








## Description



The SEM Builder allows you to create path diagrams of generalized SEMs, fit those models, and show the results on the path diagram. Here we extend the discussion from [\[SEM\] Builder](#). Read that manual entry first.

## Remarks and examples



Launch the SEM Builder by selecting the menu item **Statistics > SEM (structural equation modeling) > Model building and estimation**. You can also type `sembuilder` in the Command window. Switch the Builder into generalized SEM mode by clicking on the **Change to generalized SEM** button, . The generalized SEM mode allows you to add generalized responses and multilevel latent variables to your path diagram. This mode also disallows constraints on the means or variances of observed exogenous variables and on the variances of errors. In technical terms, the generalized mode draws and fits `gsem` models rather than `sem` models; see [\[SEM\] Intro 1](#) for a discussion.

Aside from activating tools to add generalized responses and multilevel latent variables, everything about the Builder works the same in generalized SEM mode as it did in standard SEM mode. You can still add observed variables () and latent variables () and create connections using paths () and covariances ()


You can now add to your diagram a special kind of observed variable called a generalized response variable by using the  tool. A generalized response is a dependent variable that may be continuous, count, binary, ordinal, or multinomial, and whose statistical properties are described by its family and link; see [\[SEM\] Intro 2](#) for a discussion. Simply click on the  tool and then click in the diagram to add a generalized response variable. After adding the generalized response, use the Contextual Toolbar to do the following: 1) select its *Family/Link* and 2) select its variable from the *Variable* control. You may also type a variable name into the *Variable* control.


You can also add multilevel latent variables—random effects assumed to have a Gaussian distribution whose realizations are at the level of a grouping variable or variables. See [\[SEM\] Intro 2](#) for a discussion. Click on the  tool and then click on the diagram to add a multilevel latent variable. After adding the variable, click on the  button of the *Name/Level* control in the Contextual Toolbar. In the resulting dialog box, choose the nesting depth of your latent variable, and then choose the variables that define the nesting. For example, for a three-level model of doctors nesting patients nesting observations, you would select 3 in the *Nesting depth* control, select `doctor` in the first variable control, and select `patient` in the second variable control, leaving `> Observations`, which is fixed. You do not need to change the default *Base name*, but you may type a different name of your choice. Do read the note on the dialog carefully because it provides guidance on successfully creating multilevel models. Also see [\[SEM\] Example 39g](#) for an example that demonstrates creating a nested model in the Builder.



As with standard observed and latent variables, you can also click and drag as you add generalized responses and multilevel latent variables to control the size of the resulting variables. You can also select the **Properties...** button from the Contextual Toolbar or double-click on a variable to change even more properties of the variable. As with standard variables, you can control their appearance from the **Appearance** tab of the resulting dialog box or, more likely, control the appearance of all variables of a given type from the **Settings > Variables** menu.


As with standard models, you create the structure of your model by connecting the variables with the  tool. You may also specify covariances among variables with the  tool.


There is one other construct available in generalized mode that is not available in standard mode—paths to other paths. In addition to creating paths from a latent variable to an observed variable or to another latent variable at the same nesting level, you can connect a standard or multilevel latent variable to a path from one observed variable to another observed variable. This makes that path a random path, or a random slope. As with other path connections, think of the path as adding the source variable to the target. So we are adding a random variable to a path (or slope), making it a random path. See [SEM] [Example 38g](#) for an example of creating a random path in the Builder.



In generalized mode, the Add Measurement Component tool, , allows the measurements to be created as generalized responses. Simply click on the *Make measurements generalized* box on the dialog box and select a *Family/Link*. It also allows the latent variable to be either standard observation-level or multilevel with the radio control at the top of the dialog box.

The Add observed variables set tool, , also allows you to create multiple generalized responses. Click on the *Make variables generalized responses* box on the dialog box and select a *Family/Link*.

Creating multinomial logit responses can be tricky. You must create a generalized response for each level of your outcome and use factor-variable notation to designate the levels of the outcome. The  tool is the safest way to create a multinomial logit response. With your dataset in memory, select the  tool and then click on the diagram. Click on the *Make variables generalized responses* box on the dialog box, and then select *Multinomial*, *Logit* in the *Family/Link* control. Select your multinomial response variable from the *Variable* control, and the levels for your multinomial response will be automatically populated. The level designated with a b will be the base level. You can type the b on another level to make it the base. When you click **OK**, multinomial generalized responses will be created for each level of your variable. See [SEM] [Example 37g](#) for an example of creating multinomial logit responses in the Builder.

The Add Regression Component tool, , also allows the dependent variable to be specified as a generalized response.

Place shaded boxes on the diagram with the  tool. This tool can be used in both standard and generalized mode. It is most useful in the generalized mode, where we can shade different nesting levels of multilevel models.

As in standard mode, constraints are specified with lock controls , and you fit the model by using the  button on the Standard Toolbar.

## Video example

[SEM Builder in Stata](#)

Visit the [Stata YouTube channel](#) for more videos.

## Reference

Huber, C. 2012. Using Stata's SEM features to model the Beck Depression Inventory. *The Stata Blog: Not Elsewhere Classified*. <https://blog.stata.com/2012/10/17/using-statas-sem-features-to-model-the-beck-depression-inventory/>.

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