

5 Working with Variables

Variables are characteristics of the studies in your meta-analysis. *Meta-Stat* comes precoded with several variables. You can add other variables specific to your meta-analysis.

This chapter describes how to work with variables.

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Types of Variables

You can use four types of variables:

Type	Use When ...	Example						
Discrete	The variable will have up to nine values, and you know the values in advance.	A discrete variable called GENDER could have the values Male or Female.						
Continuous	The variable can have any value.	A continuous variable called HOURS could describe the number of hours that subjects received treatment, coaching, or other intervention.						
Blocking	The variable will identify up to five groups of data, and the groupings are based on the values of other variables.	<p>A blocking variable could be used to group student grade levels. The variable could contain the values Elem, Middle, and High.</p> <table border="0"> <tr> <td>Elem</td> <td>Grades 1-5</td> </tr> <tr> <td>Middle</td> <td>Grades 7-9</td> </tr> <tr> <td>High</td> <td>Grades 10-12</td> </tr> </table> <p>The variable's equations could calculate the values based on a continuous variable that holds the actual grade level (1 to 12).</p>	Elem	Grades 1-5	Middle	Grades 7-9	High	Grades 10-12
Elem	Grades 1-5							
Middle	Grades 7-9							
High	Grades 10-12							
Equation	The value of the variable should be calculated by <i>Meta-Stat</i> , using mathematical operators and other variables.	A precoded variable, UNBIASED, uses the sample size and effect size variables to remove effect size bias that is caused by a small study sample. See the next page for more information about this variable.						

Precoded Variables

Meta-Stat comes precoded with several variables that are used for a typical meta-analysis. The table below describes these variables for effect-size meta-analysis.

Variable	Type	Is Used to Identify ...																		
EFFECTSZ	Continuous	Effect size from a study, typically the difference between the means of two groups divided by a standard deviation. <i>Meta-Stat</i> can calculate the value of this variable for you.																		
UNBIASED	Equation	Unbiased effect size. This variable's equation uses the sample size (TOTAL_N) and the effect size (EFFECTSZ) to remove effect size bias that is caused by a small study sample. The equation is: $\text{UNBIASED} = (1 - (3 / ((4 * \text{TOTAL_N}) - 9))) * \text{EFFECTSZ}$																		
EFFSR_GP	Discrete	Source of the effect size value. The variable describes one of eight values. <i>Meta-Stat</i> fills in the value for you based on your entry for the Effect Size variable. <table border="0"> <thead> <tr> <th><u>Value</u></th> <th><u>Effect Size Source</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Correlation</td> </tr> <tr> <td>2</td> <td>T-Statistic</td> </tr> <tr> <td>3</td> <td>F-Statistic</td> </tr> <tr> <td>4</td> <td>Chi-Square</td> </tr> <tr> <td>5</td> <td>Probability</td> </tr> <tr> <td>6</td> <td>Standardized</td> </tr> <tr> <td>7</td> <td>Gain Score</td> </tr> <tr> <td>8</td> <td>Direct Entry</td> </tr> </tbody> </table>	<u>Value</u>	<u>Effect Size Source</u>	1	Correlation	2	T-Statistic	3	F-Statistic	4	Chi-Square	5	Probability	6	Standardized	7	Gain Score	8	Direct Entry
<u>Value</u>	<u>Effect Size Source</u>																			
1	Correlation																			
2	T-Statistic																			
3	F-Statistic																			
4	Chi-Square																			
5	Probability																			
6	Standardized																			
7	Gain Score																			
8	Direct Entry																			
PUB_YR	Continuous	Year the study was published.																		
EXP_N	Continuous	Size of the experimental group.																		

Variable	Type	Is Used to Identify ...												
CTRL_N	Continuous	Size of the control group.												
TOTAL_N	Equation	<p>The total sample size. This equation uses the size of the experimental group (EXP_N) and the size of the control group (CTRL_N) to calculate the total sample size. The equation is:</p> $TOTAL_N = CTRL_N + EXP_N$												
WEIGHT	Equation	<p>The inverse of the variance. This equation uses the values of other variables to calculate a weighting value.</p> <p>The equation is:</p> $WEIGHT = (2 * TOTAL_N * EXP_N * CTRL_N) / ((2 * \text{sqr}(TOTAL_N)) + (EXP_N * CTRL_N * \text{sqr}(UNBIASED)))$												
PUB_GP	Discrete	<p>The type of publication in which the study appeared.</p> <p>The variable can hold one of five values:</p> <table border="0"> <thead> <tr> <th><u>Value</u></th> <th><u>Type of Publication</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Journal</td> </tr> <tr> <td>2</td> <td>Dissertation</td> </tr> <tr> <td>3</td> <td>Paper</td> </tr> <tr> <td>4</td> <td>Book</td> </tr> <tr> <td>5</td> <td>Other</td> </tr> </tbody> </table>	<u>Value</u>	<u>Type of Publication</u>	1	Journal	2	Dissertation	3	Paper	4	Book	5	Other
<u>Value</u>	<u>Type of Publication</u>													
1	Journal													
2	Dissertation													
3	Paper													
4	Book													
5	Other													

Creating New Variables

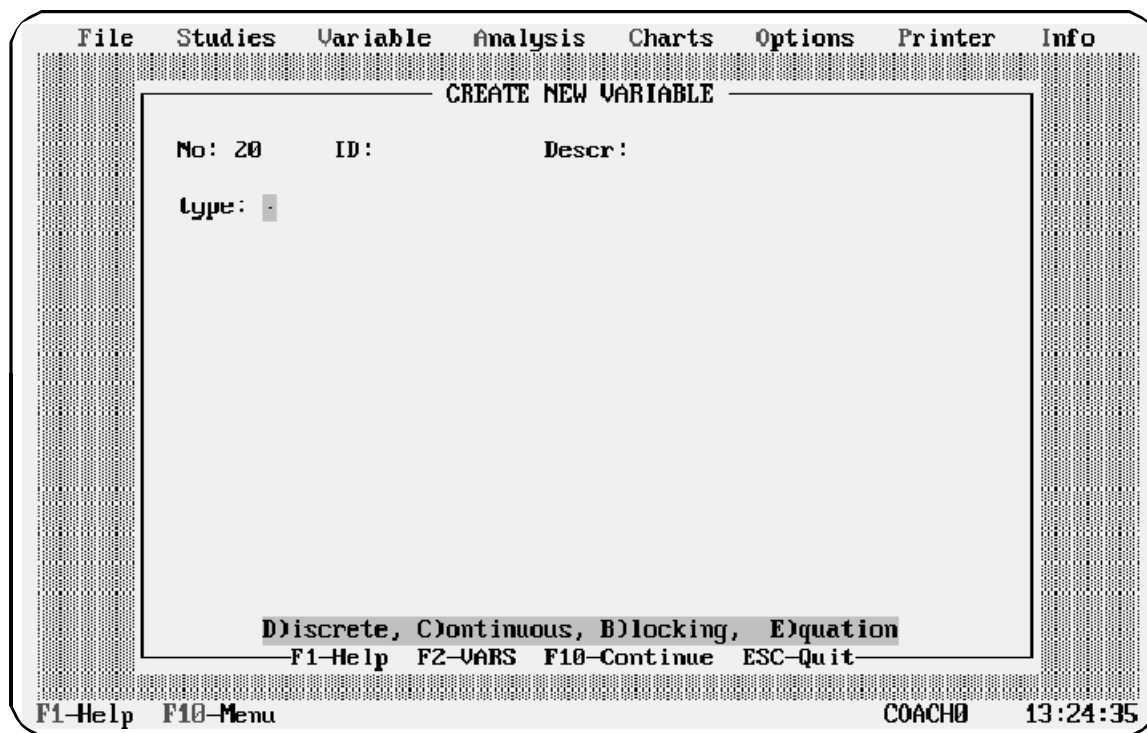
You must create additional variables to describe the data from the studies in your meta-analysis.

