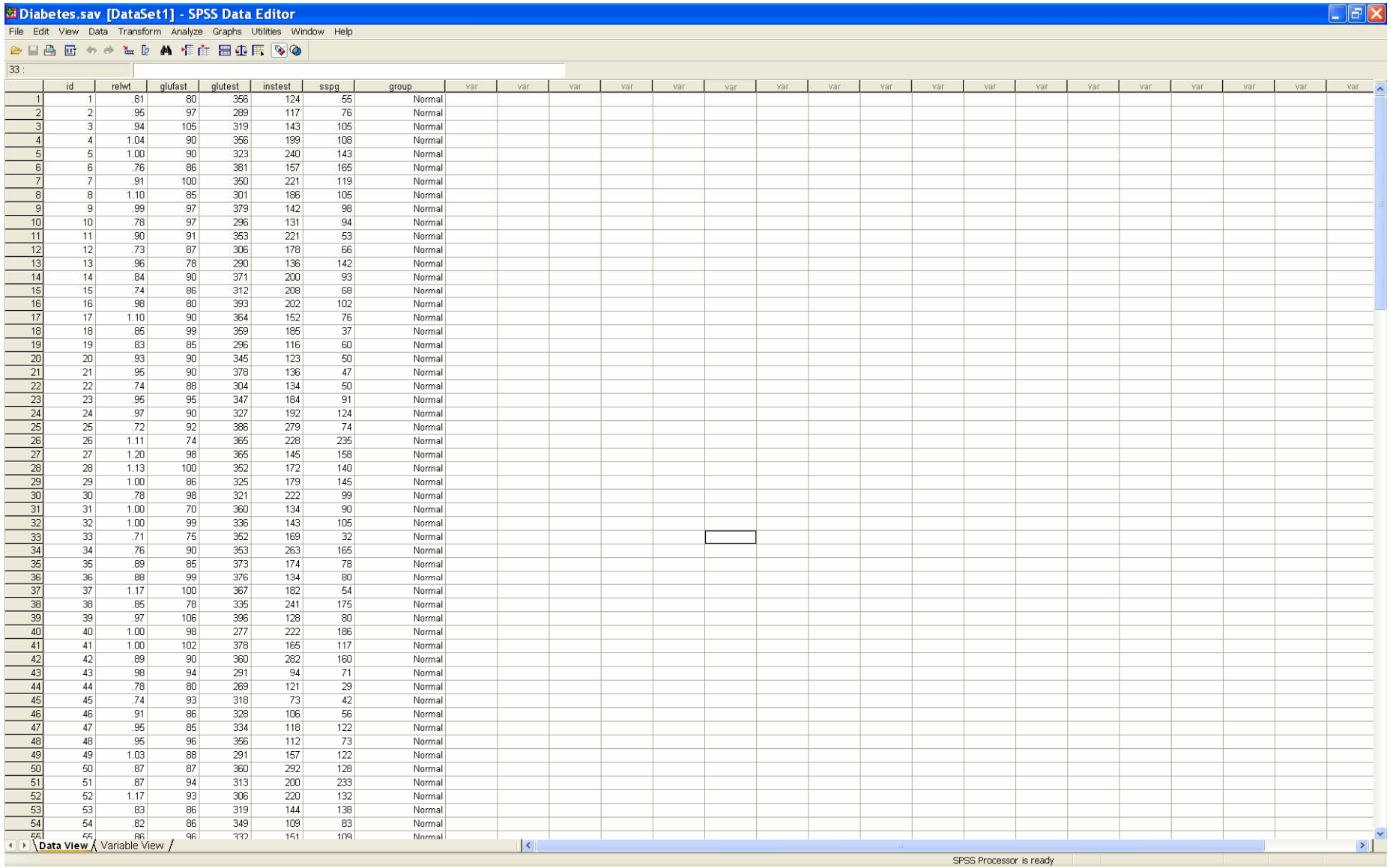
Diabetes Data Set



	id	relwt	glufast	glutest	instest	sspg	group
1	1	.81	80	356	124	55	Normal
2	2	.95	97	289	117	76	Normal
3	3	.94	105	319	143	105	Normal
4	4	1.04	90	356	199	108	Normal
5	5	1.00	90	323	240	143	Normal
6	6	.76	86	381	157	165	Normal
7	7	.91	100	350	221	119	Normal
8	8	1.10	85	301	186	105	Normal
9	9	.99	97	379	142	98	Normal
10	10	.78	97	296	131	94	Normal
11	11	.90	91	353	221	53	Normal
12	12	.73	87	306	178	66	Normal
13	13	.96	78	290	136	142	Normal
14	14	.84	90	371	200	93	Normal
15	15	.74	86	312	208	68	Normal
16	16	.98	80	393	202	102	Normal
17	17	1.10	90	364	152	76	Normal
18	18	.85	99	359	185	37	Normal
19	19	.83	85	296	116	60	Normal
20	20	.93	90	345	123	50	Normal
21	21	.95	90	378	136	47	Normal
22	22	.74	88	304	134	50	Normal
23	23	.95	95	347	184	91	Normal
24	24	.97	90	327	192	124	Normal
25	25	.72	92	386	279	74	Normal
26	26	1.11	74	365	228	235	Normal
27	27	1.20	98	365	145	158	Normal
28	28	1.13	100	352	172	140	Normal
29	29	1.00	86	325	179	145	Normal
30	30	.78	98	321	222	99	Normal
31	31	1.00	70	360	134	90	Normal
32	32	1.00	99	336	143	105	Normal
33	33	.71	75	352	169	32	Normal
34	34	.76	90	353	263	165	Normal
35	35	.89	85	373	174	78	Normal
36	36	.88	99	376	134	80	Normal
37	37	1.17	100	367	182	54	Normal
38	38	.85	78	335	241	175	Normal
39	39	.97	106	396	128	80	Normal
40	40	1.00	98	277	222	186	Normal
41	41	1.00	102	378	165	117	Normal
42	42	.89	90	360	282	160	Normal
43	43	.98	94	291	94	71	Normal
44	44	.78	80	269	121	29	Normal
45	45	.74	93	318	73	42	Normal
46	46	.91	86	328	106	56	Normal
47	47	.95	85	334	118	122	Normal
48	48	.95	96	356	112	73	Normal
49	49	1.03	88	291	157	122	Normal
50	50	.87	87	360	292	128	Normal
51	51	.87	94	313	200	233	Normal
52	52	1.17	93	306	220	132	Normal
53	53	.83	86	319	144	138	Normal
54	54	.82	86	349	109	83	Normal
55	55	.86	96	332	151	109	Normal

