
## 261	P2TVRUL2	~1	0.000	0.000	NA	NA	0.000	0.000
## 262	P1TELLST	~1	0.000	0.000	NA	NA	0.000	0.000
## 263	P1SINGSO	~1	0.000	0.000	NA	NA	0.000	0.000
## 264	P1HELPAR	~1	0.000	0.000	NA	NA	0.000	0.000
## 265	P1CHORES	~1	0.000	0.000	NA	NA	0.000	0.000
## 266	P1GAMES	~1	0.000	0.000	NA	NA	0.000	0.000
## 267	P1NATURE	~1	0.000	0.000	NA	NA	0.000	0.000
## 268	P1BUILD	~1	0.000	0.000	NA	NA	0.000	0.000
## 269	P1SPORT	~1	0.000	0.000	NA	NA	0.000	0.000
## 270	P2LIBRAR	~1	0.000	0.000	NA	NA	0.000	0.000
## 271	P2CONCRT	~1	0.000	0.000	NA	NA	0.000	0.000
## 272	P2MUSEUM	~1	0.000	0.000	NA	NA	0.000	0.000
## 273	P2ZOO	~1	0.000	0.000	NA	NA	0.000	0.000
## 274	C2RSCALE	~1	1.541	0.202	7.623	0.000	1.145	1.938
## 275	T2LEARN	~1	4.313	0.079	54.326	0.000	4.158	4.469
## 276	T2EXTERN	~1	2.566	0.058	43.978	0.000	2.451	2.680
## 277	T2INTERN	~1	2.958	0.056	52.695	0.000	2.848	3.068
## 278	T2CONTR0	~1	4.901	0.083	58.795	0.000	4.737	5.064
## 279	T2INTERP	~1	4.787	0.084	57.248	0.000	4.623	4.950
## 280	f1	~1	0.000	0.000	NA	NA	0.000	0.000
## 281	f2	~1	0.000	0.000	NA	NA	0.000	0.000
## 282	f3	~1	0.000	0.000	NA	NA	0.000	0.000
## 283	f4	~1	0.000	0.000	NA	NA	0.000	0.000
## 284	f5	~1	0.000	0.000	NA	NA	0.000	0.000
## 285	f6	~1	0.000	0.000	NA	NA	0.000	0.000

#The lines that we are interested are line 1 to line 11

Step 4: Run sensitivity analysis with the SEMsen package

In the SEMsen package, the `sa.aco` function is used to run the sensitivity analysis. The original model is complicated, and for illustration purpose, we analyzed 6 phantom variables, and paths for the C2RSCALE.

```
my.sa1 <- sa.aco(data= smith19.use,
  model = model1,
  sens.model = sens.model1,
  k = 10,
  opt.fun = quote(1/abs(new.par$pvalue[9]-0.05)),
  rate.of.conv = .05,
  paths = c(1:11),
  seed=119,
  max.iter = 100,
  estimator="WLSMV",
```

```
ordered = factornames)
#15 out of 175 evaluations converged.
```

In the `sa.aco` function, we specified the `data(data)` we are using, original model (`model1`), the sensitivity model (`sens.model1`), the optimization function (`opt.fun`), the convergence rate threshold (`rate.of.conv`) the paths that we are interested from the previous step (`paths`), a seed for reproducibility (`seed`), the estimator we used to conduct the analysis (`estimator`; using the `lavaan` package format), and the variables that are ordinal (`ordered`; using the `lavaan` package format).

Note: We only used `k = 10` and `max.iter = 100` so the analysis would run quickly for illustration purposes. For actual analyses, please specify these parameters as larger numbers (e.g., default value of `k = 100` and `max.iter = 1000`). In addition, the convergence rate is set to be (`rate.of.conv = .05`) in this example as the model is complicated. An error message may show up like below:

```
#error message
# Error in sa.aco(data= smith19.use,
#                  model = model1,
#                  sens.model = sens.model1,
#                  k = 10,rate.of.conv = .1, :
#
#                  Sensitivity analysis models do not reach the specified convergence rate.
#                  Please set a lower convergence rate threshold (i.e., rate. of. conv) or
#                  reduce model complexity)
```

Step 5: Results

The `sens.tables` function helps summarize the results of a sensitivity analysis.

```
my.sa.table = sens.tables(my.sa1) # get results
```

