

Getting Started with AmosDraw™ under Windows

Revision 1.03

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1 Introduction

This document will get you started using AmosDraw under Microsoft Windows. It will not show you all the things you can do with AmosDraw, or how to interpret the results of an Amos analysis. The purpose of the present document is merely to guide you through your first Amos analysis. Once you have worked through the example presented here, you can turn to the User's Guide and to AmosDraw's on-line help to learn more about the capabilities of Amos and AmosDraw.

2 Software requirements

AmosDraw requires Microsoft Windows 3.0 or later.

3 Hardware requirements

A mouse is required. A numeric coprocessor is recommended.

4 Installation

To install AmosDraw on your system, first insert the distribution diskette in drive **a**. From Program Manager's File menu, choose Run. Then type

```
a:\install
```

As an alternative, you can insert the distribution diskette in drive **b** and type

```
b:\install
```

5 An example

Hamilton (1990) provided several measurements on each of 21 states. Three of the measurements will be used for the present example: 1) average SAT score, 2) per capita income, 3) median education for residents 25 years old or older. The data are shown in table 1.

SAT	Income	Educati on
899	14345	12.7
896	16370	12.6
897	13537	12.5
889	12552	12.5
823	11441	12.2
857	12757	12.7
860	11799	12.4
890	10683	12.5
889	14112	12.5
888	14573	12.6
925	13144	12.6

869	15281	12.5
896	14121	12.5
827	10758	12.2
908	11583	12.7
885	12343	12.4
887	12729	12.3
790	10075	12.1
868	12636	12.4
904	10689	12.6
888	13065	12.4

The path diagram in figure 1 shows a model for these data. It is a simple regression model in which one observed variable, *SAT*, is predicted as a linear combination of the other two observed variables, *Education* and *Income*. Each single-headed arrow represents a regression weight. The number "1" in the figure specifies that *Error* must have a weight of one in the prediction of *SAT*. Some such constraint must be imposed in order to make the model identified, and it is one of the features of the model that must be communicated to Amos.



You need to provide Amos with information about both the model (in figure 1) and the data (in table 1).


6 Specifying the model

When you start AmosDraw (by double-clicking on the AmosDraw icon), you will see a window that contains a large rectangle and a few buttons like the following:


The large rectangle (the one that almost fills the window) represents a sheet of paper. Its shape depends on how your printer is set up. If your printer is set for printing in portrait mode, the large rectangle will be taller than it is wide. If your printer is set for landscape printing, the rectangle will be wider than it is tall. Your job is to draw a replica of figure 1 within the boundaries of the big rectangle. Your tools are the mouse, the buttons on the screen, and occasionally the keyboard.

7 Drawing rectangles and ellipses

Begin the construction of your path diagram by drawing three rectangles to represent the three observed variables in the model. First, click on the  button. The button will change in appearance, so that it looks as if it is illuminated. Then move the mouse pointer to the place where you want the *Education* rectangle to appear. Don't worry too much about the exact placement of the rectangle. You can move it later on. Once you have picked a spot for the *Education* rectangle, press the left mouse button and hold it down while making some trial movements of the mouse. Movements of the mouse will affect the size and shape of the rectangle. When you are satisfied with its appearance, release the mouse button. You don't need to be too picky. You can change the rectangle's size and shape later. Having completed the *Education* rectangle, use the same method to draw two more rectangles for *Income* and *SAT*. As long as the  button is illuminated a new rectangle will appear every time you press the left mouse button and move the mouse.

Next, draw an ellipse to represent *Error*. Ellipses are drawn the same way as rectangles, except that you begin by clicking on the  button. After drawing the *Error* ellipse, your screen should look more or less like figure 2.

8 Naming variables

To assign names to the four variables, click on the  button. Then use the mouse pointer to pick one of the objects in the path diagram -- the ellipse or one of the rectangles. It doesn't matter which object you start with, but say you start with the rectangle that is supposed to represent *Education*. Move the mouse pointer to the *Education* rectangle. (The rectangle will change color.) Click the left mouse button, and the following window will appear.

Type the name *Education* in the space provided and press the "Enter" key. Follow the same procedure to name the remaining three variables. The path diagram should end up looking something like figure 3.

9 Drawing arrows

To draw the single headed arrows in the path diagram, start off by clicking on the button. Then to draw an arrow from *Education* to *SAT*, go through the following steps. 1) Move the mouse pointer to the *Education* rectangle. 2) Press the left mouse button and hold it down. 3) While holding the left mouse button down, move the mouse pointer to the *SAT* rectangle. 4) Release the mouse button. Repeat this procedure for each of the remaining single headed arrows.


Drawing double headed arrows is similar to drawing single headed arrows except that you begin by clicking on the button. Then, to draw the double headed arrow connecting *Education* and *Income* go through the following steps. 1) move the mouse pointer to the *Income* rectangle. 2) Press the left mouse button and hold it down. 3) While holding the left mouse button down, move the mouse pointer to the *Education* rectangle. 4) Release the mouse button. Your path diagram should then resemble figure 4.