Create two new variables **loggluf** and **logglut** for the logged variables

*Diabetes.sav [DataSet1] - SPSS Data Editor

File Edit View Data Transform Analyze Graphs Utilities Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	id	Numeric	11	0	Patient ID	None	None	8	Right	Scale
2	relwt	Numeric	11	2	Relative Weight	None	None	8	Right	Scale
3	glufast	Numeric	11	0	Fasting Plasma Glucose	None	None	8	Right	Scale
4	glutest	Numeric	11	0	Test Plasma Glucose	None	None	8	Right	Scale
5	instest	Numeric	11	0	Plasma Insulin during Test	None	None	8	Right	Scale
6	sspg	Numeric	11	0	Steady State Plasma Glucose	None	None	8	Right	Scale
7	group	Numeric	11	0	Clinical Group	{1, Overt Diabe	None	14	Right	Ordinal
8	loggluf	Numeric	8	2	Log(GluFast)	None	None	8	Right	Scale
9	logglut	Numeric	8	2	Log(GluTest)	None	None	8	Right	Scale
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
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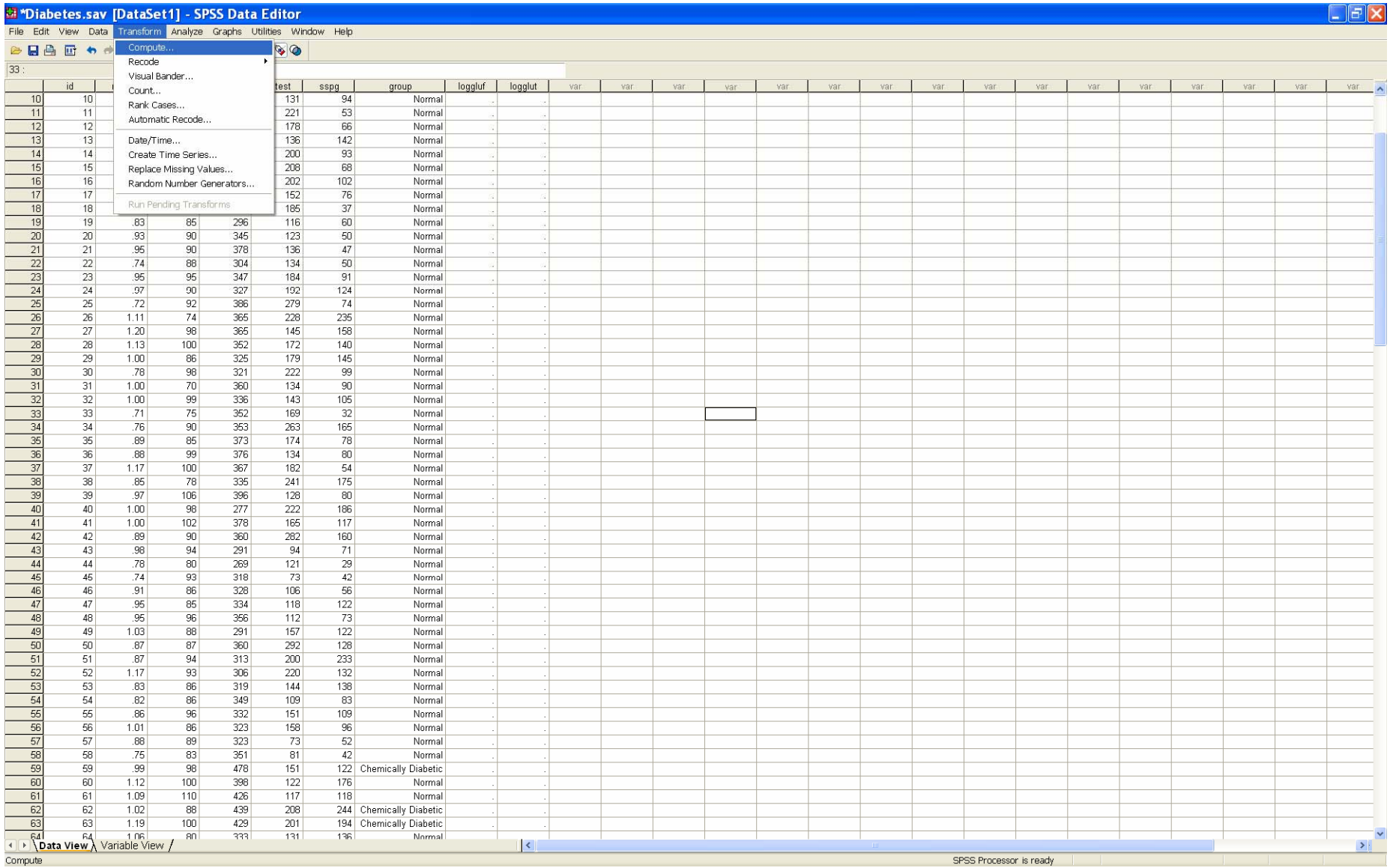
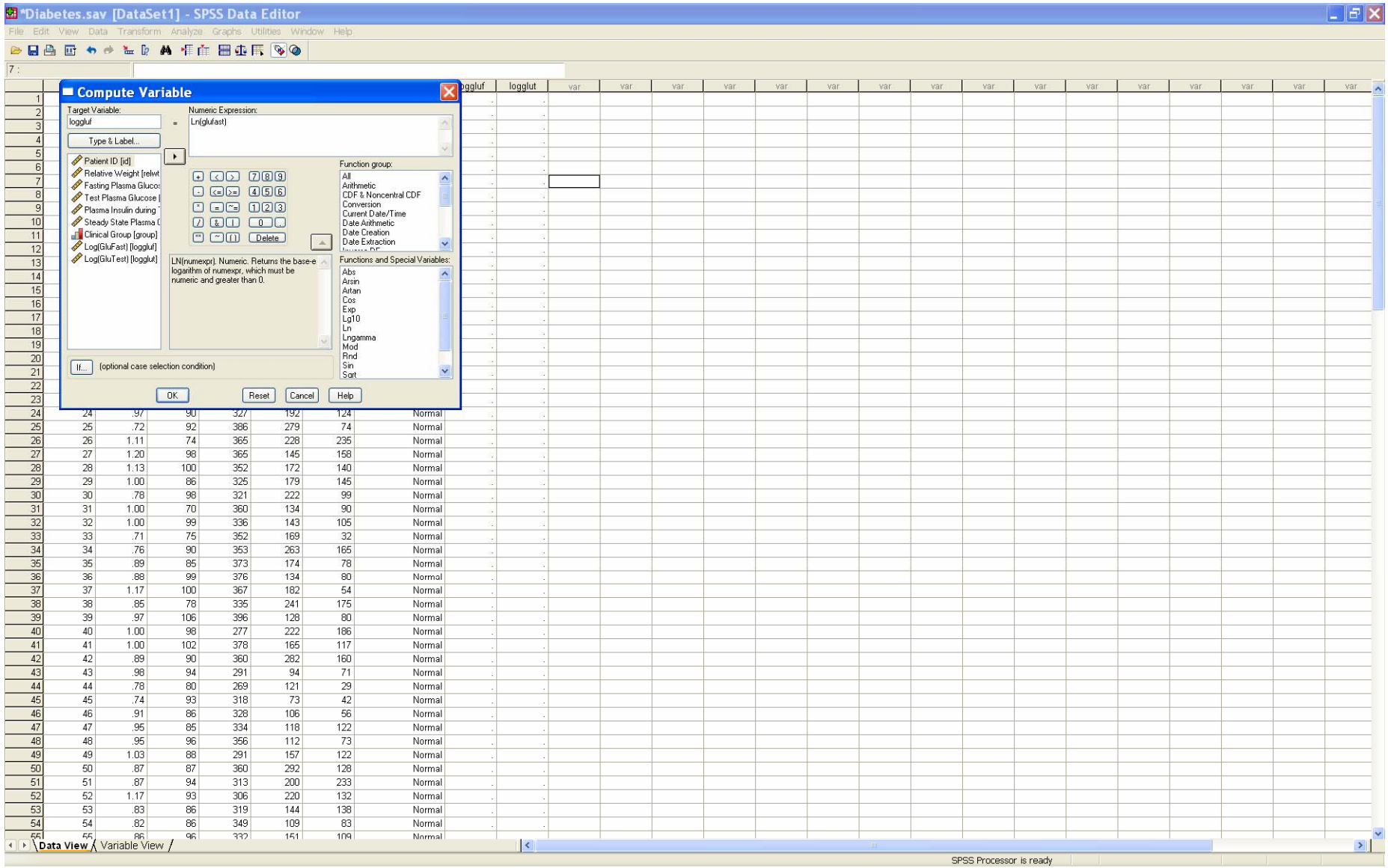
Data View | Variable View