The `sens.summary` table provides estimates and p-values for each path in the original model. The `phan.paths` table provides the minimum, mean and maximum value of sensitivity parameters that we described in our sensitivity model at Step 2. The `phan.min` table provides the sensitivity parameters lead to the minimum coefficient for each path from `sa.aco`. The `phan.max` table provides the sensitivity parameters lead to the maximum coefficient for each path estimates from `sa.aco`. The `p.paths` table provides sensitivity parameters lead to change in significance for each path. The NA indicates there is no change in p-value and meaningful sensitivity parameters that can change p-value.

```
my.sa.table$sens.summary
```

##	model.est	model.pvalue	mean.est.sens	min.est.sens
## T2CONTRO~f1	-0.1445446263	5.672534e-09	-0.1445445513	-0.1445453225
## T2INTERP~f1	-0.1372948697	3.220701e-08	-0.1372944661	-0.1372950392
## T2LEARN~f1	-0.1161465928	3.557464e-06	-0.1110832468	-0.2609898707
## C2RSCALE~T2CONTRO	-0.0785269002	2.599748e-02	-0.0753318919	-0.1004213881
## C2RSCALE~f6	-0.0658091048	1.247915e-01	-0.0593832142	-0.1107343431
## T2INTERP~f6	-0.0582568971	1.854210e-01	-0.0582647493	-0.0583085157
## T2INTERN~f3	-0.0546445782	1.400257e-01	-0.0546438300	-0.0546451212
## T2CONTRO~f6	-0.0533439553	2.502683e-01	-0.0533369842	-0.0533699567
## C2RSCALE~f2	-0.0478053252	9.044476e-02	-0.0469410164	-0.0650719618
## T2EXTERN~f6	0.0283456107	5.375607e-01	-0.0452896434	-0.8440902468

