**Introduction to Latent Transition Analysis**

**Exercises**

In other documents included in these resources I have provided guidance on:

(a) How to use Mplus to specify latent class measurement models and latent transition models with or without measurement invariance, see document:

*1.0 Introduction to LTA using Mplus \_OliverPerra\_ IntroLCA.*

(b) How to apply the Three-Step Approach to fix the latent class measurement models and investigate transitions between classes, see document:

*1.1 Three-Step Approach\_OliverPerra\_IntroLTA.*

(c) Conducting different stages of LTA, including tests of constraints on transition probabilities, investigation of associations with covariates and moderation by covariates, investigation of associations with distal outcomes, see document:

*1.2 Stages of LTA\_IntroLTA\_OPerra.*

We are going to use Mplus to conduct some analyses in a dataset. The dataset is provided with the exercises, and it is called:

**NLS\_extract.dta.dat**

The dataset is described in more details in a separate document. It includes data collected as part of the NLSY Child Survey in 1986, 1988, and 1990.

A generic input file with the name of the variables and the missing data indicator is included:

**Input file NLS extract.inp**

and can be used as a starting point to create the input files to solve these exercises.

Use the dataset provided to fulfil the following tasks:

1. Test latent class measurement models for the indicators of behavioural and emotional difficulties collected in 1986 and 1988, i.e. **ranti86 ranx86 rhypr86 rdep86 rpeer86** and **ranti88 ranx88 rhypr88 rdep88 rpeer88**, respectively. In other words, test latent class models of participants’ difficulties in 1986, and latent class models of participants’ difficulties in 1988. Test models that include *n* classes between 1 and 8.
2. Inspect the outputs from the previous task to select the optimal measurement models of individuals’ behaviour difficulties in 1986 and the optimal measurement models of individuals’ behaviour difficulties in 1988.
3. Consider a model with 3 latent classes in 1986 and 3 latent classes in 1988, and test full measurement invariance across time.
4. Assume a model with full measurement invariance with 3 classes in 1986 and 1988. Use the Three-Step Approach to investigate the associations between latent classes in 1986 and in 1988.
5. Considering that the model with three classes at each age indicates these classes as representing respondents with “Low”, “Moderate”, and “High” levels of difficulties, define a model where the transition probabilities from Low to High and from High to Low are constrained to be zero. Compare this model with the model where transition probabilities are freely estimated using the Likelihood Ratio test.
6. Use covariates **male**, **bla\_his** (ethnicity) and **csage86** (age), and test their associations with the latent classes in 1986 and 1988.
7. Add to the previous model a moderation effect of **male** and interpret the output.
8. Investigate the associations between latent classes in 1988 and participants’ **ppvtz90**. What do the results indicate?

Solutions to these tasks are provided in a different file.