SPSS Processor is ready

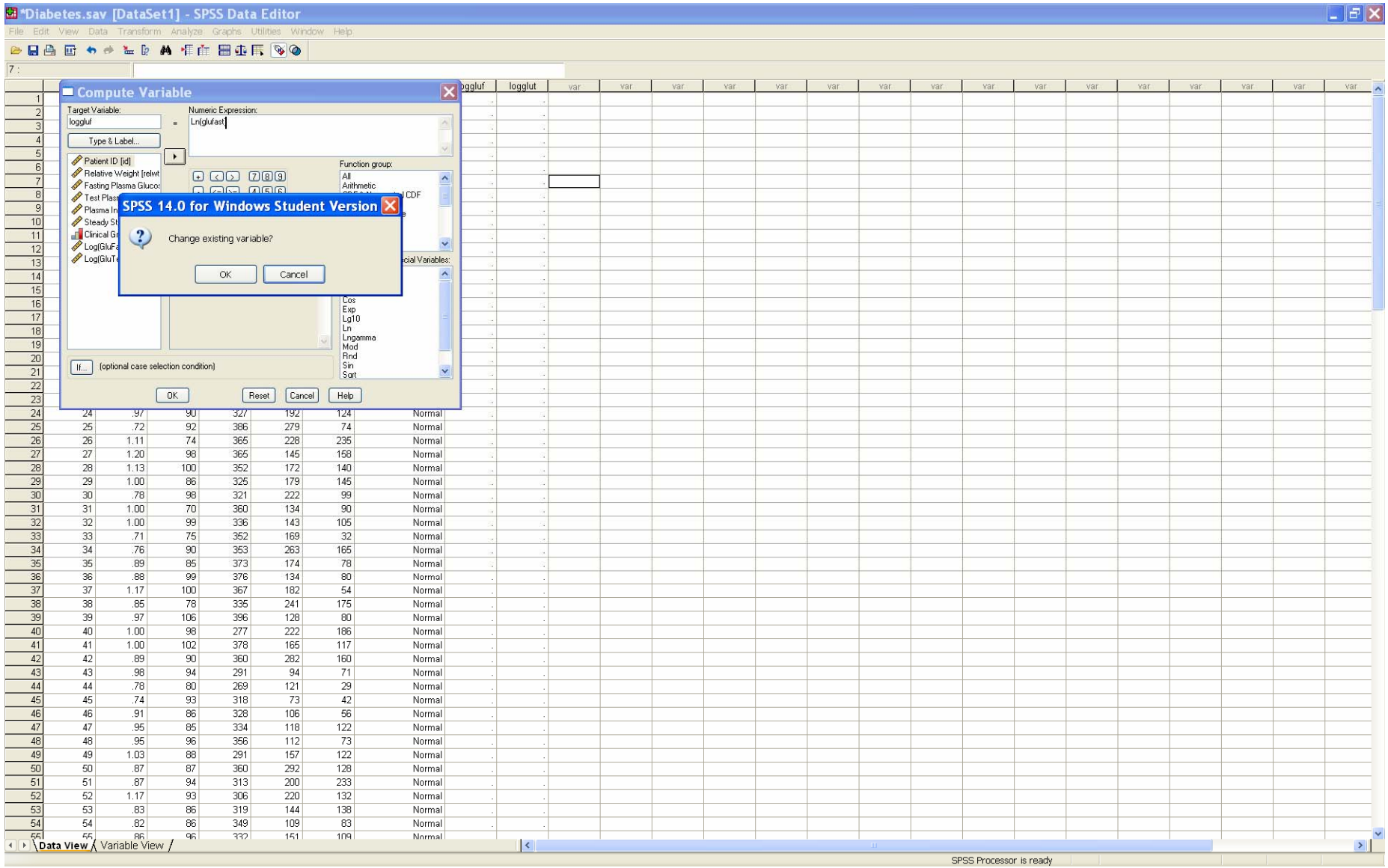
Use the *Compute* pulldown menu to compute the log transform