## T2LEARN~f4	0.0053384171	8.568420e-01	-0.0422538655	-0.6815210545
## T2LEARN~f6	-0.0305375590	4.931428e-01	-0.0397184257	-0.8642471071
## T2LEARN~f2	-0.0382625825	2.096279e-01	-0.0376372197	-0.2273087662
## T2INTERN~f6	-0.0327797770	4.486623e-01	-0.0327804185	-0.0327849972
## T2INTERP~f2	-0.0246496948	4.157732e-01	-0.0246527957	-0.0246712634
## C2RSCALE~T2INTERP	-0.0248810443	3.884874e-01	-0.0237905506	-0.0557040649
## T2EXTERN~f3	-0.1251606892	8.509256e-04	-0.0220709380	-0.5981441959
## T2CONTRO~f2	-0.0207138567	4.969758e-01	-0.0207105641	-0.0207202900
## C2RSCALE~f1	-0.0169880165	4.933816e-01	-0.0195577234	-0.0388915254
## C2RSCALE~f5	0.0017189063	9.492271e-01	-0.0113484705	-0.0989397759
## T2INTERP~f4	-0.0039044391	8.959249e-01	-0.0039022435	-0.0039045852
## T2CONTRO~f5	-0.0036095049	9.003702e-01	-0.0036100114	-0.0036175548
## T2INTERN~f5	-0.0015122973	9.570646e-01	-0.0015122455	-0.0015127834
## T2CONTRO~f4	-0.0001404092	9.962962e-01	-0.0001425849	-0.0001592474
## C2RSCALE~T2INTERN	0.0036770123	8.490658e-01	0.0030015383	-0.0072204190
## T2INTERN~f1	0.0064944410	8.020084e-01	0.0064945100	0.0064943042
## T2EXTERN~f2	0.0347198310	2.518782e-01	0.0103434105	-0.1631032684
## T2INTERN~f4	0.0137869556	6.299069e-01	0.0137871852	0.0137867874
## T2INTERP~f5	0.0188911241	4.996183e-01	0.0188921184	0.0188908153
## C2RSCALE~f4	0.0438501902	9.878833e-02	0.0418164692	-0.0350299147
## T2INTERN~f2	0.0447558098	1.466241e-01	0.0447555307	0.0447537609
## C2RSCALE~T2EXTERN	0.0454009043	1.047413e-01	0.0490681985	0.0268152023
## T2LEARN~f5	0.0421933914	1.319447e-01	0.0498815401	-0.5054167960
## T2EXTERN~f4	0.0122678817	6.774808e-01	0.0507932861	-0.5303015652
## T2EXTERN~f5	0.0311271634	2.730746e-01	0.0650823756	-0.2997877071
## T2CONTRO~f3	0.1197561322	1.749667e-03	0.1197477775	0.1196844296
## C2RSCALE~f3	0.1498234539	7.525736e-06	0.1480770913	0.0657390418
## T2LEARN~f3	0.1106045344	3.715749e-03	0.1506356077	-0.4881633895
## T2INTERP~f3	0.1568265729	2.557126e-05	0.1568349314	0.1568259576
## T2EXTERN~f1	0.1583809130	7.146328e-11	0.1760751862	0.0439651742
## C2RSCALE~T2LEARN	0.4853128580	0.000000e+00	0.4828125863	0.4318415842
##	max.est.sens			
## T2CONTRO~f1	-0.1445425972			
## T2INTERP~f1	-0.1372919437			
## T2LEARN~f1	0.1419114735			
## C2RSCALE~T2CONTRO	-0.0348539196			
## C2RSCALE~f6	0.0078880074			
## T2INTERP~f6	-0.0582561794			
## T2INTERN~f3	-0.0546391116			
## T2CONTRO~f6	-0.0532773618			
## C2RSCALE~f2	-0.0224232440			
## T2EXTERN~f6	0.5336562364			
## T2LEARN~f4	0.4278551493			
## T2LEARN~f6	0.6091549553			
## T2LEARN~f2	0.1825455390			
## T2INTERN~f6	-0.0327783434			
## T2INTERP~f2	-0.0246493892			
## C2RSCALE~T2INTERP	0.0016133701			
## T2EXTERN~f3	0.4450368117			
## T2CONTRO~f2	-0.0206871256			
## C2RSCALE~f1	-0.0079199773			
## C2RSCALE~f5	0.0509632547			
## T2INTERP~f4	-0.0038897621			
## T2CONTRO~f5	-0.0036036597			

```
## T2INTERN~f5      -0.0015116692
## T2CONTRO~f4      -0.0001353881
## C2RSCALE~T2INTERN 0.0128769548
## T2INTERN~f1      0.0064948260
## T2EXTERN~f2      0.2091424014
## T2INTERN~f4      0.0137885043
## T2INTERP~f5      0.0188972207
## C2RSCALE~f4      0.0985734639
## T2INTERN~f2      0.0447559818
## C2RSCALE~T2EXTERN 0.0991216923
## T2LEARN~f5       1.2390163456
## T2EXTERN~f4      0.5835144174
## T2EXTERN~f5      1.2834450825
## T2CONTRO~f3      0.1197768658
## C2RSCALE~f3      0.1985251435
## T2LEARN~f3       1.0027244773
## T2INTERP~f3      0.1568834567
## T2EXTERN~f1      0.4284066793
## C2RSCALE~T2LEARN 0.5530986059
```

```
my.sa.table$phan.paths
```

```
##               mean.phan  min.phan  max.phan
## T2EXTERN~phantom -0.23241566 -1.3517301 0.5478649
## T2LEARN~phantom  -0.17684069 -1.2918587 0.6248955
## f5~phantom       -0.02110502 -0.3992532 0.7794786
## C2RSCALE~phantom 0.00684393  -0.1119661 0.1082448
## f4~phantom       0.13047824  -0.7186094 0.5766870
## f3~phantom       0.27881719  -0.5192671 0.6243018
```

```
my.sa.table$phan.min
```

```
##               T2LEARN~phantom T2EXTERN~phantom C2RSCALE~phantom f3~phantom
## C2RSCALE~T2LEARN      0.55218125      -0.4747524      0.0525956099 -0.07833205
## C2RSCALE~T2EXTERN     -0.04070211     -0.2690685     -0.0468532735  0.30651642
## C2RSCALE~T2INTERN      0.55218125     -0.4747524      0.0525956099 -0.07833205
## C2RSCALE~T2CONTRO     -1.05580059      0.1057519      0.0990550986  0.57939657
## C2RSCALE~T2INTERP     -1.05580059      0.1057519      0.0990550986  0.57939657
## C2RSCALE~f1           -1.29185870     -1.3517301      0.1082448198  0.33840983
## C2RSCALE~f2           -0.24734577      0.3501010      0.0719601880 -0.51926712
## C2RSCALE~f3           -1.05580059      0.1057519      0.0990550986  0.57939657
## C2RSCALE~f4           -0.97205864     -0.7678565     -0.1119660675 -0.47950875
## C2RSCALE~f5           -1.29185870     -1.3517301      0.1082448198  0.33840983
## C2RSCALE~f6           -0.24734577      0.3501010      0.0719601880 -0.51926712
## T2LEARN~f1            -0.97205864     -0.7678565     -0.1119660675 -0.47950875
## T2LEARN~f2            -1.29185870     -1.3517301      0.1082448198  0.33840983
## T2LEARN~f3            -0.97205864     -0.7678565     -0.1119660675 -0.47950875
## T2LEARN~f4            -0.97205864     -0.7678565     -0.1119660675 -0.47950875
## T2LEARN~f5            -1.05580059      0.1057519      0.0990550986  0.57939657
## T2LEARN~f6            -1.29185870     -1.3517301      0.1082448198  0.33840983
## T2EXTERN~f1           -0.97205864     -0.7678565     -0.1119660675 -0.47950875
## T2EXTERN~f2           -1.29185870     -1.3517301      0.1082448198  0.33840983
## T2EXTERN~f3           -0.97205864     -0.7678565     -0.1119660675 -0.47950875
```

