RegVal

RegVal is a tool to calculate predicted values based on the results of a moderated regression analysis. It was programmed by myself in 2005, and has recently been updated by Stefan Huber. RegVal can now handle up to five independent variables. The five IVs can be either all continuous variables or all categorical variables or a mix of categorical and continuous variables. A categorical variable can have up to five levels. The program is written for the case of a full factorial model, that is, the model contains all main effects and interactions.

When the relevant information to calculate predicted values has been entered (see below "Data entry" Mode), an Excel file will be saved that contains both the entered data and the predicted values. Changes can then be made in the Excel file, and predicted values can be recalculated by reading data from the Excel file (see below "Read data from file" Mode).

Thus, the program may be helpful particularly in those cases in which the same regression equation (i.e., containing the same predictors) is tested repeatedly (e.g. with different dependent variables).

I should state that I believe the tool is relatively easy to use, but that it is also very easy to make a mistake (as is the case with any analysis). In particular, this is true when the "Read data from file" Mode is used. So please read this explanation through and be careful when you make changes to an existing Excel file in order to recalculate predicted values.
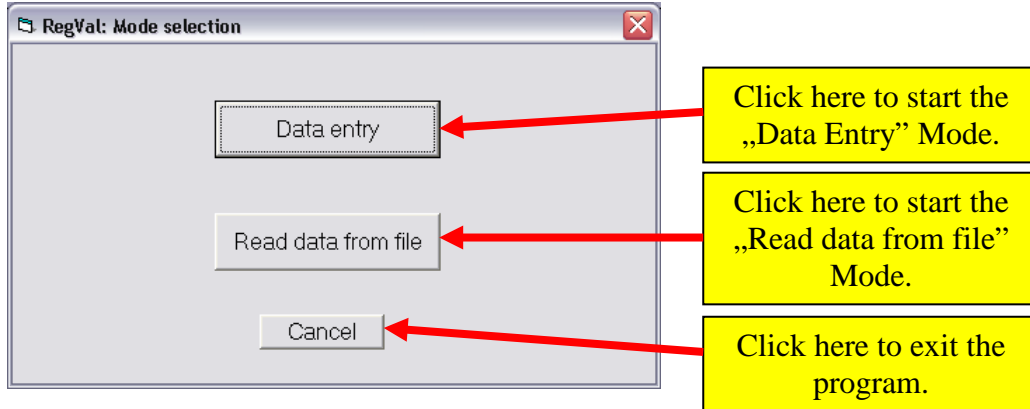
Rene Ziegler, Tübingen University   July 2014

TOC:

Mode selection

When you have started the program, choose whether you want to enter data via the "Data entry" Mode or whether you want to recalculate predicted values by reading data from file. Note that you need to run the data entry mode at least once before you can read data from file.

"Data entry" Mode

Step 1: Number of independent variables:

How many independent variables are there altogether? At this step it doesn't matter whether they are categorical or continuous. For instance, if there is one continuous variable (e.g. "*Need for Cognition*") and two categorical variables ("*Argument Quality*" and "*Source Expertise*"), select "3" and click the "next" button.

Step 2: Number of continuous variables:
How many of the independent variables are continuous ones? For instance, if there is one continuous variable (e.g. "*Need for Cognition*"), select "1" and click the "next" button. The maximum number you can select is adjusted to the overall number of independent variables specified in Step 1. If there is no continuous independent variable (i.e. only categorical variables), Steps 3, 4, and 5 are skipped.

Step 3: Variable labels for continuous variables:
Please enter a label for each continuous variable. For instance, type "*Need for Cognition*" and click the "next" button. If there is more than one continuous variable, you will be prompted to enter a second (third, fourth) label.

Step 4: Number of values for continuous variables:
For how many values (2 or 3) of a continuous variable would you like to get predicted values of your dependent variable? The caption specifies the variable label of the continuous variable entered in Step 3. For instance, you might want to get predicted values for those high in Need for Cognition and for those low in Need for Cognition. Accordingly, select "2" and click the "next" button. If there is more than one continuous variable, you will be prompted to select a number a second (third, fourth) time.