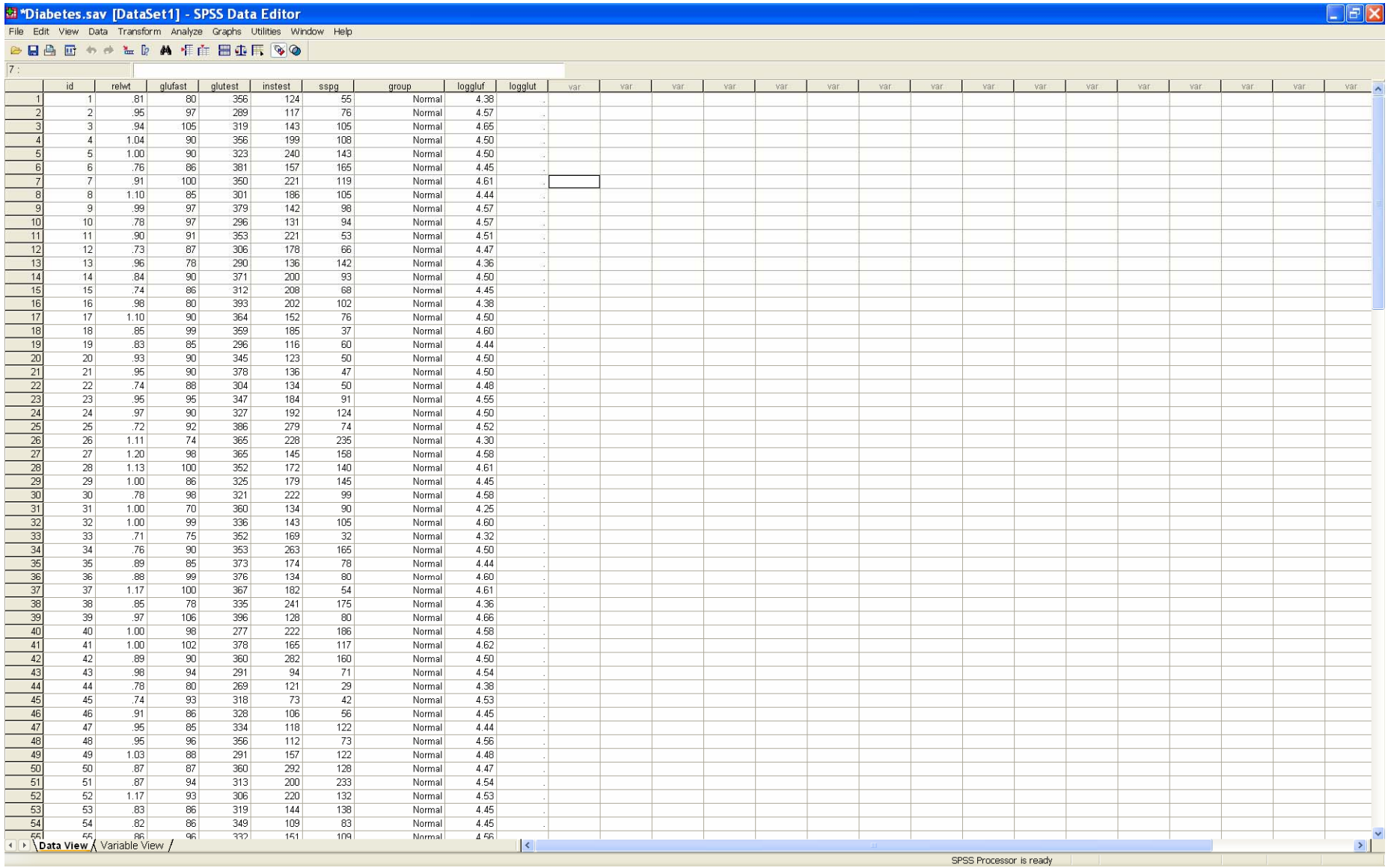
In *Target Variable* insert **loggluf**, and in *Numeric Expression* type **Ln(glufast),** and click OK