## T2EXTERN~f4	-0.97205864	-0.7678565	-0.1119660675	-0.47950875
## T2EXTERN~f5	-0.97205864	-0.7678565	-0.1119660675	-0.47950875
## T2EXTERN~f6	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERN~f1	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERN~f2	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2INTERN~f3	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERN~f4	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERN~f5	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERN~f6	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2CONTRO~f1	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2CONTRO~f2	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2CONTRO~f3	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2CONTRO~f4	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2CONTRO~f5	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2CONTRO~f6	-1.29185870	-1.3517301	0.1082448198	0.33840983
## T2INTERP~f1	-0.37615240	-0.2219899	-0.0342680283	0.58754335
## T2INTERP~f2	-0.31730618	0.3385820	0.0005171162	0.20901534
## T2INTERP~f3	0.55218125	-0.4747524	0.0525956099	-0.07833205
## T2INTERP~f4	0.62489554	-0.9184887	0.0904980088	0.45849095
## T2INTERP~f5	-0.04070211	-0.2690685	-0.0468532735	0.30651642
## T2INTERP~f6	-0.31730618	0.3385820	0.0005171162	0.20901534
##	f4~phantom	f5~phantom		
## C2RSCALE-T2LEARN	-0.26408850	0.20684082		
## C2RSCALE-T2EXTERN	-0.05317235	-0.34366777		
## C2RSCALE-T2INTERN	-0.26408850	0.20684082		
## C2RSCALE-T2CONTRO	0.04555417	-0.39925324		
## C2RSCALE-T2INTERP	0.04555417	-0.39925324		
## C2RSCALE~f1	0.34219070	0.77947860		
## C2RSCALE~f2	-0.71860936	-0.22442134		
## C2RSCALE~f3	0.04555417	-0.39925324		
## C2RSCALE~f4	-0.67428477	-0.39220692		
## C2RSCALE~f5	0.34219070	0.77947860		
## C2RSCALE~f6	-0.71860936	-0.22442134		
## T2LEARN~f1	-0.67428477	-0.39220692		
## T2LEARN~f2	0.34219070	0.77947860		
## T2LEARN~f3	-0.67428477	-0.39220692		
## T2LEARN~f4	-0.67428477	-0.39220692		
## T2LEARN~f5	0.04555417	-0.39925324		
## T2LEARN~f6	0.34219070	0.77947860		
## T2EXTERN~f1	-0.67428477	-0.39220692		
## T2EXTERN~f2	0.34219070	0.77947860		
## T2EXTERN~f3	-0.67428477	-0.39220692		
## T2EXTERN~f4	-0.67428477	-0.39220692		
## T2EXTERN~f5	-0.67428477	-0.39220692		
## T2EXTERN~f6	0.34219070	0.77947860		
## T2INTERN~f1	0.34219070	0.77947860		
## T2INTERN~f2	0.20038571	0.18558215		
## T2INTERN~f3	0.34219070	0.77947860		
## T2INTERN~f4	0.34219070	0.77947860		
## T2INTERN~f5	0.34219070	0.77947860		
## T2INTERN~f6	0.20038571	0.18558215		
## T2CONTRO~f1	0.20038571	0.18558215		
## T2CONTRO~f2	0.34219070	0.77947860		
## T2CONTRO~f3	0.20038571	0.18558215		

```
## T2CONTRO~f4      0.20038571  0.18558215
## T2CONTRO~f5      0.20038571  0.18558215
## T2CONTRO~f6      0.34219070  0.77947860
## T2INTERP~f1      0.26334431 -0.04515809
## T2INTERP~f2      0.20038571  0.18558215
## T2INTERP~f3     -0.26408850  0.20684082
## T2INTERP~f4      0.57668697 -0.18007001
## T2INTERP~f5     -0.05317235 -0.34366777
## T2INTERP~f6      0.20038571  0.18558215
```

```
my.sa.table$phan.max
```

```
##          T2LEARN~phantom T2EXTERN~phantom C2RSCALE~phantom f3~phantom
## C2RSCALE~T2LEARN      -1.0558006      0.1057519      0.0990550986  0.57939657
## C2RSCALE~T2EXTERN      0.6248955     -0.9184887      0.0904980088  0.45849095
## C2RSCALE~T2INTERN     -1.0558006      0.1057519      0.0990550986  0.57939657
## C2RSCALE~T2CONTRO      0.6248955     -0.9184887      0.0904980088  0.45849095
## C2RSCALE~T2INTERP      0.5521812     -0.4747524      0.0525956099 -0.07833205
## C2RSCALE~f1           -0.2473458      0.3501010      0.0719601880 -0.51926712
## C2RSCALE~f2           -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## C2RSCALE~f3           -0.2473458      0.3501010      0.0719601880 -0.51926712
## C2RSCALE~f4           -0.2473458      0.3501010      0.0719601880 -0.51926712
## C2RSCALE~f5           -1.0558006      0.1057519      0.0990550986  0.57939657
## C2RSCALE~f6           -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## T2LEARN~f1            -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2LEARN~f2            -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## T2LEARN~f3            -1.0558006      0.1057519      0.0990550986  0.57939657
## T2LEARN~f4            -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2LEARN~f5            -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2LEARN~f6            -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## T2EXTERN~f1           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2EXTERN~f2           -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## T2EXTERN~f3           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2EXTERN~f4            0.6248955     -0.9184887      0.0904980088  0.45849095
## T2EXTERN~f5           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2EXTERN~f6           -0.9720586     -0.7678565     -0.1119660675 -0.47950875
## T2INTERN~f1           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERN~f2           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2INTERN~f3           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERN~f4           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERN~f5           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERN~f6           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2CONTRO~f1           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2CONTRO~f2           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2CONTRO~f3           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2CONTRO~f4           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2CONTRO~f5           -1.2918587     -1.3517301      0.1082448198  0.33840983
## T2CONTRO~f6           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERP~f1           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERP~f2            0.5521812     -0.4747524      0.0525956099 -0.07833205
## T2INTERP~f3           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERP~f4           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERP~f5           -0.3173062      0.3385820      0.0005171162  0.20901534
## T2INTERP~f6            0.2764462      0.3808589      0.0499169125  0.23533817
```

```
##          f4~phantom f5~phantom
## C2RSCALE~T2LEARN  0.04555417 -0.3992532
## C2RSCALE~T2EXTERN 0.57668697 -0.1800700
## C2RSCALE~T2INTERN 0.04555417 -0.3992532
## C2RSCALE~T2CONTRO 0.57668697 -0.1800700
## C2RSCALE~T2INTERP -0.26408850  0.2068408
## C2RSCALE~f1      -0.71860936 -0.2244213
## C2RSCALE~f2      -0.67428477 -0.3922069
## C2RSCALE~f3      -0.71860936 -0.2244213
## C2RSCALE~f4      -0.71860936 -0.2244213
## C2RSCALE~f5       0.04555417 -0.3992532
## C2RSCALE~f6      -0.67428477 -0.3922069
## T2LEARN~f1       0.34219070  0.7794786
## T2LEARN~f2      -0.67428477 -0.3922069
## T2LEARN~f3       0.04555417 -0.3992532
## T2LEARN~f4       0.34219070  0.7794786
## T2LEARN~f5       0.34219070  0.7794786
## T2LEARN~f6      -0.67428477 -0.3922069
## T2EXTERN~f1      0.34219070  0.7794786
## T2EXTERN~f2      -0.67428477 -0.3922069
## T2EXTERN~f3      0.34219070  0.7794786
## T2EXTERN~f4      0.57668697 -0.1800700
## T2EXTERN~f5      0.34219070  0.7794786
## T2EXTERN~f6      -0.67428477 -0.3922069
## T2INTERN~f1      0.20038571  0.1855821
## T2INTERN~f2      0.34219070  0.7794786
## T2INTERN~f3      0.20038571  0.1855821
## T2INTERN~f4      0.20038571  0.1855821
## T2INTERN~f5      0.20038571  0.1855821
## T2INTERN~f6      0.34219070  0.7794786
## T2CONTRO~f1      0.34219070  0.7794786
## T2CONTRO~f2      0.20038571  0.1855821
## T2CONTRO~f3      0.34219070  0.7794786
## T2CONTRO~f4      0.34219070  0.7794786
## T2CONTRO~f5      0.34219070  0.7794786
## T2CONTRO~f6      0.20038571  0.1855821
## T2INTERP~f1      0.20038571  0.1855821
## T2INTERP~f2      -0.26408850  0.2068408
## T2INTERP~f3      0.20038571  0.1855821
## T2INTERP~f4      0.20038571  0.1855821
## T2INTERP~f5      0.20038571  0.1855821
## T2INTERP~f6      0.46095003  0.5284704
```

```
my.sa.table$p.paths
```

```
##          p.value    p.changed T2LEARN~phantom T2EXTERN~phantom
## C2RSCALE~f5      9.492271e-01 0.0002804033      -1.2918587      -1.351730085
## C2RSCALE~T2EXTERN 1.047413e-01 0.0075055104       0.2699275       0.547864851
## T2LEARN~f5       1.319447e-01 0.0105797885       0.1868681       0.004585214
## T2EXTERN~f6      5.375607e-01 0.0128454029      -0.3173062       0.338581972
## T2EXTERN~f5      2.730746e-01 0.0137743468      -0.2454073      -0.546981432
## T2LEARN~f6       4.931428e-01 0.0199000254       0.2764462       0.380858850
## T2EXTERN~f4      6.774808e-01 0.0227129668      -0.3761524      -0.221989930
## T2LEARN~f4       8.568420e-01 0.0236271337       0.1868681       0.004585214
```

