# Amos Tutorial: Multi-sample analysis

This workshop uses files on the AcadLabs server. These folders are read-only, so, to begin, copy them to your home directory (your F:\ drive), or to the C:\drive.

1. From My Computer, navigate to "Sasuser on Lancelot (N:)" → psy6140\amos\
2. Select the folders `Ex12` and `invariance`, and copy these either to your F:\ drive or to the C:\ drive.

Multi-sample analysis: using Amos Graphics

In this exercise, you will examine two models for the Holzinger and Swineford (1939) data on a subset of six variables (3 spatial and 3 verbal). There are two smaller samples from the original data set: 72 boys and 73 girls from the original Grant-White sample. Of interest is whether a model with invariant factor pattern ($\Lambda_1 = \Lambda_2$) fits the data, compared with the unrestricted 2-factor model for both groups.

1. From My Computer, navigate to the `Ex12` folder, wherever you saved it.

2. Double-click on the `Grnt_fem.sav` file to view the SPSS file for the female sample. This is one of the forms of raw data files you can open in Amos. Close this file to continue.

3. Double-click on the file `Ex12-a.amw` with the blue Amos Graphics icon.

4. Note that the path diagram has no labels on the loadings (regression weights) except for the 1's required for identification. Click on the model for the Boys sample to see that it is the same. This is the model *k=2*, which fits separate, 2-factor models in each group.
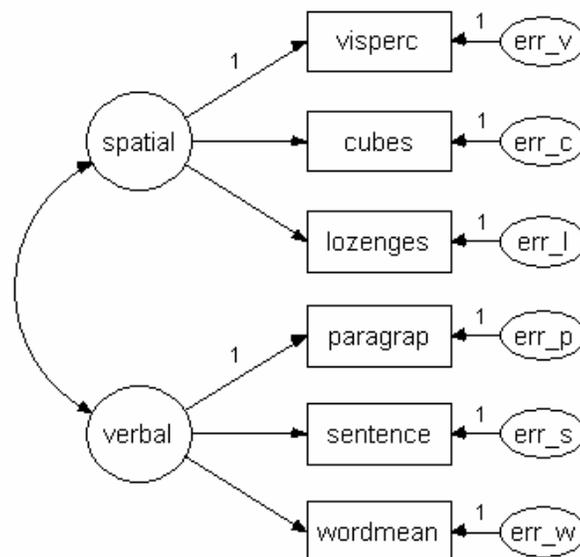
5. From the menu, select Analyze → Calculate Estimates (or press Ctrl-F9).

6. You can now view the results visually by selecting the "view output path diagram" at the top, or numerically, by selecting View → Text Output from the menus. In the visual view, click on Boys or Girls to see the separate parameter estimates in the path diagram.

7. Now, close the file Ex12-a.amw, and open (double-clik) Ex12-b.amw from the Ex12 directory. Click on Boys and Girls to compare the path diagrams.

8. Note that both have the *same* labels on the links from Spatial and Verbal to the individual variables--- this says that $\Lambda_1 = \Lambda_2$.

9. From the menu, select Analyze → Calculate Estimates (or press Ctrl-F9).

Multi-sample analysis: using AmosBasic

In this exercise, you will run the AmosBasic program, `invar.AmosBasic,`which fits several models of factorial invariance for Sorbom's example of models for Academic and Non-Academic boys, in grades 7 and 9, with measures for reading and writing.

1. From My Computer, navigate to the `invariance` folder, wherever you saved it.

2. Double-click on the `invar.xls` file to view one form of input to Amos, when the data consists of a variance-covariance matrix for one or more groups.
   a. There is one worksheet for each group.
   b. Each row in the worksheet has a `rowtype_` (`n` or `cov`, here)
   c. The `varname_` column corresponds to the remaining variables
   d. Only the lower triangle of the variance-covariance matrix needs to be entered.
   e. SAS and SPSS have similar structures for entering data in the form of a variance-covariance matrix (rather than raw data, which all handle easily).

3. Close the `invar.xls` file, and return to the ...\`invariance` window.

4. Double-click on `invar.AmosBasic` to launch the Amos Basic application for this problem.
   a. Note how the initial model for each group begins with a line like

       `Sem.BeginGroup "invar.xls", "Academic"`

   Here, `invar.xls` indicates the Excel file, and `Academic` indicates the worksheet for the group.

   b. Note how the `Sem.Model` lines specify more restrictive versions of the base model, Model B, by constraining parameters in the two groups to be equal.
   c. Press F5 or click on the Start/Resume button (like the play button on a VCR) to run this problem.