Click OK when the confirmation screen appears

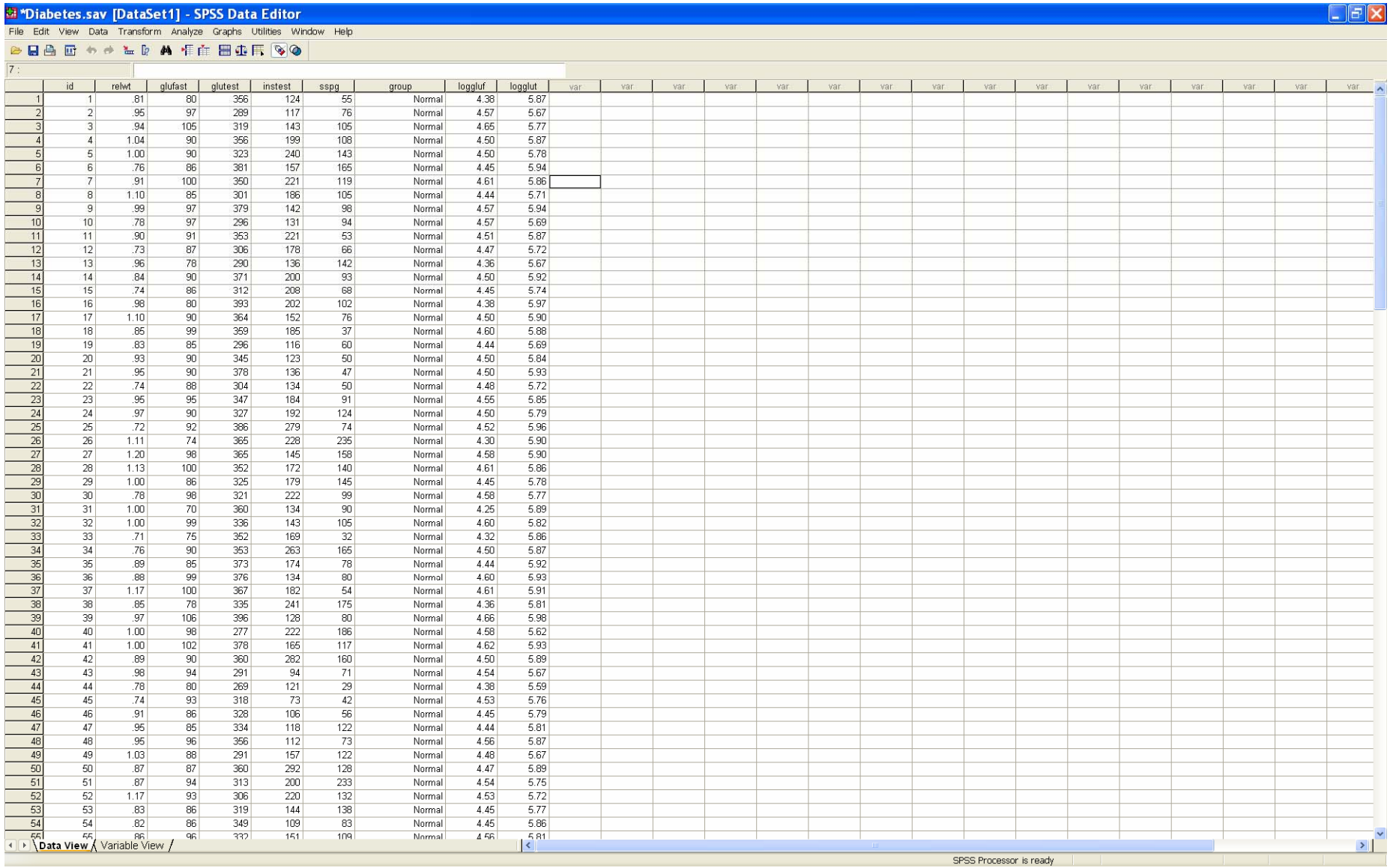


The log transformed variable **loggluf** is computed.



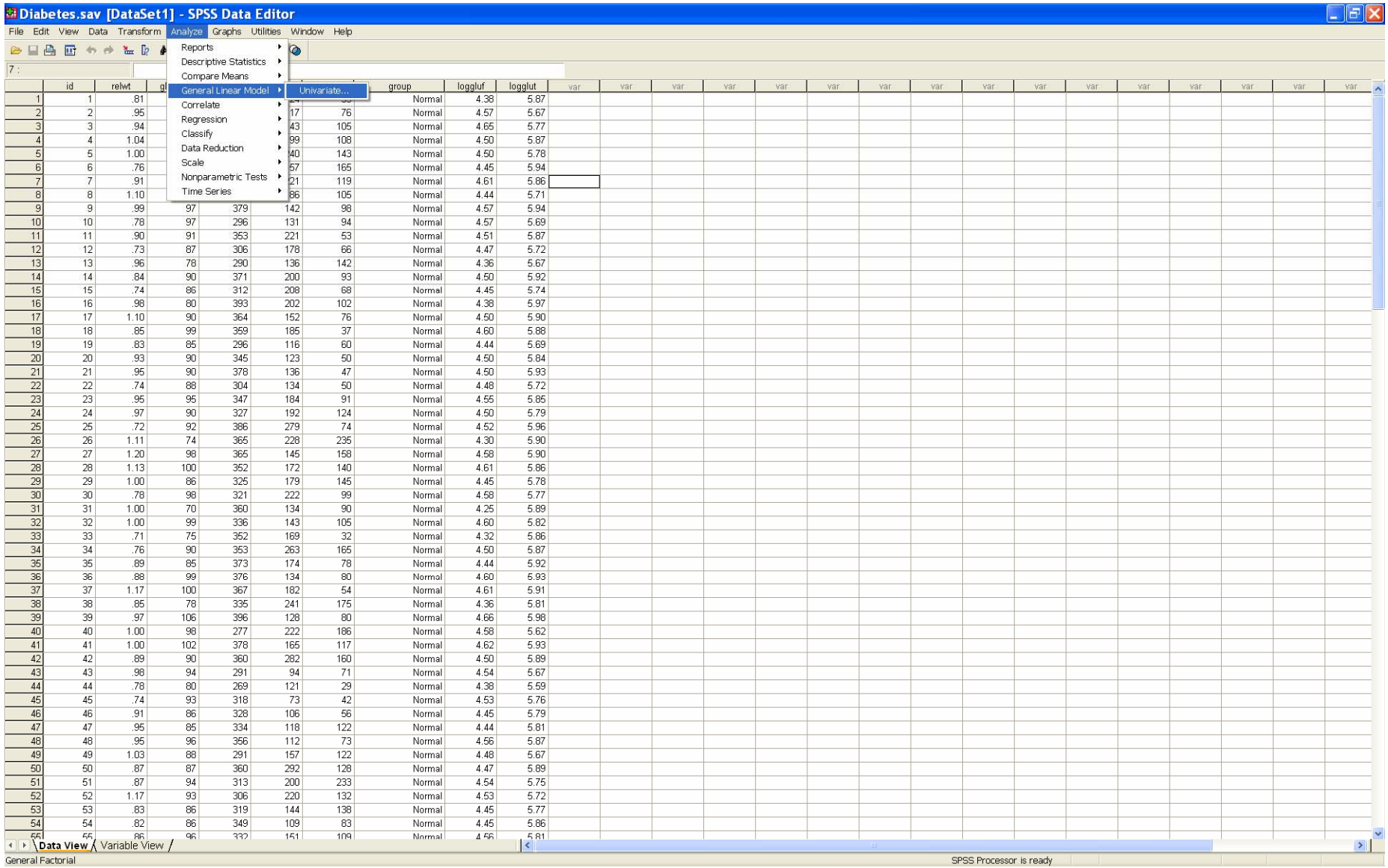
	id	relwt	glufast	glutest	instest	sspg	group	loggluf	logglut	var	var	var	var	var	var	var	var	var	var	var	var	var	var	var
1	1	.81	80	356	124	55	Normal	4.38	.															
2	2	.95	97	289	117	76	Normal	4.57	.															
3	3	.94	105	319	143	105	Normal	4.65	.															
4	4	1.04	90	356	199	108	Normal	4.50	.															
5	5	1.00	90	323	240	143	Normal	4.50	.															
6	6	.76	86	381	157	165	Normal	4.45	.															
7	7	.91	100	350	221	119	Normal	4.61	.															
8	8	1.10	85	301	186	105	Normal	4.44	.															
9	9	.99	97	379	142	98	Normal	4.57	.															
10	10	.78	97	296	131	94	Normal	4.57	.															
11	11	.90	91	353	221	53	Normal	4.51	.															
12	12	.73	87	306	178	66	Normal	4.47	.															
13	13	.96	78	290	136	142	Normal	4.36	.															
14	14	.84	90	371	200	93	Normal	4.50	.															
15	15	.74	86	312	208	68	Normal	4.45	.															
16	16	.98	80	393	202	102	Normal	4.38	.															
17	17	1.10	90	364	152	76	Normal	4.50	.															
18	18	.85	99	359	185	37	Normal	4.60	.															
19	19	.83	85	296	116	60	Normal	4.44	.															
20	20	.93	90	345	123	50	Normal	4.50	.															
21	21	.95	90	378	136	47	Normal	4.50	.															
22	22	.74	88	304	134	50	Normal	4.48	.															
23	23	.95	95	347	184	91	Normal	4.55	.															
24	24	.97	90	327	192	124	Normal	4.50	.															
25	25	.72	92	386	279	74	Normal	4.52	.															