Initial Steps for All Types of Variables

No matter which type of variable you want to create, the initial steps are the same:

1. If necessary, create or open a meta-file. See Chapter 4 for more information.
2. Select Variable/New (^N)

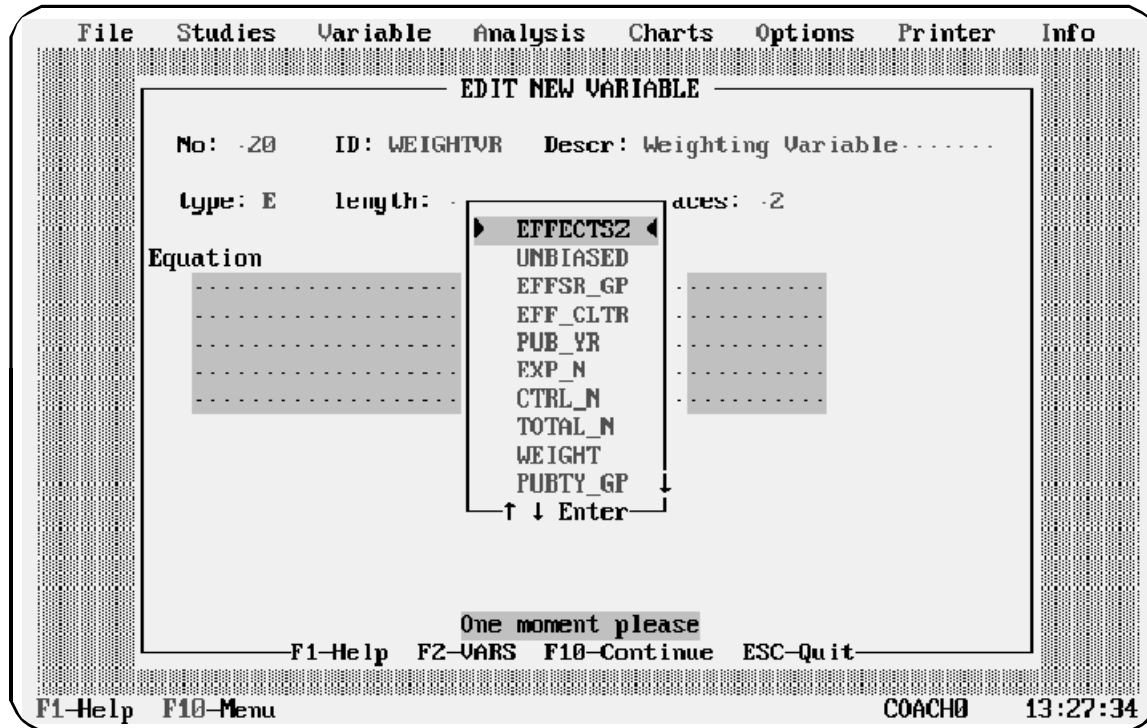
Meta-Stat displays the following screen:



3. Complete the type, ID, and Descr fields as shown below:

Field	Enter this ...	Notes										
type	<p>A letter to identify the type of variable you are creating:</p> <table border="0"> <tr> <td><u>Letter</u></td> <td><u>Variable Type</u></td> </tr> <tr> <td>B</td> <td>Blocking</td> </tr> <tr> <td>C</td> <td>Continuous</td> </tr> <tr> <td>D</td> <td>Discrete</td> </tr> <tr> <td>E</td> <td>Equation</td> </tr> </table>	<u>Letter</u>	<u>Variable Type</u>	B	Blocking	C	Continuous	D	Discrete	E	Equation	<p>As soon as you identify the type of variable, <i>Meta-Stat</i> displays the appropriate screen for that type. The cursor moves to the ID field.</p>
<u>Letter</u>	<u>Variable Type</u>											
B	Blocking											
C	Continuous											
D	Discrete											
E	Equation											
ID	<p>An eight-character identifier that:</p> <ul style="list-style-type: none"> ! Begins with a letter ! Contains no punctuation or special characters except the underline character (<u> </u>). 	<p><i>Meta-Stat</i> uses the ID to identify the variable on selection screens. Therefore, use a meaningful identifier.</p> <p>Press Enter after you complete this field.</p>										
Descr	<p>Up to 25 characters to identify the variable.</p>	<p><i>Meta-Stat</i> uses the description as a label for the variable on screens and reports.</p> <p>Press Enter after you complete this field.</p>										

4. Press F2 to see a list of the variables that you have already created for the meta-analysis. For example:



5. Press F10 when you have finished.

Meta-Stat saves the new variable and returns you to the Variable menu.

The sections below describe additional steps required for each type of variable.

Creating a Continuous Variable (Type C)

When you create a continuous variable, you must identify the length of data you will input for the variable, including the number of decimal places you want to retain.

Field	Enter this ...	Example
length	A number that identifies the maximum length of data you will enter for the variable, including the decimal point and decimal places.	A length of 6 means that you will enter up to 6 characters total, including a decimal point if any.
decimal places	<p>A number that identifies the number of decimal places you want <i>Meta-Stat</i> to retain.</p> <p>Note: <i>Meta-Stat</i> will round decimals, if necessary, when you perform data entry.</p>	<p>A length of 6 with two decimal places means that you will enter up to 6 characters total, including a decimal point and up to two decimal places—for example:</p> <p>512.18 615.25</p> <p>If you enter three decimal places during data entry, <i>Meta-Stat</i> will preserve the significant digits internally, but will round the decimals to two places for display. For example, 52.896 will be rounded in displays to 52.90.</p>

The following example shows a continuous variable called HOURS. The variable has a length of 4, with 2 decimal places:

The screenshot shows the 'EDIT NEW VARIABLE' dialog box in the Meta-Stat software. The dialog is titled 'EDIT NEW VARIABLE' and contains the following information:

No: -18	ID: HOURS...	Descr: Num of hours of coaching.
Type: C	length: -4	decimal places: -2