RegVal: Data entry

Number of independent variables
1 2 **3** 4   3 -> next

> Select whether you would like to get predicted values for 2 or 3 values of this continuous variable.

Need for Cognition   next

Values of continuous variable Need for Cognition
2 3   2 -> next

Value labels for continuous variables
next

> This is the variable label you entered in the previous step.

> Then click this button. If there is more than one continuous variable, you will be prompted to select a number a second (third, fourth) time.

Step 5: Value labels for continuous variables:
Please label the values of the continuous variable for which you will get predicted values. The caption specifies the variable label of the continuous variable entered in Step 3 (e.g. "*Need for Cognition*"). For instance, if you selected "2" in Step 4, now you might label them as "*High NC*" and "*Low NC*". Accordingly, first enter "*High NC*" and click the "next" button. Then, enter "*Low NC*" and click the "next" button. If there is more than one continuous variable, you will be prompted to enter value labels for the second (third, fourth) variable.

RegVal: Data entry

Number of independent variables
1 2 **3** 4   3 -> next

Number of continuous variables
2 3   1 -> next

> Enter a label for the first of the 2 or 3 values on which you would like to get predicted values for this continuous variable.

next

2 -> next

Value label 1 of Need for Cognition
High Need for Cognition   next

Variable labels for categorical variables
next

> This is the variable label you entered in step 3.

> Then click this button. You will be prompted to enter a label for the second value of this continuous label. If there is more than one continuous variable, you will be prompted to enter value labels for the second (third, fourth) variable.

Step 6: Variable labels for categorical variables:
Please enter a label for each categorical variable. For instance, type "*Source Expertise*" and click the "next" button. If there is more than one categorical variable, you will be prompted to enter a second (third, fourth) label. If there is no categorical independent variable (i.e. only continuous variables), this Step as well as Steps 7 and 8 are skipped.

Step 7: Levels of categorical variables
How many different levels of the categorical variable are there? The caption specifies the variable label of the categorical variable entered in Step 6. For instance, "*Source Expertise*" might be either high or low. Accordingly, select "2" and click the "next" button. If there is more than one categorical variable, you will be prompted to select a number a second (third, fourth) time.

Select how many different levels there are for this categorical variable.

This is the variable label you entered in the previous step.

Then click this button. If there is more than one categorical variable, you will be prompted to select a number a second (third, fourth) time.

Step 8: Value labels for categorical variables:
Please label the levels of the categorical variables. The caption specifies the variable label of the categorical variable entered in Step 6 (e.g. "*Source Expertise*"). For instance, if you selected "*2*" in Step 7, now you might label them as "*High Expertise*" and "*Low Expertise*". Accordingly, first enter "*High Expertise*" and click the "next" button. Then, enter "*Low Expertise*" and click the "next" button. If there is more than one categorical variable, you will be prompted to enter level labels for the second (third, fourth) variable.

Step 9: Codes:

Enter the codes for the independent variables. You will be prompted to enter the codes in the order the variables were declared. For instance, one of the three independent variables may have been specified as continuous (Step 2), and labeled as "Need for Cognition" (Step 3). Further, you may have selected that you would like to get predicted values for two values of this independent variable (Step 4), with value labels "*High NC*" and "*Low NC*" (Step 5). Then you will first be prompted to enter a code for "*High NC*". Given centered NC scores with higher scores indicating higher Need for Cognition, you might enter the standard deviation (e.g. "1.23"), and click the "next" button. Next, you will be prompted to enter a code for "*Low NC*", so you might enter minus the standard deviation (e.g. "-1.23"). If NC scores were standardized (with higher scores indicating higher Need for Cognition) you might enter the standard deviations "1" and "-1".