26	26	1.11	74	365	228	235	Normal	4.30	.															
27	27	1.20	98	365	145	158	Normal	4.58	.															
28	28	1.13	100	352	172	140	Normal	4.61	.															
29	29	1.00	86	325	179	145	Normal	4.45	.															
30	30	.78	98	321	222	99	Normal	4.58	.															
31	31	1.00	70	360	134	90	Normal	4.25	.															
32	32	1.00	99	336	143	105	Normal	4.60	.															
33	33	.71	75	352	169	32	Normal	4.32	.															
34	34	.76	90	353	263	165	Normal	4.50	.															
35	35	.89	85	373	174	78	Normal	4.44	.															
36	36	.88	99	376	134	80	Normal	4.60	.															
37	37	1.17	100	367	182	54	Normal	4.61	.															
38	38	.85	78	335	241	175	Normal	4.36	.															
39	39	.97	106	396	128	80	Normal	4.66	.															
40	40	1.00	98	277	222	186	Normal	4.58	.															
41	41	1.00	102	378	165	117	Normal	4.62	.															
42	42	.89	90	360	282	160	Normal	4.50	.															
43	43	.98	94	291	94	71	Normal	4.54	.															
44	44	.78	80	269	121	29	Normal	4.38	.															
45	45	.74	93	318	73	42	Normal	4.53	.															
46	46	.91	86	328	106	56	Normal	4.45	.															
47	47	.95	85	334	118	122	Normal	4.44	.															
48	48	.95	96	356	112	73	Normal	4.56	.															
49	49	1.03	88	291	157	122	Normal	4.48	.															
50	50	.87	87	360	292	128	Normal	4.47	.															
51	51	.87	94	313	200	233	Normal	4.54	.															
52	52	1.17	93	306	220	132	Normal	4.53	.															
53	53	.83	86	319	144	138	Normal	4.45	.															
54	54	.82	86	349	109	83	Normal	4.45	.															
55	55	.86	96	332	151	109	Normal	4.56	.															