## T2LEARN~f2	2.096279e-01	0.0373372490	-0.3173062	0.338581972
## C2RSCALE~f2	9.044476e-02	0.0460107125	0.1868681	0.004585214
## C2RSCALE~f6	1.247915e-01	0.0489983864	0.2699275	0.547864851
## C2RSCALE~f4	9.878833e-02	0.0492902306	-0.3761524	-0.221989930
## T2EXTERN~f2	2.518782e-01	0.0494754271	0.5521812	-0.474752423
## C2RSCALE~f3	7.525736e-06	0.0512910622	-1.0558006	0.105751894
## C2RSCALE-T2CONTRO	2.599748e-02	0.0717371949	0.2699275	0.547864851
## T2EXTERN~f3	8.509256e-04	0.1433011796	-0.3761524	-0.221989930
## T2LEARN~f3	3.715749e-03	0.1633065843	-0.2473458	0.350101035
## T2EXTERN~f1	7.146328e-11	0.2607842095	-0.9720586	-0.767856540
## C2RSCALE-T2LEARN	0.000000e+00	NA	NA	NA
## C2RSCALE-T2INTERN	8.490658e-01	NA	NA	NA
## C2RSCALE-T2INTERP	3.884874e-01	NA	NA	NA
## C2RSCALE~f1	4.933816e-01	NA	NA	NA
## T2LEARN~f1	3.557464e-06	NA	NA	NA
## T2INTERN~f1	8.020084e-01	NA	NA	NA
## T2INTERN~f2	1.466241e-01	NA	NA	NA
## T2INTERN~f3	1.400257e-01	NA	NA	NA
## T2INTERN~f4	6.299069e-01	NA	NA	NA
## T2INTERN~f5	9.570646e-01	NA	NA	NA
## T2INTERN~f6	4.486623e-01	NA	NA	NA
## T2CONTRO~f1	5.672534e-09	NA	NA	NA
## T2CONTRO~f2	4.969758e-01	NA	NA	NA
## T2CONTRO~f3	1.749667e-03	NA	NA	NA
## T2CONTRO~f4	9.962962e-01	NA	NA	NA
## T2CONTRO~f5	9.003702e-01	NA	NA	NA
## T2CONTRO~f6	2.502683e-01	NA	NA	NA
## T2INTERP~f1	3.220701e-08	NA	NA	NA
## T2INTERP~f2	4.157732e-01	NA	NA	NA
## T2INTERP~f3	2.557126e-05	NA	NA	NA
## T2INTERP~f4	8.959249e-01	NA	NA	NA
## T2INTERP~f5	4.996183e-01	NA	NA	NA
## T2INTERP~f6	1.854210e-01	NA	NA	NA
##	C2RSCALE~phantom	f3~phantom	f4~phantom	f5~phantom
## C2RSCALE~f5	0.1082448198	0.33840983	0.34219070	0.77947860
## C2RSCALE-T2EXTERN	-0.0800522058	0.42483437	0.49088616	-0.34633287
## T2LEARN~f5	-0.0471767154	0.57246992	0.38514600	-0.09567508
## T2EXTERN~f6	0.0005171162	0.20901534	0.20038571	0.18558215
## T2EXTERN~f5	-0.0192800832	0.58987744	0.44088352	-0.13340756
## T2LEARN~f6	0.0499169125	0.23533817	0.46095003	0.52847043
## T2EXTERN~f4	-0.0342680283	0.58754335	0.26334431	-0.04515809
## T2LEARN~f4	-0.0471767154	0.57246992	0.38514600	-0.09567508
## T2LEARN~f2	0.0005171162	0.20901534	0.20038571	0.18558215
## C2RSCALE~f2	-0.0471767154	0.57246992	0.38514600	-0.09567508
## C2RSCALE~f6	-0.0800522058	0.42483437	0.49088616	-0.34633287
## C2RSCALE~f4	-0.0342680283	0.58754335	0.26334431	-0.04515809
## T2EXTERN~f2	0.0525956099	-0.07833205	-0.26408850	0.20684082
## C2RSCALE~f3	0.0990550986	0.57939657	0.04555417	-0.39925324
## C2RSCALE-T2CONTRO	-0.0800522058	0.42483437	0.49088616	-0.34633287
## T2EXTERN~f3	-0.0342680283	0.58754335	0.26334431	-0.04515809
## T2LEARN~f3	0.0719601880	-0.51926712	-0.71860936	-0.22442134
## T2EXTERN~f1	-0.1119660675	-0.47950875	-0.67428477	-0.39220692
## C2RSCALE-T2LEARN	NA	NA	NA	NA
## C2RSCALE-T2INTERN	NA	NA	NA	NA

