

## Exercises Session 3: Longitudinal SEMs

### Additional exercise 2

(Similar to exercise 5.1 from the book.)

Here are the means and covariance matrix of six measurements in a sample called 'group 0' (sample size = 30):

```
gr0.cov <- lav_matrix_lower2full(c(  
  3.59,  
  3.11, 3.10,  
  2.91, 2.80, 2.82,  
  3.22, 3.05, 2.86, 3.30,  
  2.88, 2.63, 2.62, 2.82, 2.71  
)  
)  
gr0.means <- c(11.97, 11.72, 12.03, 11.96, 12.10)  
  
colnames(gr0.cov) <- rownames(gr0.cov) <-  
  c("T1", "T2", "T3", "T4", "T5")
```

- Fit the consecutive latent growth curve models to the data. Find the best-fitting model.
- What do the means and variances of the latent intercept and slope, and the standardized factor loadings tell you about inter- and intra-individual differences?

### Additional exercise 3

Demo.growth is a dataset that is included in the lavaan package, consisting of 400 observations on the following variables:

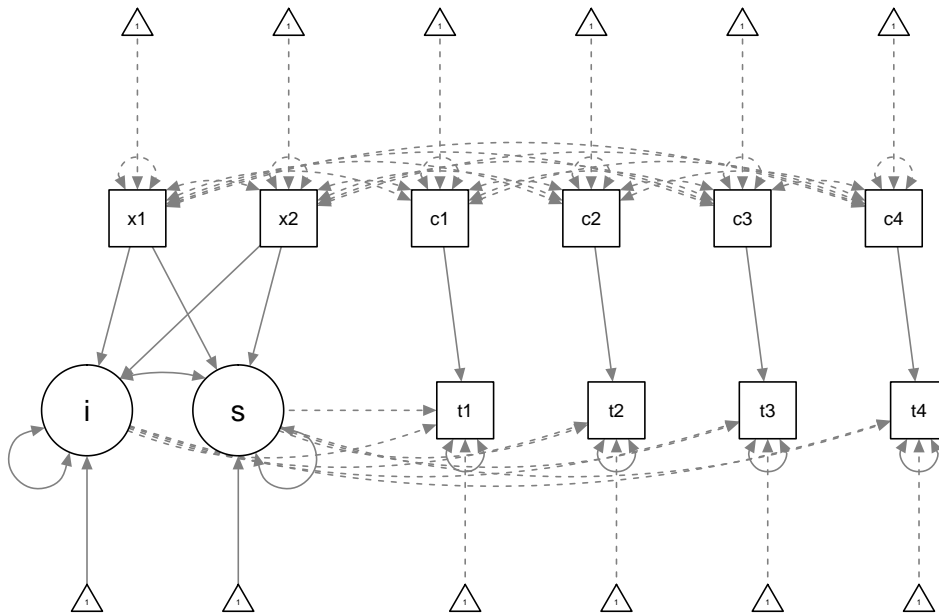
$t1$  -  $t4$ : variable of interest, measured at four timepoints

$x1$  -  $x2$ : two time-invariant covariates

$c1$  -  $c4$ : a time-varying covariate

```
data(Demo.growth)
```

Fit an LGCM with  $x1$  and  $x2$  as time-constant predictors of the latent intercept and slope, and  $c1$  through  $c4$  as time-varying predictors of the observed variables  $t1$  through  $t4$ . Like in the following picture:



- Test whether  $x_1$  and  $x_2$  are significant predictors of the slope and/or intercept.
- Test whether  $c$  has the same effect on  $t$  at each timepoint.
- Test whether the residual variances are the same at across timepoints.