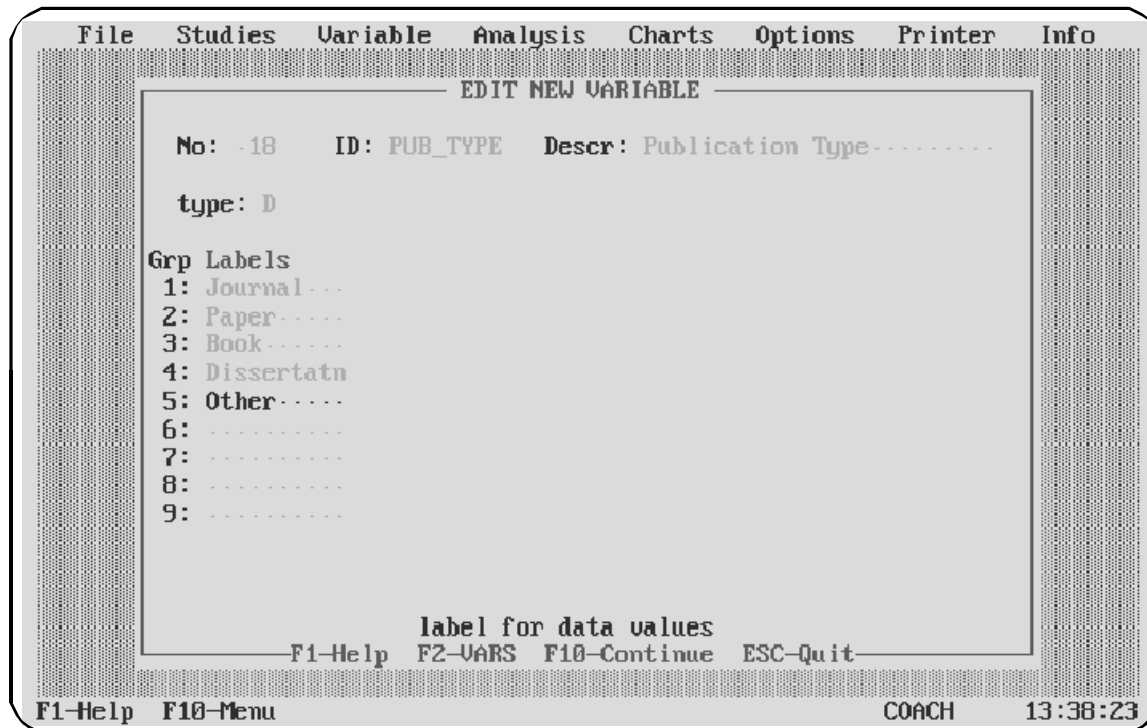
At the bottom of the dialog, there is a prompt: '8 character abbreviation of variable'. Below the dialog, the main window shows the following text: 'F1-Help F2-VARS F10-Continue ESC-Quit'. The status bar at the bottom of the window displays 'F1-Help F10-Menu COACH1 13:35:02'.

Creating a Discrete Variable (Type D)

Use a discrete variable to handle up to nine values that you know in advance. To assign a value to the variable during data entry, you will enter a number from 1 to 9. *Meta-Stat* will then assign the corresponding label.

Field	Enter this ...	Example
Grp	No entry required. The Grp value is the value you will enter during data entry.	—
labels	The label that corresponds to the Grp value. These are optional.	<p>When creating a variable called Gender, you would use Female for the first label and Male for the second label.</p> <p>To assign a value during data entry, you would enter 1 to indicate female, 2 to indicate male.</p>

The following example shows a discrete variable called PUB_TY. When entering data for this variable, you would enter 1 if the study was published in a journal, 2 if it was published in a paper, and so on:



Creating a Blocking Variable (Type B)

Use a blocking variable when you want to arrange data into groups.

Example of a Blocking Variable

Suppose you have created a continuous variable that will describe the grade level (from 1 to 12) of study participants. You could create a second, blocking variable to assign a group:

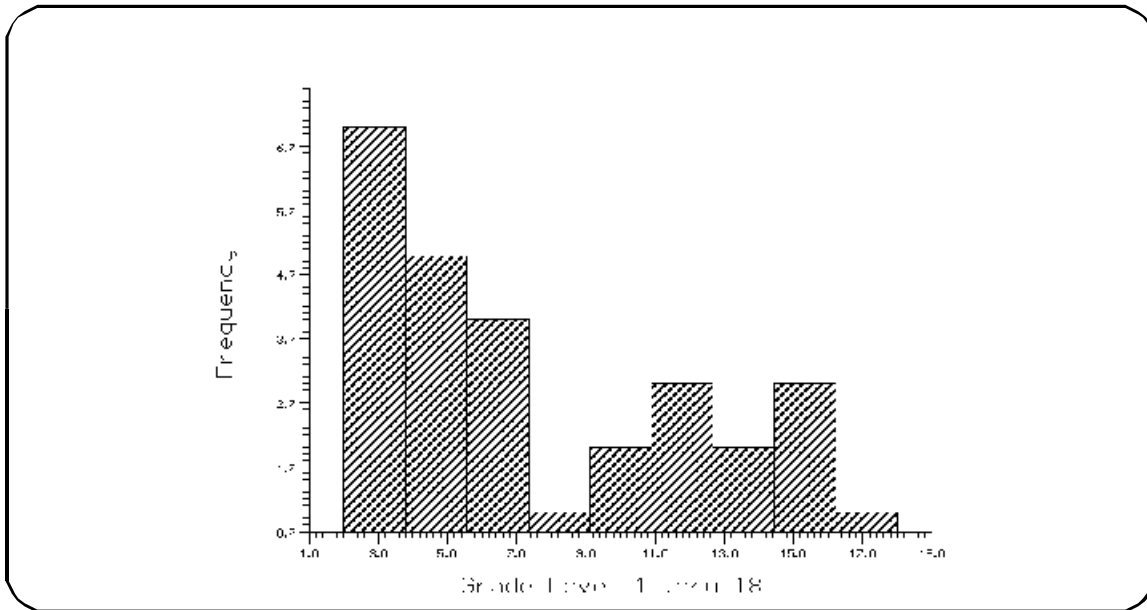
Grade Level (Continuous)	Grade Group (Blocking)
1 2 3 4 5 6	Elem School
7 8 9	Middle School
10 11 12	High School

During data entry, you would enter the grade level of study participants. *Meta-Stat* would then use the blocking variable to assign a group.

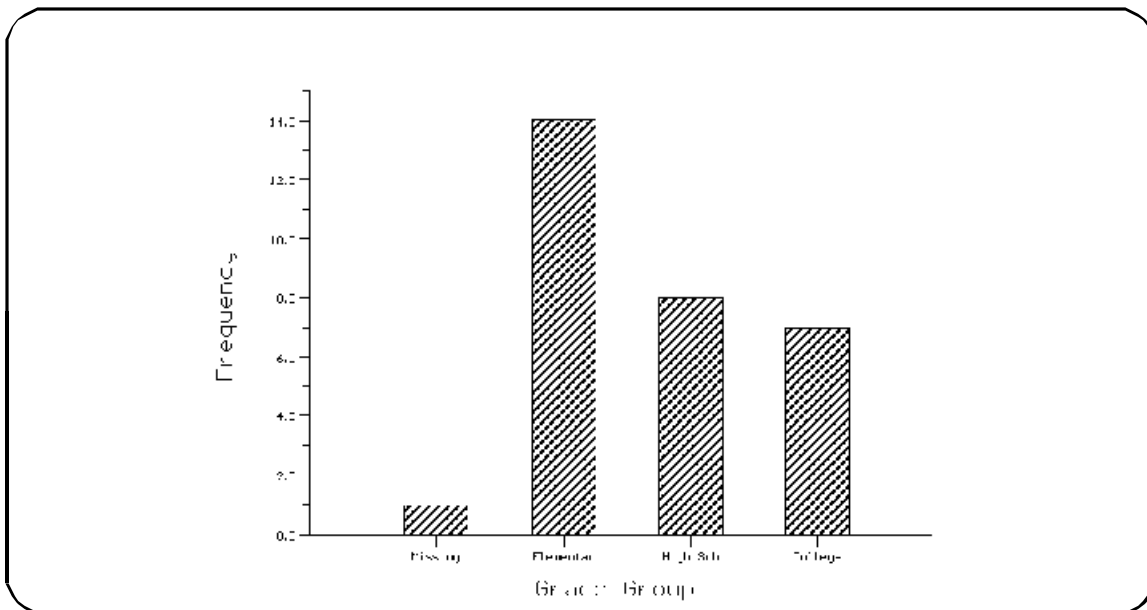
Advantages of Blocking Variables

A blocking variable allows you to preserve your original data (the grade level, in the previous example). At the same time, the variable provides you with meaningful groupings of data that make for cleaner charts and displays.