The second independent variable may be a categorical variable, labeled as "Source Expertise" (Step 6), with two levels (Step 7) labeled "*High Expertise*" and "*Low Expertise*" (Step 8). Then you will be prompted to enter a code for "*High Expertise*". For instance, in the case of dummy codes (*High Expertise* = 1; *Low Expertise* = 0) enter "1" and click the "next" button. Next, you will be prompted to enter a code for "*Low Expertise*", so you might enter "0" and click the "next" button.

Let's assume the third independent variable is a categorical variable with three levels. For instance, "*Argument Quality*" is good, medium, or bad. In this case, you will be prompted to enter codes in the order: first level on the first vector, second level on the first vector, third level on the first vector, followed by the same order for the second vector.

The program accepts only digits, the minus sign, and the decimal indicator (dot or comma, depending on your computer system) as entries.

Code value of Need for Cognition: High Need for Cognition
1.23   next

b-weights
next

next

cancel

This is the first value label of the continuous variable.

Enter the first value of the continuous variable for which you would like to get predicted values.

Then click this button. You will be prompted to enter the second (third) value of the continuous variable. Afterwards, you will need to enter values (continuous variables) and codes (categorical variables) of the second (third, fourth) independent variable.

Step 10: b-weights:

Please enter the unstandardized regression coefficient (bs, not betas) pertaining to the predictor specified in the caption. For example, there may be three independent variables, one continuous variable CON1 (e.g. "*Need for Cognition*"), and two categorical variables CAT1 ("*Source Expertise*") and CAT2 ("*Argument Strength*"). The first categorical variable has two levels ("*High Expertise*" and "*Low Expertise*"), the second categorical variable has three levels ("*Good Arguments*", "*Medium Arguments*", and "*Bad Arguments*").
Accordingly, there are two vectors for the second categorical variable CAT21 and CAT22. The order in which b-weights have to be entered is as follows:
- Constant
- CON1, CAT1, CAT21, CAT22 (i.e., all "main effects" first)
- CON1xCAT1, CON1xCAT21, CON1xCAT22
  CAT1xCAT21, CAT1xCAT22 ("two-way interactions" next)
- CON1xCAT1xCAT21,
  CON1xCAT1xCAT22 (three-way interactions last)

Step 11: Label of dependent / criterion variable:

Please enter a label for the dependent / outcome / predicted / criterion variable and click the "next" button.

Enter a label for the dependent variable here.

Then click this button.

Note again that you may exit the program at any time.
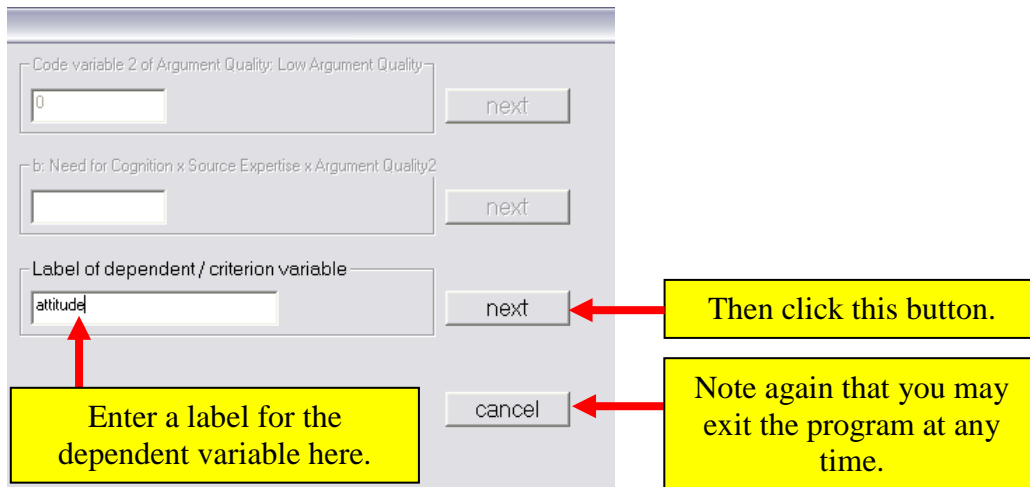
Step 12: Save file as:

You will be prompted to enter a filename. All entries and the calculated predicted values will be saved in an Excel file. RegVal will then automatically be terminated. The Excel file consists of two worksheets. The first one (labeled "data") contains all the entries made in Steps 1 through 11. The second one contains the predicted values and is labeled respectively (see below).