## C2RSCALE~T2INTERP	NA	NA	NA	NA
## C2RSCALE~f1	NA	NA	NA	NA
## T2LEARN~f1	NA	NA	NA	NA
## T2INTERN~f1	NA	NA	NA	NA
## T2INTERN~f2	NA	NA	NA	NA
## T2INTERN~f3	NA	NA	NA	NA
## T2INTERN~f4	NA	NA	NA	NA
## T2INTERN~f5	NA	NA	NA	NA
## T2INTERN~f6	NA	NA	NA	NA
## T2CONTRO~f1	NA	NA	NA	NA
## T2CONTRO~f2	NA	NA	NA	NA
## T2CONTRO~f3	NA	NA	NA	NA
## T2CONTRO~f4	NA	NA	NA	NA
## T2CONTRO~f5	NA	NA	NA	NA
## T2CONTRO~f6	NA	NA	NA	NA
## T2INTERP~f1	NA	NA	NA	NA
## T2INTERP~f2	NA	NA	NA	NA
## T2INTERP~f3	NA	NA	NA	NA
## T2INTERP~f4	NA	NA	NA	NA
## T2INTERP~f5	NA	NA	NA	NA
## T2INTERP~f6	NA	NA	NA	NA

References

Leite, W., Shen, Z., Marcoulides, K., Fish, C., & Harring, J. (in press). Using ant colony optimization for sensitivity analysis in structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal*.