The same procedure computes the log transformed variable **logglut**; we log transform the glutest variable using the *Compute* pulldown

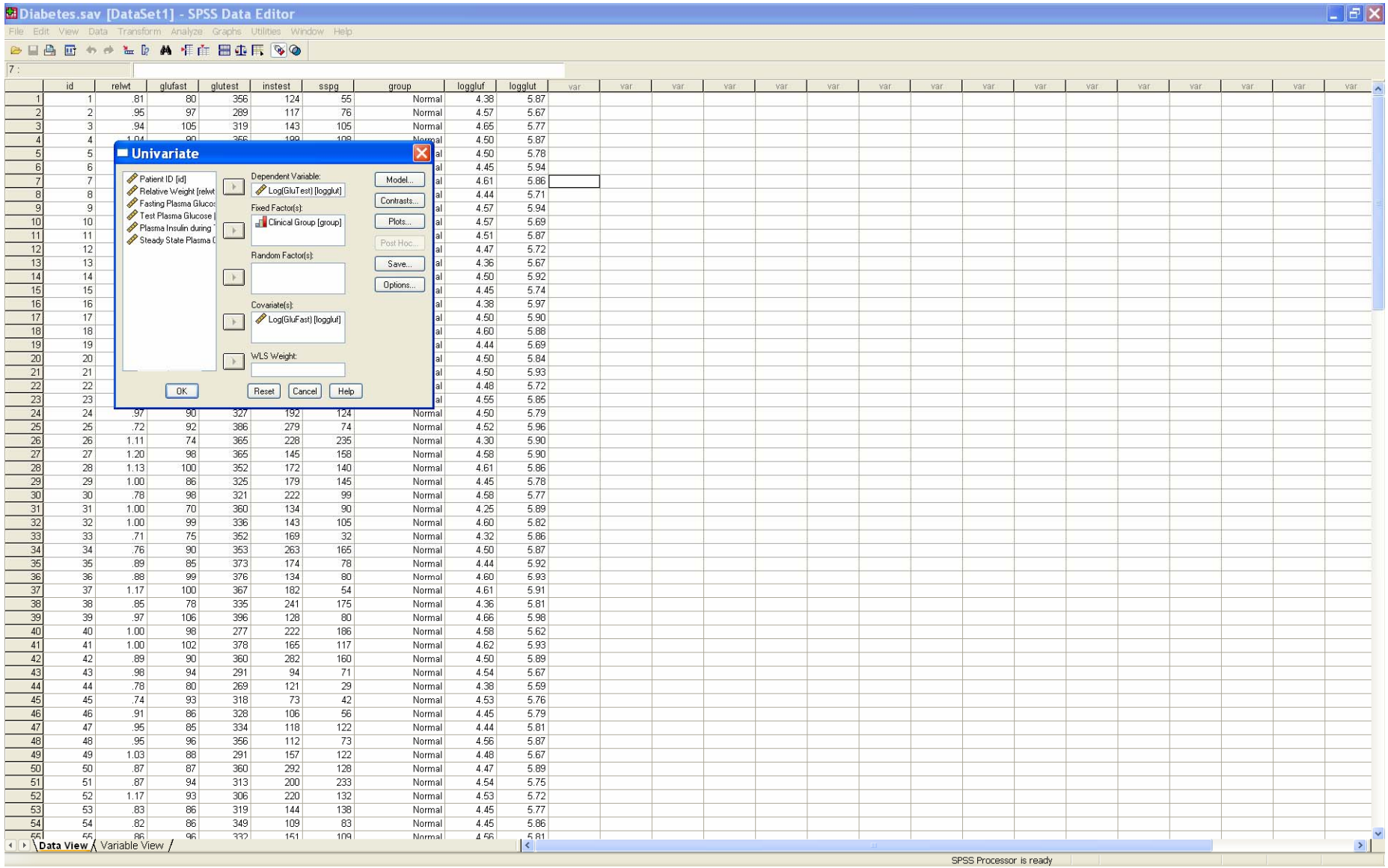


	id	relwt	glufast	glutest	instest	sspg	group	loggluf	logglut	var	var	var	var	var	var	var	var	var	var	var	var	var	var	var
1	1	.81	80	356	124	55	Normal	4.38	5.87															
2	2	.95	97	289	117	76	Normal	4.57	5.67															
3	3	.94	105	319	143	105	Normal	4.65	5.77															
4	4	1.04	90	356	199	108	Normal	4.50	5.87															
5	5	1.00	90	323	240	143	Normal	4.50	5.78															
6	6	.76	86	381	157	165	Normal	4.45	5.94															
7	7	.91	100	350	221	119	Normal	4.61	5.86															
8	8	1.10	85	301	186	105	Normal	4.44	5.71															
9	9	.99	97	379	142	98	Normal	4.57	5.94															
10	10	.78	97	296	131	94	Normal	4.57	5.69															
11	11	.90	91	353	221	53	Normal	4.51	5.87															
12	12	.73	87	306	178	66	Normal	4.47	5.72															
13	13	.96	78	290	136	142	Normal	4.36	5.67															
14	14	.84	90	371	200	93	Normal	4.50	5.92															
15	15	.74	86	312	208	68	Normal	4.45	5.74															
16	16	.98	80	393	202	102	Normal	4.38	5.97															
17	17	1.10	90	364	152	76	Normal	4.50	5.90															
18	18	.85	99	359	185	37	Normal	4.60	5.88															
19	19	.83	85	296	116	60	Normal	4.44	5.69															
20	20	.93	90	345	123	50	Normal	4.50	5.84															
21	21	.95	90	378	136	47	Normal	4.50	5.93															
22	22	.74	88	304	134	50	Normal	4.48	5.72															
23	23	.95	95	347	184	91	Normal	4.55	5.85															
24	24	.97	90	327	192	124	Normal	4.50	5.79															
25	25	.72	92	386	279	74	Normal	4.52	5.96															
26	26	1.11	74	365	228	235	Normal	4.30	5.90															
27	27	1.20	98	365	145	158	Normal	4.58	5.90															
28	28	1.13	100	352	172	140	Normal	4.61	5.86															
29	29	1.00	86	325	179	145	Normal	4.45	5.78															
30	30	.78	98	321	222	99	Normal	4.58	5.77															
31	31	1.00	70	360	134	90	Normal	4.25	5.89															
32	32	1.00	99	336	143	105	Normal	4.60	5.82															
33	33	.71	75	352	169	32	Normal	4.32	5.86															
34	34	.76	90	353	263	165	Normal	4.50	5.87															
35	35	.89	85	373	174	78	Normal	4.44	5.92															
36	36	.88	99	376	134	80	Normal	4.60	5.93															
37	37	1.17	100	367	182	54	Normal	4.61	5.91															
38	38	.85	78	335	241	175	Normal	4.36	5.81															
39	39	.97	106	396	128	80	Normal	4.66	5.98															
40	40	1.00	98	277	222	186	Normal	4.58	5.62															
41	41	1.00	102	378	165	117	Normal	4.62	5.93															
42	42	.89	90	360	282	160	Normal	4.50	5.89															
43	43	.98	94	291	94	71	Normal	4.54	5.67															
44	44	.78	80	269	121	29	Normal	4.38	5.59															
45	45	.74	93	318	73	42	Normal	4.53	5.76															
46	46	.91	86	328	106	56	Normal	4.45	5.79															
47	47	.95	85	334	118	122	Normal	4.44	5.81															
48	48	.95	96	356	112	73	Normal	4.56	5.87															
49	49	1.03	88	291	157	122	Normal	4.48	5.67															
50	50	.87	87	360	292	128	Normal	4.47	5.89															
51	51	.87	94	313	200	233	Normal	4.54	5.75															
52	52	1.17	93	306	220	132	Normal	4.53	5.72															
53	53	.83	86	319	144	138	Normal	4.45	5.77															
54	54	.82	86	349	109	83	Normal	4.45	5.86															
55	55	.86	96	332	151	109	Normal	4.56	5.81															

We now perform the linear regression using the *General Linear Model* pulldown.