Select where you want the Excel file to be saved.

Don't get irritated by the German labels here ☺

Enter a filename here.

Then click save.
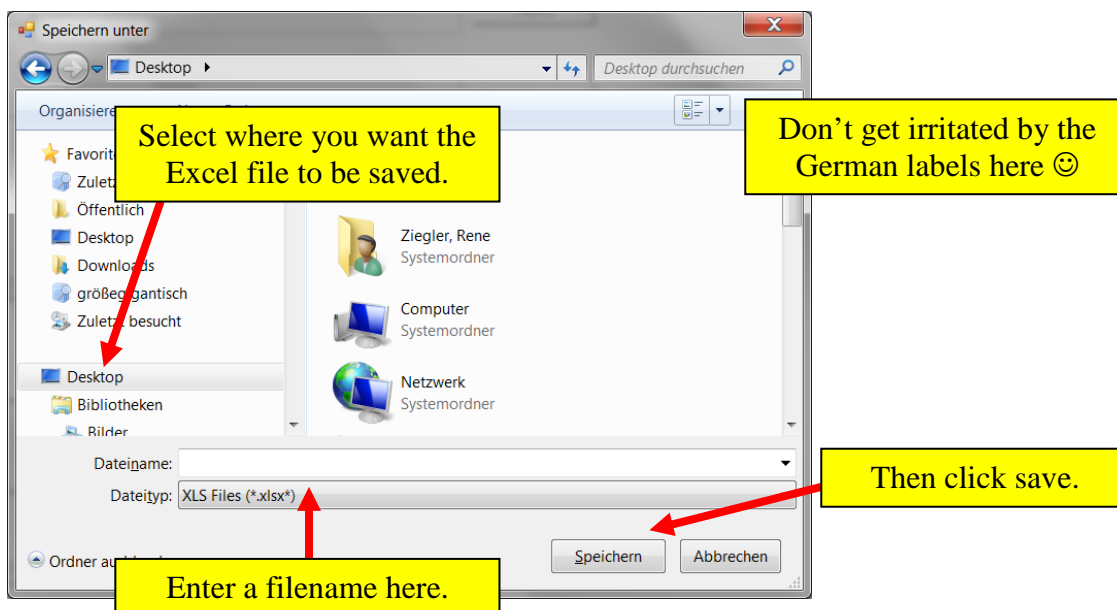
This has been the final step of the data entry mode. Next, I describe what you find in the Excel file.

When you open the saved Excel file, you should see the following:

Worksheet "data":

	A	B	C	D	E	F	G	H	I
1	DV	attitude						Weight label	b-weights
2	IVs	3						b: Constant	5
3	Continuous	1						b: Need for C	0,1
4	Categorical	2						b: Source Ex	0,6
5	Label cont. IV	Need for Cog	Values	2				b: Argument	0,6
6	Label cat. IV	Source Exper	Levels	2	Code variable	1		b: Argument	0,3
7	Label cat. IV	Argument Qu	Levels	3	Code variable	2		b: Need for C	-0,6
8								b: Need for C	0,6
9			Code values					b: Need for C	0,3
10	Value 1:	Need for Cog	High Need for	1,23				b: Source Ex	0,1
11	Value 2:	Need for Cog	Low Need for	-1,23				b: Source Ex	-0,1
12	Level 1:	Source Exper	High Source	1				b: Need for C	0,1
13	Level 2:	Source Exper	Low Source E	0				b: Need for C	-0,1
14	Level 1:	Argument Qu	High Argumer	1	0				
15	Level 2:	Argument Qu	Medium Argu	0	1				
16	Level 3:	Argument Qu	Low Argumer	0	0				

> This is what the data worksheet looks like. In the next snapshot, I have adjusted the column width so that all cell entries are completely visible.

