Measurement Model Scaling and Identification

William Murrah

```r
library(lavaan)

##Prepare data with sufficient statisitics##
mymeans<-matrix(c(3.06893, 2.92590, 3.11013), ncol=3,nrow=1)
mysd<-c(0.84194,0.88934,0.83470)
mat <- c(1.00000,
         0.55226, 1.00000,
         0.56256, 0.66307, 1.00000)
mycor <- getCov(mat, lower = TRUE)
##Transform correlation matrix to covariance matrix using information above##
myvarcov <- outer(mysd, mysd, FUN="*")
mycov <- mycor * myvarcov

rownames(mycor) <-c( "Glad", "Cheerful", "Happy")
colnames(mycor) <-c( "Glad", "Cheerful", "Happy")

rownames(mycov) <-c( "Glad", "Cheerful", "Happy")
colnames(mycov) <-c( "Glad", "Cheerful", "Happy")
mynob<-823
```

Descriptive Statistics

.	Glad	Cheerful	Happy
Glad	1.000		
Cheerful	0.552	1.000	
Happy	0.563	0.663	1.000
SD	.842	.889	.835
Var	.709	.791	.697
Mean	3.07	2.93	3.11

Fundamental SEM equation

$$\Sigma = \Lambda\Psi\Lambda + \Theta \tag{1}$$

Latent Cheer with one indicator

l.cheer.inp

```r
mod1<-'Positive =~ 1*Cheerful
Positive~~Positive
Cheerful~~0*Cheerful'
```

```
#Save output to fit1##
fit1<-cfa(mod1, sample.cov=mycov, sample.nobs = mynob, sample.mean=mymeans,
          std.lv=F)
```

```
## Found more than one class "Model" in cache; using the first, from namespace 'MatrixModels'
```

```
##Request for summary of output##
summary(fit1, fit.measures=T)
```

```
## lavaan (0.5-20) converged normally after   9 iterations
##
##   Number of observations                        823
##
##   Estimator                                      ML
##   Minimum Function Test Statistic             0.000
##   Degrees of freedom                              0
##
## Model test baseline model:
##
##   Minimum Function Test Statistic             0.000
##   Degrees of freedom                              0
##   P-value                                        NA
##
## User model versus baseline model:
##
##   Comparative Fit Index (CFI)                 1.000
##   Tucker-Lewis Index (TLI)                    1.000
##
## Loglikelihood and Information Criteria:
##
##   Loglikelihood user model (H0)           -1070.768
##   Loglikelihood unrestricted model (H1)   -1070.768
##
##   Number of free parameters                       1
##   Akaike (AIC)                             2143.536
##   Bayesian (BIC)                           2148.249
##   Sample-size adjusted Bayesian (BIC)      2145.074
##
## Root Mean Square Error of Approximation:
##
##   RMSEA                                       0.000
##   90 Percent Confidence Interval      0.000  0.000
##   P-value RMSEA <= 0.05                       1.000
##
## Standardized Root Mean Square Residual:
##
##   SRMR                                        0.000
##
## Parameter Estimates:
##
##   Information                              Expected
##   Standard Errors                          Standard
##
```

```
## Latent Variables:
##                   Estimate  Std.Err  Z-value  P(>|z|)
##   Positive =~
##     Cheerful        1.000
##
## Variances:
##                   Estimate  Std.Err  Z-value  P(>|z|)
##     Positive        0.790    0.039   20.285    0.000
##     Cheerful        0.000
```