For example, the following chart was created using grade level as a discrete variable:



This chart, created with the blocking variable, might better suit your purposes:



Creating a Blocking Variable

When you create a blocking variable, you must specify equations that *Meta-Stat* will use to group values. These equations refer to the values of other variables.

The table below shows you how to create a blocking variable.

Field	Enter this ...	Example
Grp	No entry required.	—
labels	A label, up to 10 characters long, to identify the group. This label will be displayed on screens and charts.	A variable called Grade Group might use group labels such as Elem, Middle, and High.
Conditional Equations	The equation that <i>Meta-Stat</i> will use to group values. For more information, see the notes on equations below.	The equations for the Grade Group variable described above would use the value of a second variable, Grade Level, to assign a value for Grade Group.

When you create equations, be aware of the following:

! You can use the following mathematical operators:

< > <= >= <> AND OR NOT ()

! The equations must refer to variables that you have already created. Press F2 to display a list of the variables you have already created. You can then select a variable to be inserted into the equation.

! The equation must result in a true or false condition.

The following example shows a blocking variable called GRD_GP. To group values, the equations for this variable use a continuous variable called GRD_LVL. For example, if the GRD_LVL is between 1 and 6, *Meta-Stat* will assign a GRD_GP value of 1 (Elementary):

```

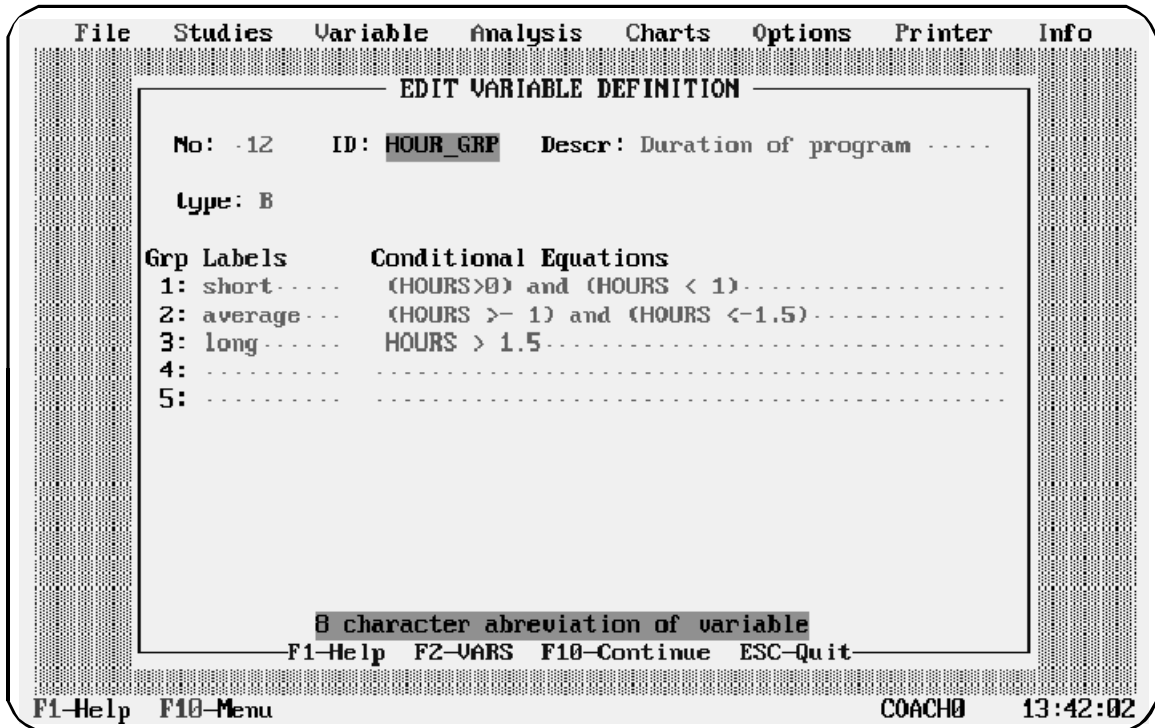
File  Studies  Variable  Analysis  Charts  Options  Printer  Info
----- EDIT VARIABLE DEFINITION -----
No:  -14    ID: GRD_GRP    Descr: Grade Group .....
type: B

Grp Labels      Conditional Equations
1: Elementary   (GRD_LVL >= 1) and (GRD_LVL <= 6).....
2: High Sch... (GRD_LVL >= 7) and (GRD_LVL <= 12).....
3: College...  (GRD_LVL >= 13) and (GRD_LVL <= 18).....
4: .....
5: .....

      8 character abbreviation of variable
      F1-Help  F2-VARS  F10-Continue  ESC-Quit
F1-Help  F10-Menu                                COACH0  13:40:53

```

The following example shows a blocking variable called HOUR_GP. To group values, the equations for this variable use a continuous variable called HOURS. For example, if the value of HOURS is greater than 0 and less than 1, *Meta-Stat* will assign a HOUR_GRP value of 1 (short):



Creating an Equation Variable (Type E)

Use an equation variable to calculate a value based on mathematical operators and other variables.

When you create an equation variable, you must identify the length of data that will be displayed, including the number of decimal places you want to retain.

Field	Enter this ...	Example
length	A number that identifies the maximum length of data that will be displayed, including the decimal point and decimal places.	A length of 6 means a maximum length of 6 characters, including a decimal point if any.
decimal places	<p>A number that identifies the number of decimal places you want <i>Meta-Stat</i> to display.</p> <p>Note: <i>Meta-Stat</i> will preserve all significant digits but will round decimals, if necessary, for display.</p>	<p>A length of 6 with two decimal places means a length of 6 characters total, including a decimal point and up to two decimal places—for example:</p> <p>512.18</p> <p>If the result of the calculation contains three decimal places, <i>Meta-Stat</i> will preserve all three digits but will round the decimals to two places for display. For example, 52.896 will be rounded to 52.90.</p>
Equation	The equation you want <i>Meta-Stat</i> to use.	An equation to calculate the total sample size would add the size of the experimental group to the size of the control group.

When you create equations, be aware of the following:

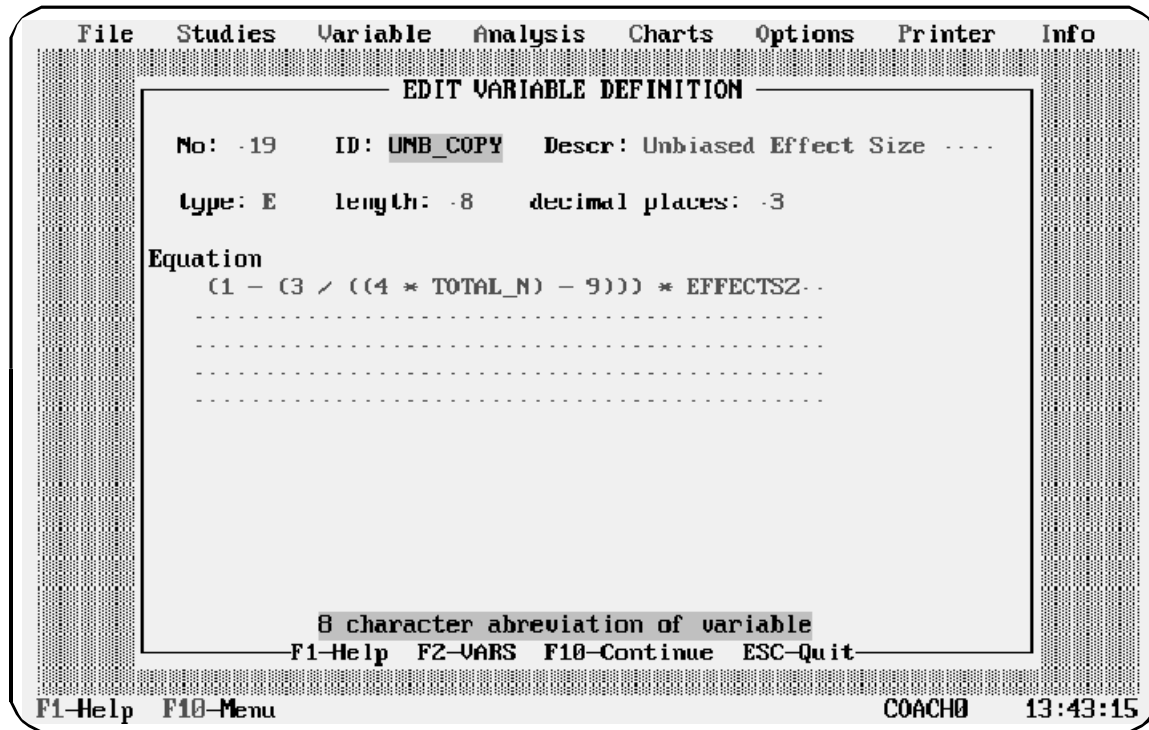
- ! You can use the following mathematical operators:

+ - * / ()

- ! The equations must refer to variables that you have already created. Press F2 to display a list of the variables you have already created.
- ! The equation must result in a real number, so logs or square roots of a negative number are not allowed.
- ! You can use the following mathematical functions:

Function	Description	Example
ABS	Absolute value	ABS(VAR1)
ATAN	Arctangent, in radians	ATAN(VAR1)
COS	Cosine, in radians	COS(VAR1)
EXP	Exponential	EXP(VAR1)
LN	Natural logarithm	LN(VAR3)
ROUND	Round result to whole number	ROUND(TOT)
SIN	Sine, in radians	SIN(VAR2)
SQRT	Square root	SQRT(TOT)
TRUNC	Truncate decimals (whole number without rounding)	TRUNC(TOT)

The following example shows the equation for the Unbiased Effect Size:



Changing Your Variables

You can change your variables in different ways. You can:

! Edit a variable

For example, you might want to change the description of a variable, or change the length of data that you can enter for the variable.

! Copy a variable

If two variables are similar, you might want to create the first variable, then copy it and edit the copy.

! Delete a variable

If you no longer need a variable, you can delete it.

The following sections describe how to change your variables.

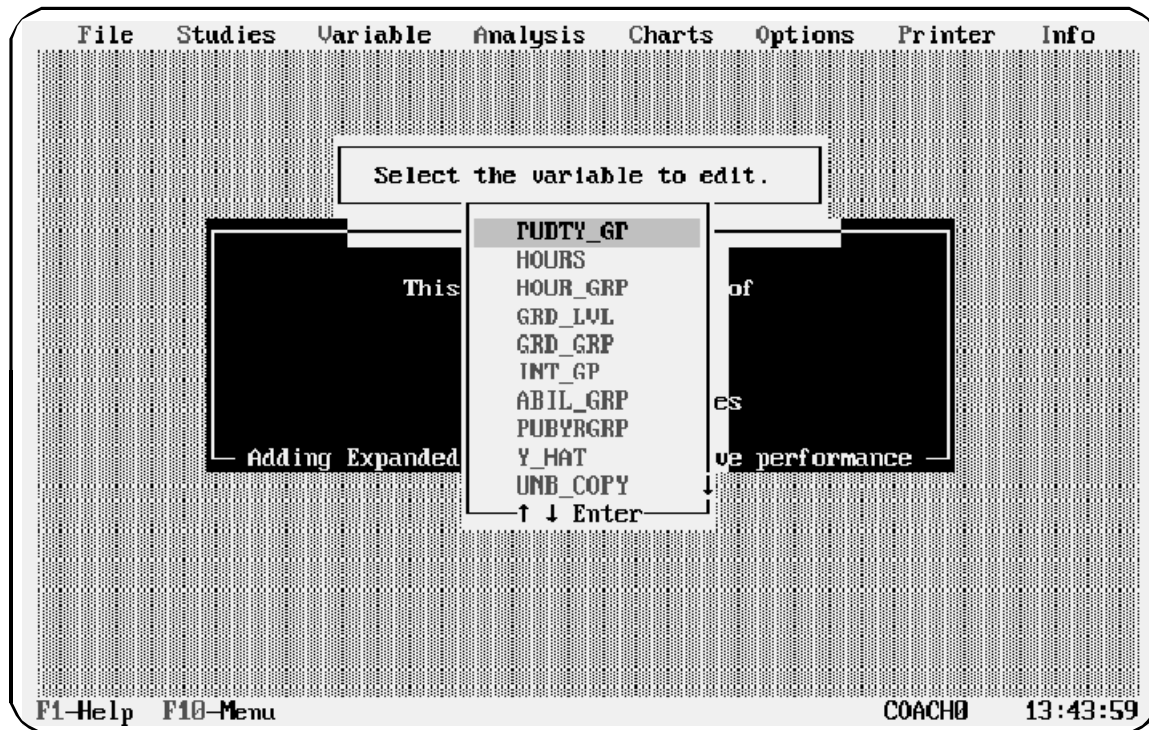
Editing a Variable

You can edit a variable by selecting it from a list, or by highlighting the variable within a study.

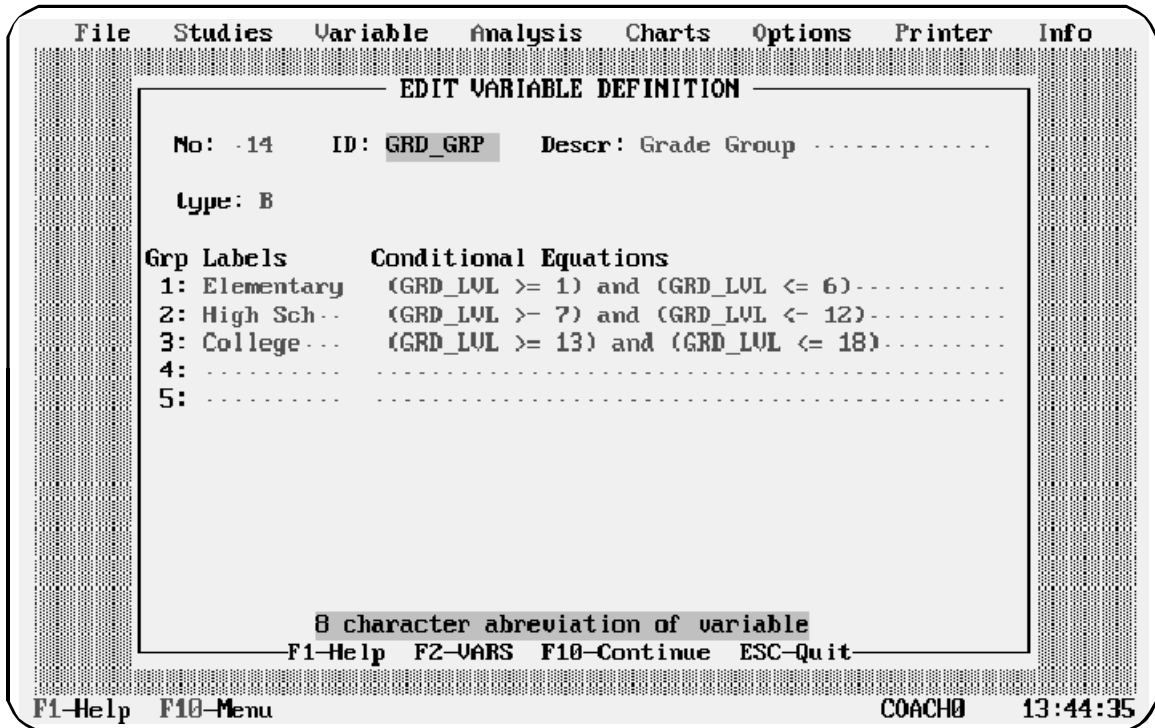
Editing by Selecting from a List

1. Select Variable/Edit (^D)

Meta-Stat displays a list of your variables:



2. Move the cursor to the variable you want to edit, then press Enter. *Meta-Stat* displays a screen where you can edit the variable:



3. Press Enter or Tab to move the cursor to the field you want to edit. Then use the editing keys Del , Ins, and Backspace to edit the field.
4. Press F10 when you have finished.

Editing by Highlighting a Variable Within a Study

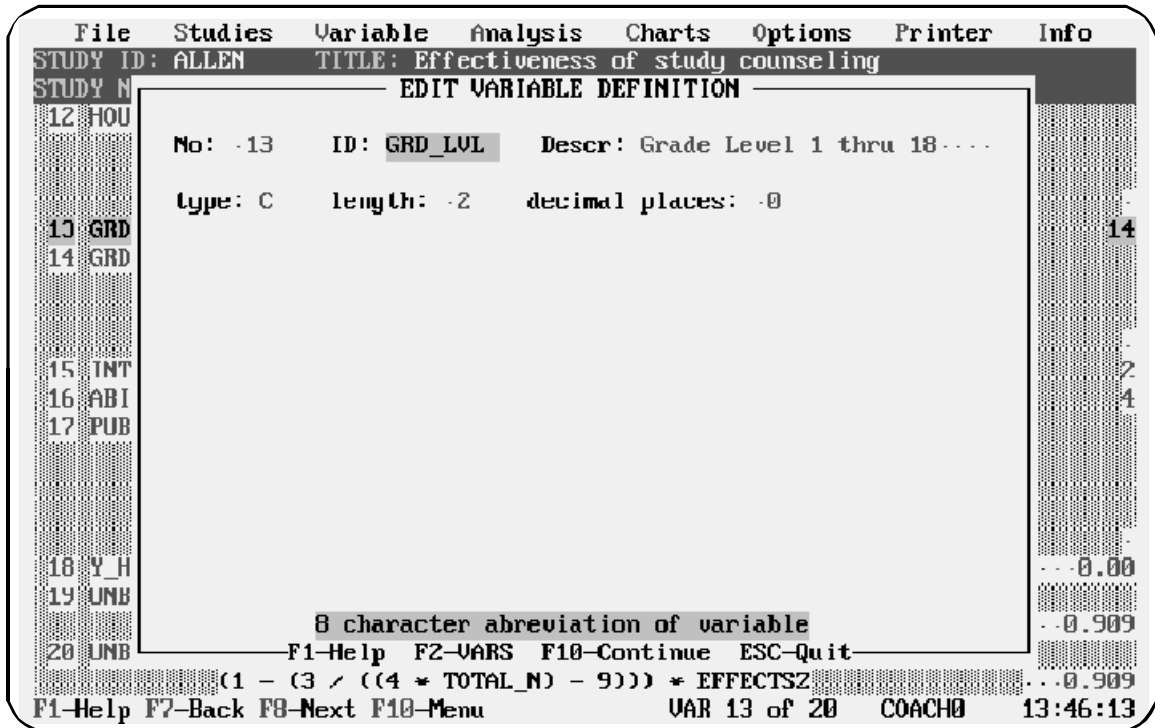
While editing a study, you can go immediately to the editing screen for a variable.

1. Highlight the variable by moving the cursor to it.

In the following example, the highlighted variable is Variable 13, GRD_LVL:

File	Studies	Variable	Analysis	Charts	Options	Printer	Info
STUDY ID: ALLEN		TITLE: Effectiveness of study counseling					
STUDY NUM: 1 of 31		AUTHORS: Allen, G. J.					
12	HOUR_GRP	Duration of program					
		1=short: (HOURS>0) and (HOURS < 1)					
		2=average: (HOURS >= 1) and (HOURS <=1.5)					
		3=long: HOURS > 1.5					
13	GRD_LVL	Grade Level 1 thru 10					14
14	GRD_GRP	Grade Group					
		1=Elementary: (GRD_LVL >= 1) and (GRD_LVL <= 6)					
		2=High Sch: (GRD_LVL >= 7) and (GRD_LVL <= 12)					
		3=College: (GRD_LVL >= 13) and (GRD_LVL <= 18)					
15	INT_GRP	Level of intervention 1=short; 2=test drill; 3=broad					2
16	ABIL_GRP	Ability level of subjects 1=low; 2=middle; 3=high					4
17	PUBYRGRP	Year of publication					
		1=60-70: (PUB_YR>=60) and (PUB_YR<=70)					
		2=71-75: (PUB_YR>=71) and (PUB_YR<=75)					
		3=76-80: (PUB_YR>=76) and (PUB_YR<=81)					
		4=81+: (PUB_YR>80)					
18	Y_HAT	Predicted Value					---0.00
19	UNB_COPY	Unbiased Effect Size					
		(1 - (3 / ((4 * TOTAL_N) - 9))) * EFFECTSZ					---0.909
20	UNB_EFFS	Unbiased Effect Size					
		(1 - (3 / ((4 * TOTAL_N) - 9))) * EFFECTSZ					...0.909
F1-Help F7-Back F8-Next F10-Menu				VAR 13 of 20		COACH0	13:45:27

2. Press ^D to display the editing screen:



3. Press Enter or Tab to move the cursor to the field you want to edit. Then use the editing keys Del, Ins, and Backspace to edit the field.
4. Press F10 when you have finished.