> This is where you have to click to see the predicted values.

Sheet tabs: data / predicted values / Diagramm3

In column B you find:
Row 1: Label for dependent variable (Step 11)
Row 2: Number of independent variables (Step 1)
Row 3: Number of continuous variables (Step 2)
Row 4: Number of categorical variables (derived from Steps 1 and 2)

Subsequent rows:
Column B / column D / column F:
Variable labels for continuous IVs (Step 3) / Number of values (Step 4) / -
Variable labels for categorical IVs (Step 6) / Number of levels (Step 7) / Number of code variables

> Dependent variable (step 11)

	A	B	C	D	E	F	G
1	DV	attitude					W
2	IVs	3					
3	Continuous	1					
4	Categorical	2					
5	Label cont. IV 1	Need for Cognition	Values	2			b:
6	Label cat. IV 1	Source Expertise	Levels	2	Code variables	1	b:
7	Label cat. IV 2	Argument Quality	Levels	3	Code variables	2	b:
8							b:

> Selected number of independent variables (step 1).
> Selected number of continuous variables (step 2).
> Last entry is automatically calculated based on steps 1 and 2.

> Variable labels entered in steps 3 (continuous variable) and 6 (categorical variables)

> Number of values (step 4) and levels (step 7)

> For categorical variables, the number of code variables is the number of levels minus 1.

Further rows:
Column C / column D (E, F, G):
Value labels of continuous IVs (Step 5) / Code values (Step 9) / -
Value labels of categorical IVs (Step 8) / Code values of first vector (second, third, fourth vector) (Step 9)

	A	B	C	D	E	F	G
	A1	▼	fx DV				
1	DV	attitude					Weight la
2	IVs	3					b: Consta
3	Continuous	1					b: Need f
4	Categorical	2					b: Source
5	Label c	Value labels entered for the continuous variable (step 5)	lu	Values of the continuous variable for which you want predicted values (step 9)	2		b: Argum
6	Label c		ve		2	Code variables 1	b: Argum
7	Label cat. IV 2	Argument Quality	Leve		3	Code variables 2	b: Need f
8							b: Need f
9				Code values			b: Need f
10	Value 1:	Need for Cognition	High Need for Cognition	1,23			b: Source
11	Value 2:	Need for Cognition	Low Need for Cognition	-1,23			b: Source
12	Level 1:	Source Expertise	High Source Expertise	1			b: Need f
13	Level 2:	Source Expertise	Low Source Expertise	0			b: Need f
14	Level 1:	Argument Quality	High Argument Quality	1	0		
15	Level 2:	Argument Quality	Medium Argument Quality	0	1		
16	Level 3:	Argument Quality	Low Argument Quality	0	0		
17							

Value labels entered for the categorical variables (step 8)

Code values of first vector (step 9)

Code values of second vector (step 9). Note that if an independent variable had 4 or 5 levels, then code values would also appear in columns F and G

In column H, labels of all predictor variables contained in a full factorial design (i.e., all main effects and interaction terms that are possible given the number and kind of independent variables) are listed.
Finally, column I lists the unstandardized regression coefficients entered in Step 10.