10 Constraining a parameter

You have to convey to Amos the fact that one of the single headed arrows (from *Error* to *SAT*) represents a regression weight whose value is fixed at one. To do this, first click on the button. Then move the mouse pointer to the arrow that points from *Error* to *SAT*. Click the left mouse button, and the following window will appear.

Using the keyboard, type the value "1" in the space provided and press the "Enter" key. The path diagram should then look like figure 5. This completes the path diagram except for any changes you might want to make to improve its appearance.


11 Improving the appearance of the path diagram

You can change the appearance of your path diagram by moving objects around, and by changing their sizes and shapes. Such changes do not affect the meaning of a path diagram. That is, they don't change the model specification. To move an object, first press the  button. Then point to the object with the mouse pointer and press the left mouse button. While the left mouse button is being held down, moving the mouse will cause the object to move.


To change the size and shape of an object, first press the  button. Then point to the object with the mouse pointer and press the left mouse button. While the left mouse button is being held down, moving the mouse will change the size and shape of the object.

No matter how carefully you try to adjust the size, shape and location of individual objects in your path diagram, the path diagram as a whole will probably end up looking slightly out of kilter. You might, for example, want the *Education* and *Income* rectangles to look exactly alike, but it is very hard to accomplish this by adjusting one rectangle at a time. AmosDraw provides tools for achieving this and other aesthetically desirable effects, but these are fine points that will not be pursued here.

12 Printing the path diagram

To print the path diagram, click on the  button. When the following window appears, click on the "Print" button.

13 Entering the data

You need to enter the data in table 1. Begin by clicking on the  button. A window will appear with the title "**Amos commands: Group number 1**". Type the following lines in this window.

```
$Smc
$Standardized
$Sample size = 21
$Input variables
  SAT
  Income
```

```


Education
$Raw Data
899 14345 12.7
896 16370 12.6
897 13537 12.5
889 12552 12.5
823 11441 12.2
857 12757 12.7
860 11799 12.4
890 10683 12.5
889 14112 12.5
888 14573 12.6
925 13144 12.6
869 15281 12.5
896 14121 12.5
827 10758 12.2
908 11583 12.7
885 12343 12.4
887 12729 12.3
790 10075 12.1
868 12636 12.4
904 10689 12.6
888 13065 12.4

```

The first two lines are optional. **\$Smc** requests a squared multiple correlation for each endogenous variable. (There is only one endogenous variable in this example -- SAT.) **\$Standardized** requests standardized parameter estimates. **\$Smc** and **\$Standardized** are just two of many optional commands that are documented in the *Amos User's Guide* and that can be entered in the "Amos commands" window.

It isn't necessary to duplicate the indentation and spacing shown above. Just make sure that every pair of adjacent numbers is separated by at least one space. In the last line, for example, there must at least one space between "888" and "13065". Apart from this requirement, spaces are ignored.

14 Performing the analysis


Clicking on the  button will cause Amos to carry out the analysis. While Amos is running, a small window will appear that will keep you informed about the progress of Amos's computations.

15 Viewing text output


When Amos completes the analysis, a new window will appear containing the text output

file that is described in the *Amos User's Guide*. If you have made any mistakes in entering the model or the data, an error message will be located at the end of this file.

16 Viewing graphics output

To view the path diagram along with Amos's parameter estimates, click on the  button. The following window will appear.


The **Models** list box contains two items -- "Input" and "OK: Output". If you choose "Input", AmosDraw will display the path diagram exactly as you entered it, without Amos's parameter estimates. You should, instead, choose "OK: Output". You can choose between **Unstandardized estimates** and **Standardized estimates** by clicking on the appropriate check box. Then click on the **C**lose button.

If the **Models** list box does not contain an "OK: Output" item, this means that parameter estimates aren't available. This could be because an error occurred while Amos was running. Of course it could also mean that you just forgot to run Amos by clicking on the  button. You have to re-run Amos after every change to the model or the data in order to keep the parameter estimates up to date.

If you checked the **Standardized estimates** box, and assuming that you used the optional Amos commands **\$Smc** and **\$Standardized**, a path diagram similar to figure 6 should appear on your screen.

.49 is the correlation between *Education* and *Income*. .72 and .11 are standardized regression weights. .60 is the squared multiple correlation of *SAT* with *Education* and *Income*.

17 Printing the parameter estimates

To print the path diagram along with Amos's parameter estimates, click on the  button. When the following window appears: 1) Choose "OK: Output" from the **Models** list box. 2) Check either the **Unstandardized estimates** box or the **Standardized estimates** box. 3) Click on the **P**rint button.

18 Getting help

You can access AmosDraw's on-line help system by pressing the F1 key. You can also get help by clicking on the button or by choosing **H**elp from the main menu. To get a brief explanation of what a button does, place the mouse pointer over that button. A description of its function will appear in the title bar of the AmosDraw window. To get an explanation of a menu item, first press <SHIFT-F1>; then select the menu item for which you want an explanation.

19 References

Hamilton, L. C. (1990). *Statistics with Stata*. Pacific Grove, California: Brooks/Cole.