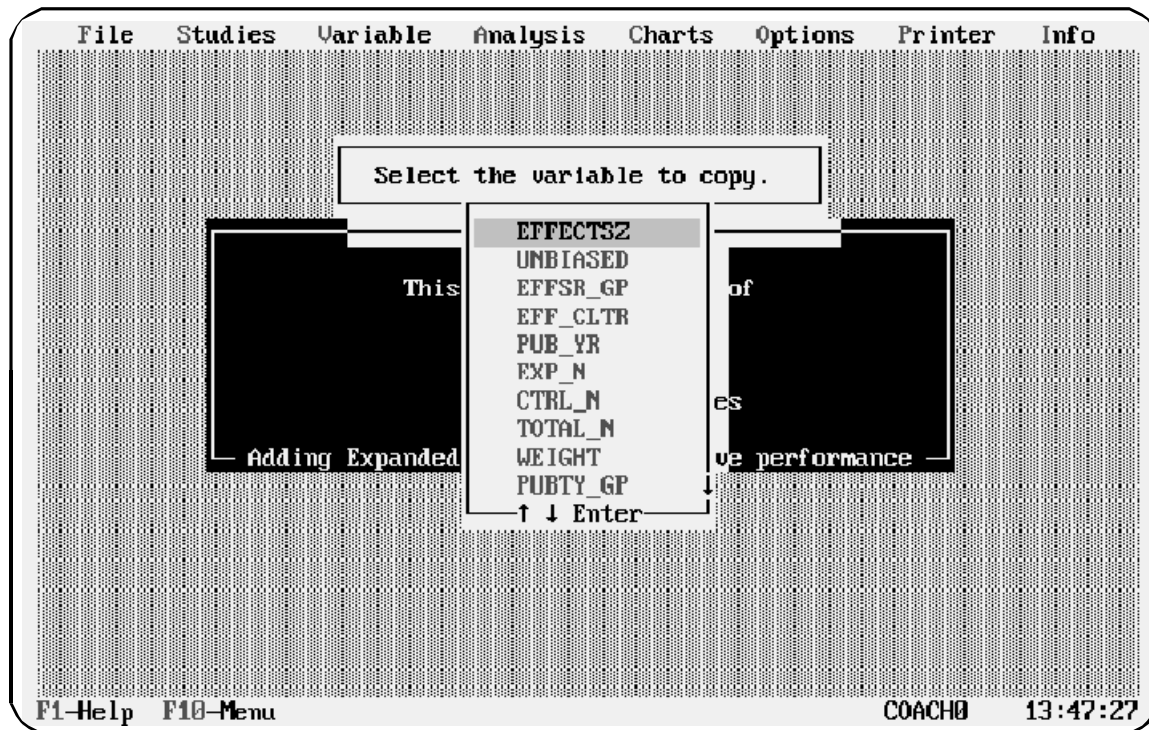
Copying a Variable

If two variables are similar, you might want to create the first variable, then copy it and edit the copy.

Follow these steps to copy a variable:

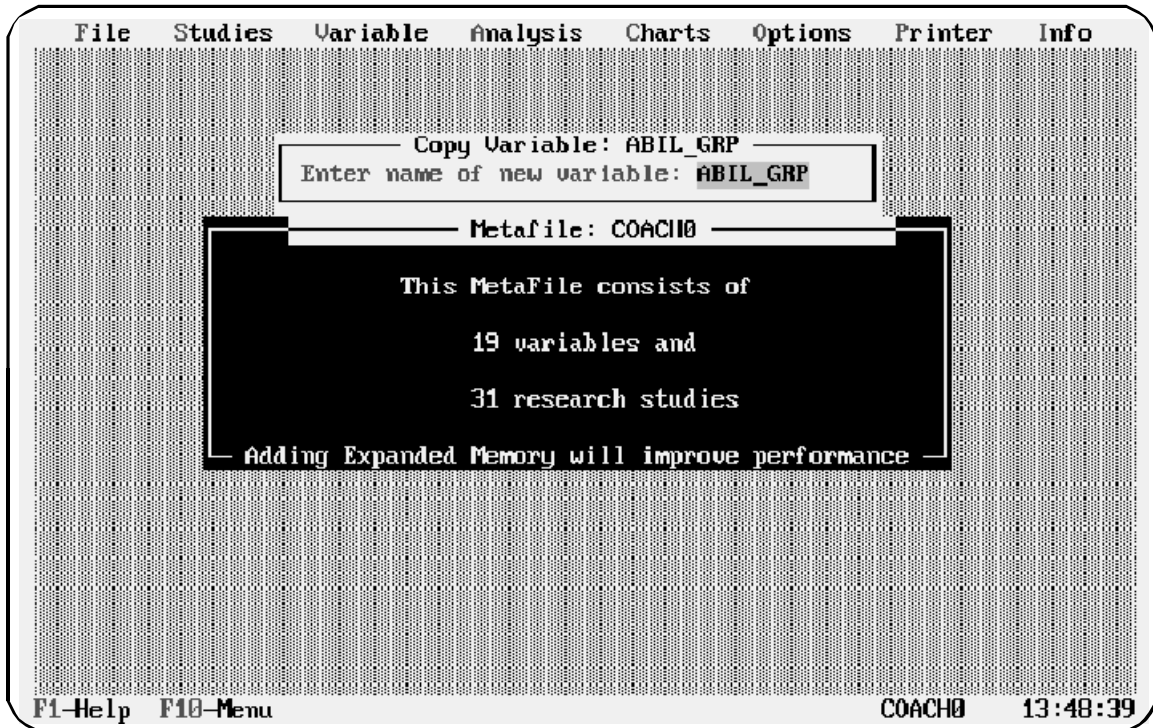
1. Select Variable/Copy

Meta-Stat displays a list of your variables:



2. Move the cursor to the variable you want to copy, then press Enter.

Meta-Stat prompts you for the name of the new variable:



3. Use the editing keys Del , Ins, and Backspace to create the name of the new variable.
4. Press Enter when you have finished.

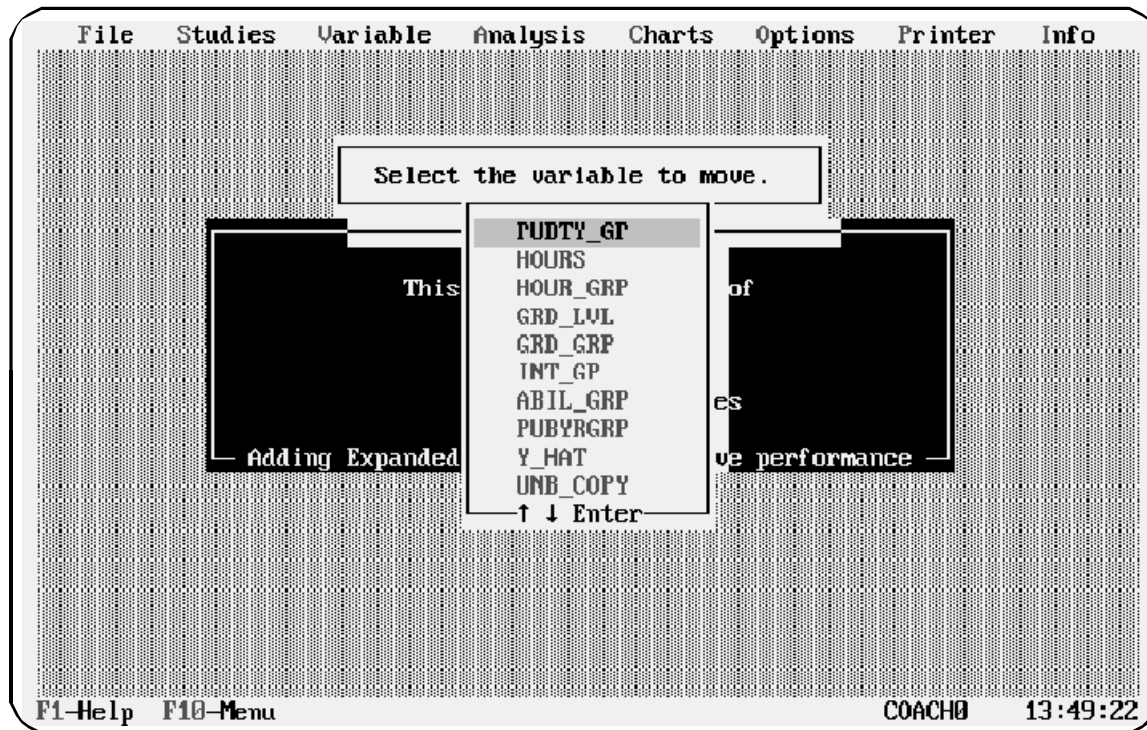
Moving a Variable

The order of variables determines the order in which you enter data for each study. If your data is set up in such a way that you want to enter one variable before another, you can change the order of the variables.