F	G	H	I
		Weight label	b-weights
		b: Constant	5
		b: Need for Cognition	0,1
		b: Source Expertise	0,6
		b: Argument Quality1	0,6
1		b: Argument Quality2	0,3
2		b: Need for Cognition x Source Expertise	-0,6
		b: Need for Cognition x Argument Quality1	0,6
		b: Need for Cognition x Argument Quality2	0,3
		b: Source Expertise x Argument Quality1	0,1
		b: Source Expertise x Argument Quality2	-0,1
		b: Need for Cognition x Source Expertise x Argument Quality1	0,1
		b: Need for Cognition x Source Expertise x Argument Quality2	-0,1

b-weights from regression analysis (entered in step 10)

all predictor variables contained in a full factorial design (entered in step 10)

Worksheet "predicted values":

This is what the worksheet "predicted values" looks like in the case of the fictitious example.

		C	D	E	F	G
		Need for Cognition				
		High Need for	High Need for	Low Need for	Low Need for Cognition	
		Source Expertise				
4		High Source I	Low Source E	High Source I	Low Source Expertise	
5	Argument Qu	High Argumer	6,546	6,46099997	6,05399942	4,73899984
6		Medium Argu	5,43100023	5,79200029	6,16900015	4,80800009
7		Low Argumer	4,98500013	5,12300014	6,21499968	4,87699986
8						
9						

The appearance depends on the number of IVs.
- The first line always shows the variable label of the first IV, and the second line always shows its value labels.
- In the case of two or more IVs, the variable label of the last (!) IV is written in the first column, and its value labels are written in the second column.
- In the case of three IVs, lines 3 and 4 give the variable label and the value labels of the second IV.
- In the case of four IVs, lines 5 and 6 show the variable label and the value labels of the third IV.

	A1	▼	fx				
	A	B	C	D	E	F	
1			Need for Cognition				
2			High Need for Cognition	High Need for Cognition	Low Need for Cognition	Low Need for Cognition	
3			Source Expertise				
4			High Source Expertise	Low Source Expertise	High Source Expertise	Low Source Expertise	
5	Argument Quality	High Argument Quality	6,55	6,46	6,05	4,74	
6		Medium Argument Quality	5,43	5,79	6,17	4,81	
7		Low Argument Quality	4,99	5,12	6,21	4,88	
8							
9							
10							
11							
12							
13							

If you like, you can adjust column width and define the cells containing the predicted values as integer with two decimals.

	A	B	C	D	E	F	G
1			Need for Cognition				
2			High Need for Cognition	High Need for Cognition	Low Need for Cognition	Low Need for Cognition	

You can also chart these results quite easily. Copy and paste the upper part of the table, delete the two rows on "Need for Cognition" and "Source Expertise" as well as the entries in cells D11 and F11. Mark the cells like it is done here and select the kind of chart you would like to get.