Follow these steps to move a variable:

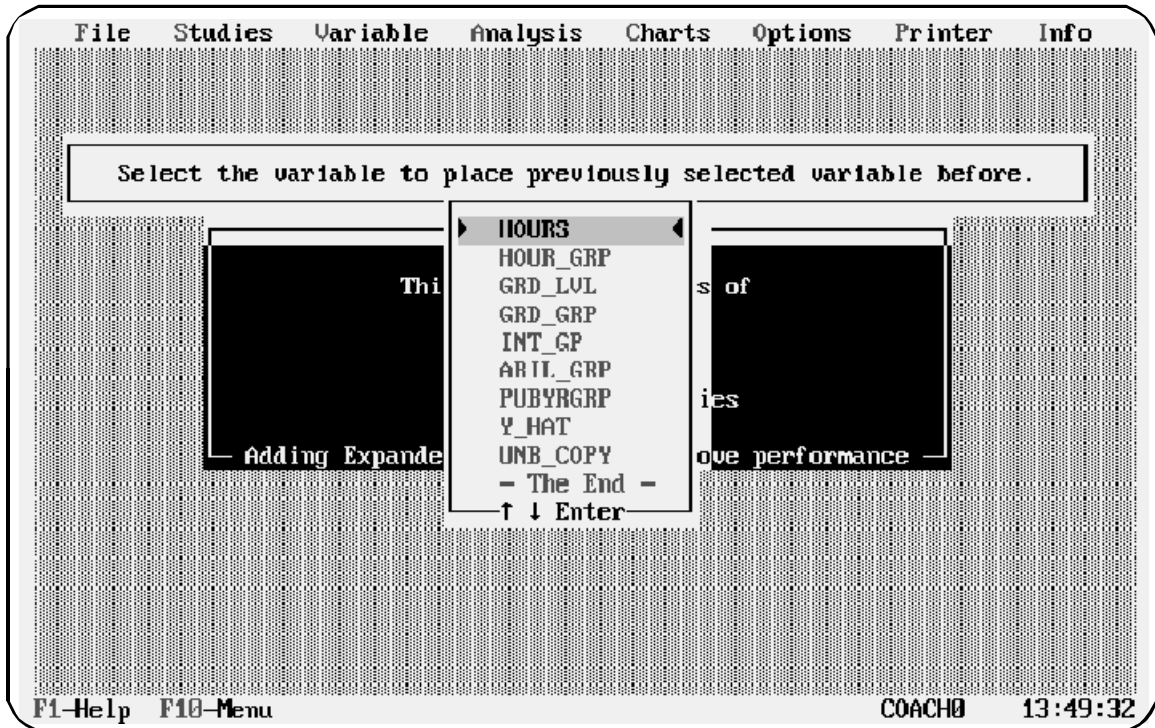
1. Select Variable/Move

Meta-Stat displays a list of your variables:



2. Move the cursor to the variable you want to move, then press Enter.

Meta-Stat prompts you to identify the location of the variable you are moving:



3. Move the cursor to the location where you want to move the variable.
4. Press Enter when you have finished.

Meta-Stat rearranges your variables and study data.

Deleting a Variable

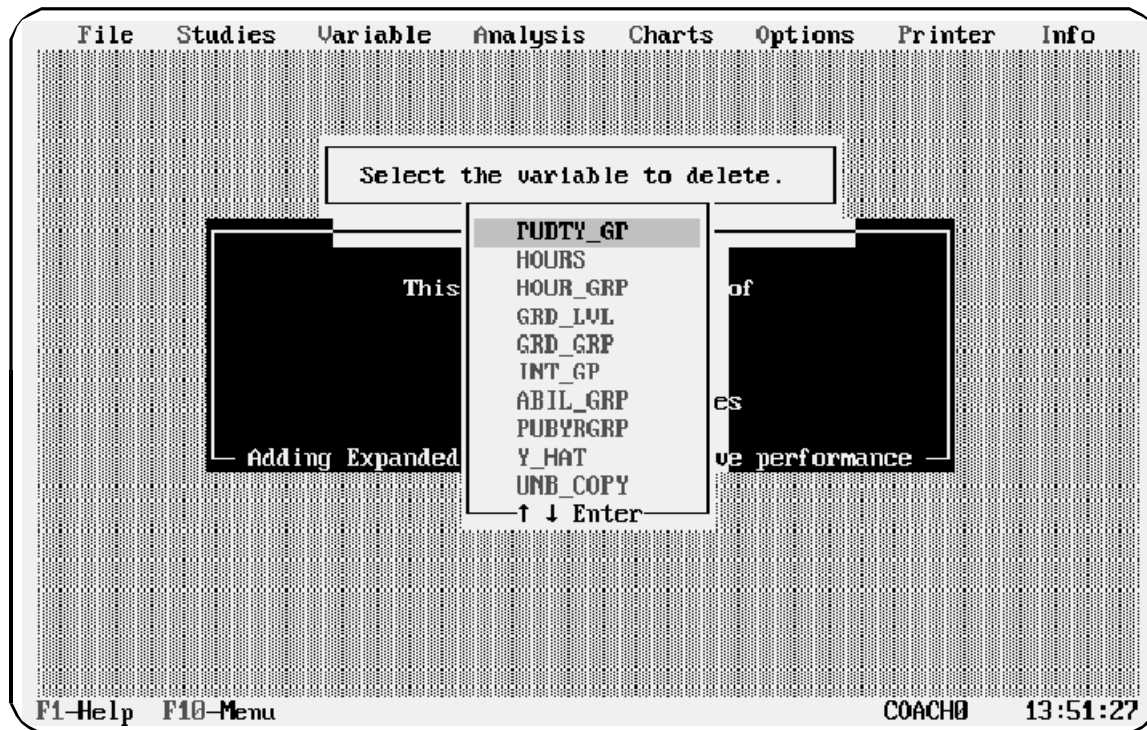
You can delete a variable that you no longer need. (However, you cannot delete a variable if other variables refer to it in equations.)

Warning: *Meta-Stat* will remove the variable and all study data that you have entered for the variable.

Follow these steps to delete a variable:

1. Select Variable/Delete

Meta-Stat displays a list of your variables:



2. Move the cursor to the variable you want to delete, then press Enter.

Meta-Stat prompts you to confirm the deletion. Press Y or N.

Working with Libraries

Libraries are collections of pre-coded variables. *Meta-Stat* uses pre-coded variables, for example, when first defining an effect-size or correlation meta-file. You can create and use your own libraries of variables. You may, for example, want to import variables from a previous meta-analysis, or you may want to share variables and equations with colleagues.

! To create a library

1. Select the variable you want to include in your library

Select **Save to Lib**. *Meta-Stat* will then present a list of your current variables. Push **Enter** to select variables. A check will appear next to the selected variable. You may select one or all of the current variables to include in your library. If you push **Enter** again, the variable will be de-selected and the check mark will no longer appear.

F9 to select all the variables on the list

Space to deselect all the variables on the list.

F10 when you are done.

2. Specify the library in which you want to save the variables.

You can either add the variables to an existing library by selecting an existing library, or you can create a new library by pushing **Alt-C** and entering a new file name. Libraries should be saved with an **.MLB** extension.

! To edit an existing library

1. Select **delete Library Variable**
2. Select a Library
3. Select the variable you want to delete by moving the cursor to the variable and pushing **Enter**.

- ! To use variables from an existing library
 1. Select Load from Lib
 2. Select the desired library name.
 3. Select the variables you want to add to your current meta-file. The selection follows the same conventions as Save to Lib discussed above.