	A	B	C	D	E	F
11			High Need for Cognition		Low Need for Cognition	
12			High Source Expertise	Low Source Expertise	High Source Expertise	Low Source Expertise
13	Argument Quality	High Argument Quality	6,55	6,46	6,05	4,74
14		Medium Argument Quality	5,43	5,79	6,17	4,81
15		Low Argument Quality	4,99	5,12	6,21	4,88
16						
17						
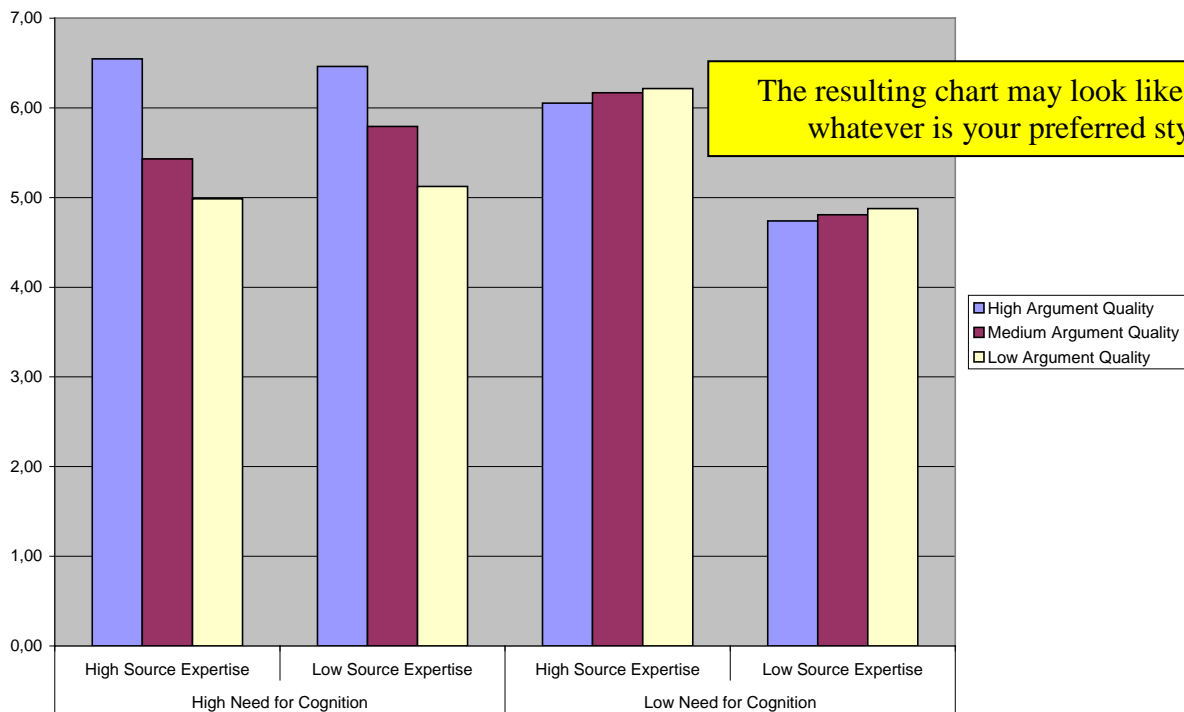
The resulting chart may look like this (or whatever is your preferred style).

This is all there is to say on the data entry mode and the Excel file. The following pages describe how to make use of the "Read data from file" Mode.

"Read data from file" Mode

When all the information necessary to calculate predicted values has been saved in an Excel file, it is possible to read information from such a file and recalculate predicted values. For instance, you may have conducted a regression analysis before the last few participants have been run in the lab. Or you run the same regression analysis on another dependent variable. Rather than re-entering all the information via the data entry mode, you may change only the information in the Excel file that is different from the original data entry.
When these changes have been made, it is neither necessary to save the file nor to close the file. Just start the program, select the read-from-file mode and the appropriate Excel file, and the recalculation takes effect immediately.
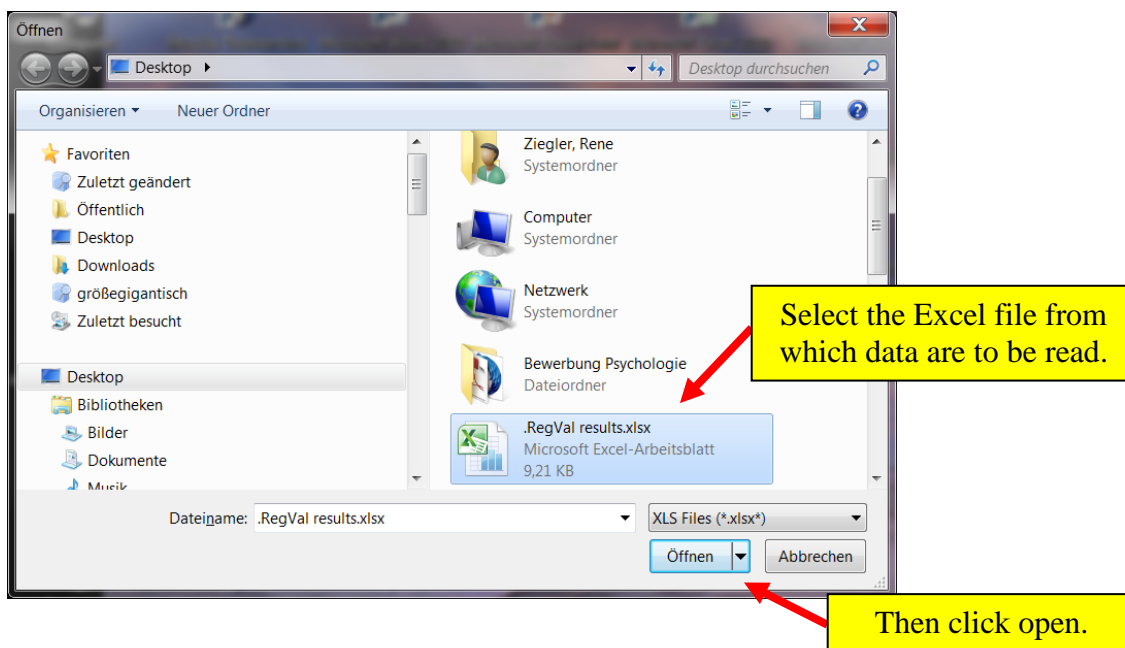
On the next three pages I describe which kinds of changes can be made.

1. Change of unstandardized regression coefficients. If the order in which they are listed in the output of your statistics software is identical to the order in which the weights are listed in the worksheet, you may simply copy and paste the obtained unstandardized regression coefficients.
   A friendly but urgent warning is in place here: You _cannot_ simply reorder the weights in the worksheet. This would lead to completely wrong predicted values because the program assumes that certain b-weights (i.e., those pertaining to specific effects) are found in certain cells of column I.

Koeffizienten[a]

Modell		Nicht standardisierte Koeffizienten B
1	(Konstante)	5,000
	nfcc	,150
	exp	,700
	arg1	,600
	arg2	,500
	nfcexp	-,600
	nfcarg1	,800
	nfcarg2	,600
	exparg1	,100
	exparg2	-,100
	nfcexparg1	,100
	nfcexparg2	-,100

a. Abhängige Variable: attitude

G	H	I b-weights
	Weight label	
	b: Constant	5
	b: Need for Cognition	0,1
	b: Source Expertise	0,6
	b: Argument Quality1	0,6
1	b: Argument Quality2	0,3
2	b: Need for Cognition x Source Expertise	-0,6
	b: Need for Cognition x Argument Quality1	0,6
	b: Need for Cognition x Argument Quality2	0,3
	b: Source Expertise x Argument Quality1	0,1
	b: Source Expertise x Argument Quality2	-0,1
	b: Need for Cognition x Source Expertise x Argument Quality1	0,1
	b: Need for Cognition x Source Expertise x Argument Quality2	-0,1

If these were the results of your regression analysis (see left), you could mark the new b-weights and copy and paste them into column I of the worksheet "data" (see old b-weights right). Notice that this is only possible, when the order in the SPSS output table is identical to the order in the worksheet. If this is not the case, make sure that each coefficient is entered into that cell in column I that pertains to the predictor that appears in column H.

2. Change of standard deviation of a continuous variable. In this case, entries in those cells of the worksheet that contain the code values for the continuous variable may have to be changed (e.g., if predicted values at one standard deviation above and below the mean are of interest).

- Change of the kind of coding of a categorical variable. In this case, make sure to adjust the code values for the categorical variable contained in the excelsheet (e.g. effect coding instead of dummy coding).

In general, when data are read from an existing file, the program makes use of the following information:

- Number of independent variables, number of continuous variables, number of categorical variables
- Variable labels for continuous IVs, number of values
- Variable labels for categorical IVs, number of levels
- Value labels of continuous IVs, code values
- Value labels of categorical Ivs, code values of first vector (second, third, fourth vector)
- unstandardized regression coefficients (b-weights)

That's it. I hope the tool is of help for the kind of analysis you want to run.