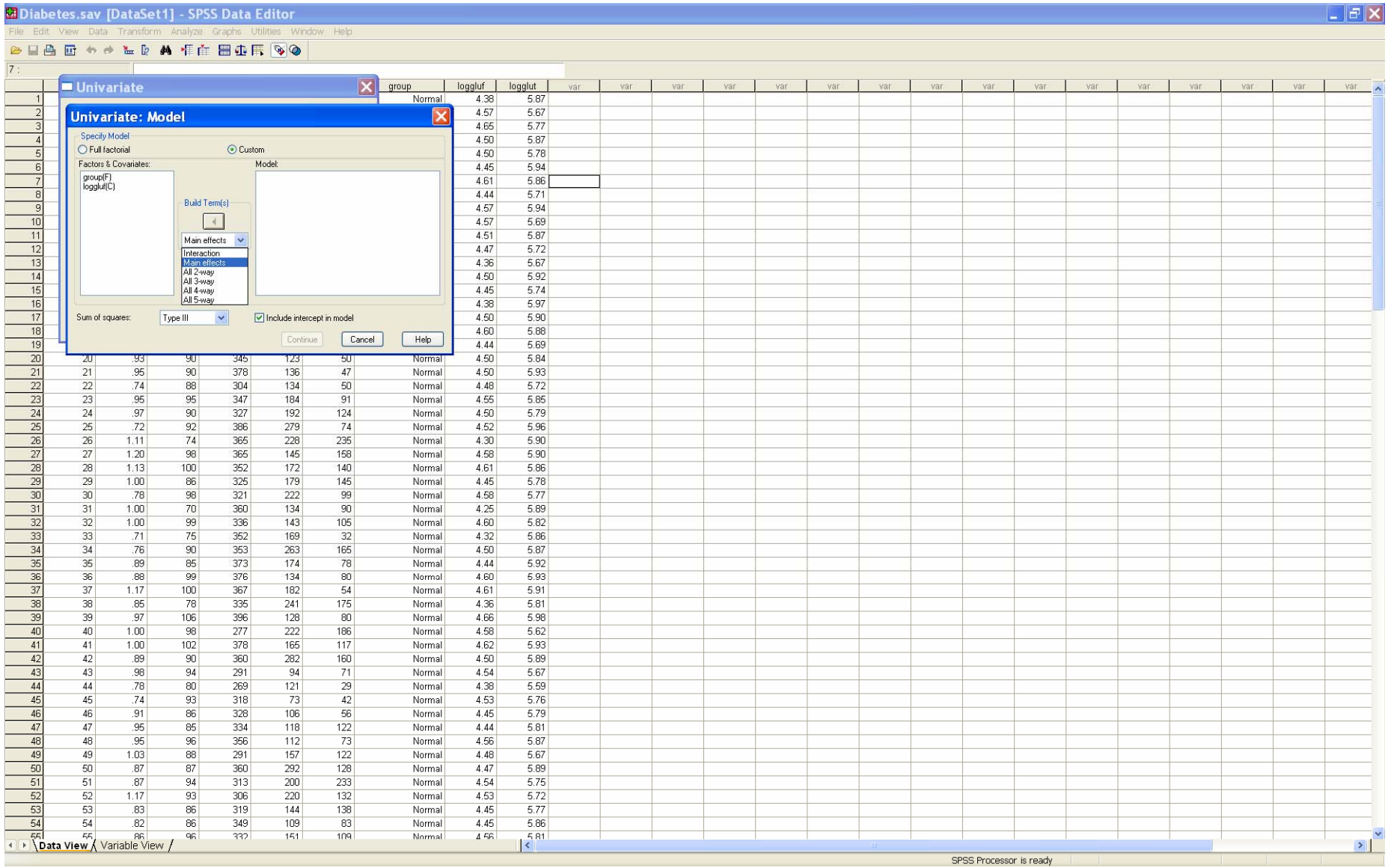


Select the *Dependent Variable* (**logglut**), the *Fixed Factor* (**grou**p) and the *Covariate* (**loggluf**).

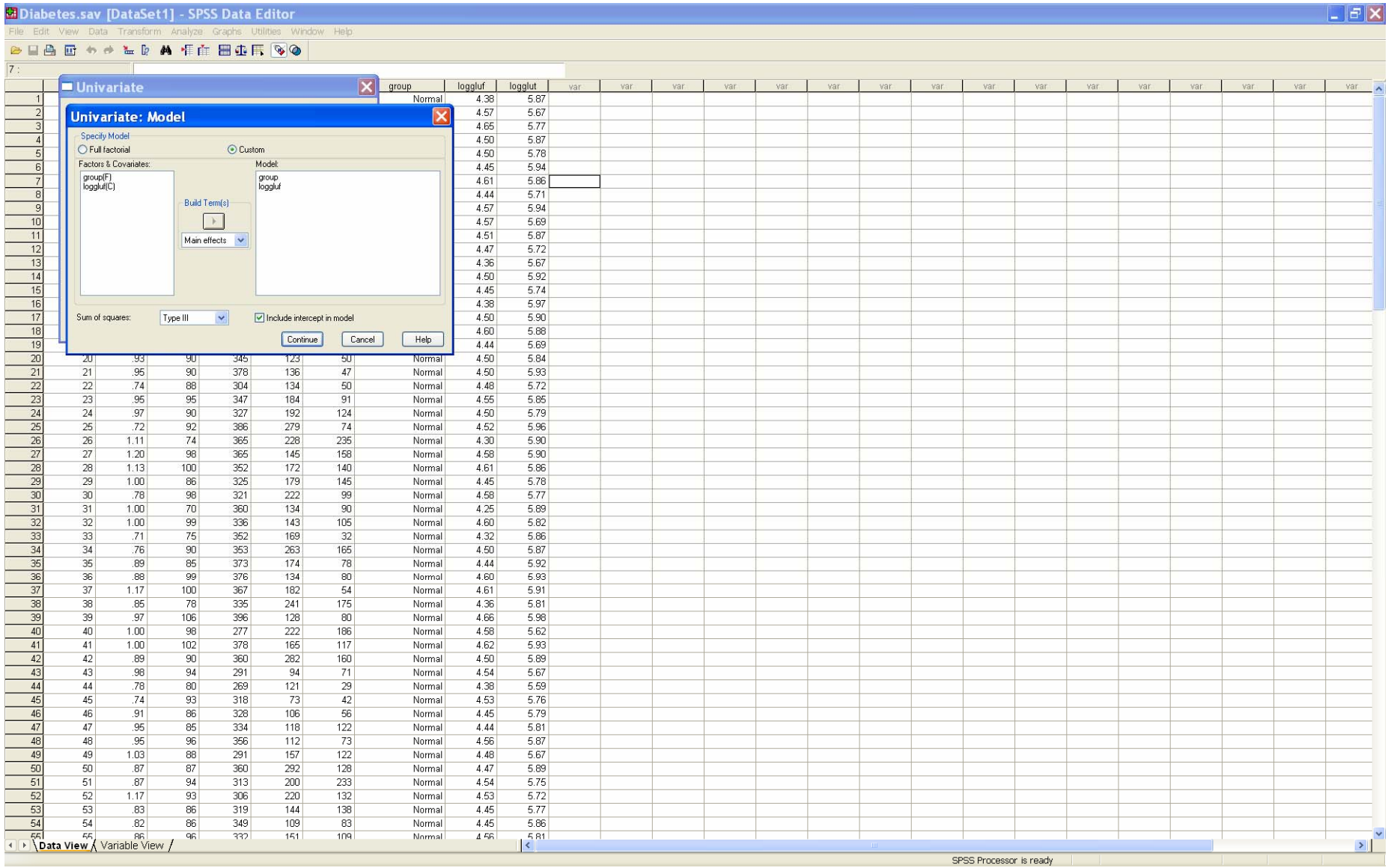


To specify the model, click the *Model* button to get the *Model Dialog*.

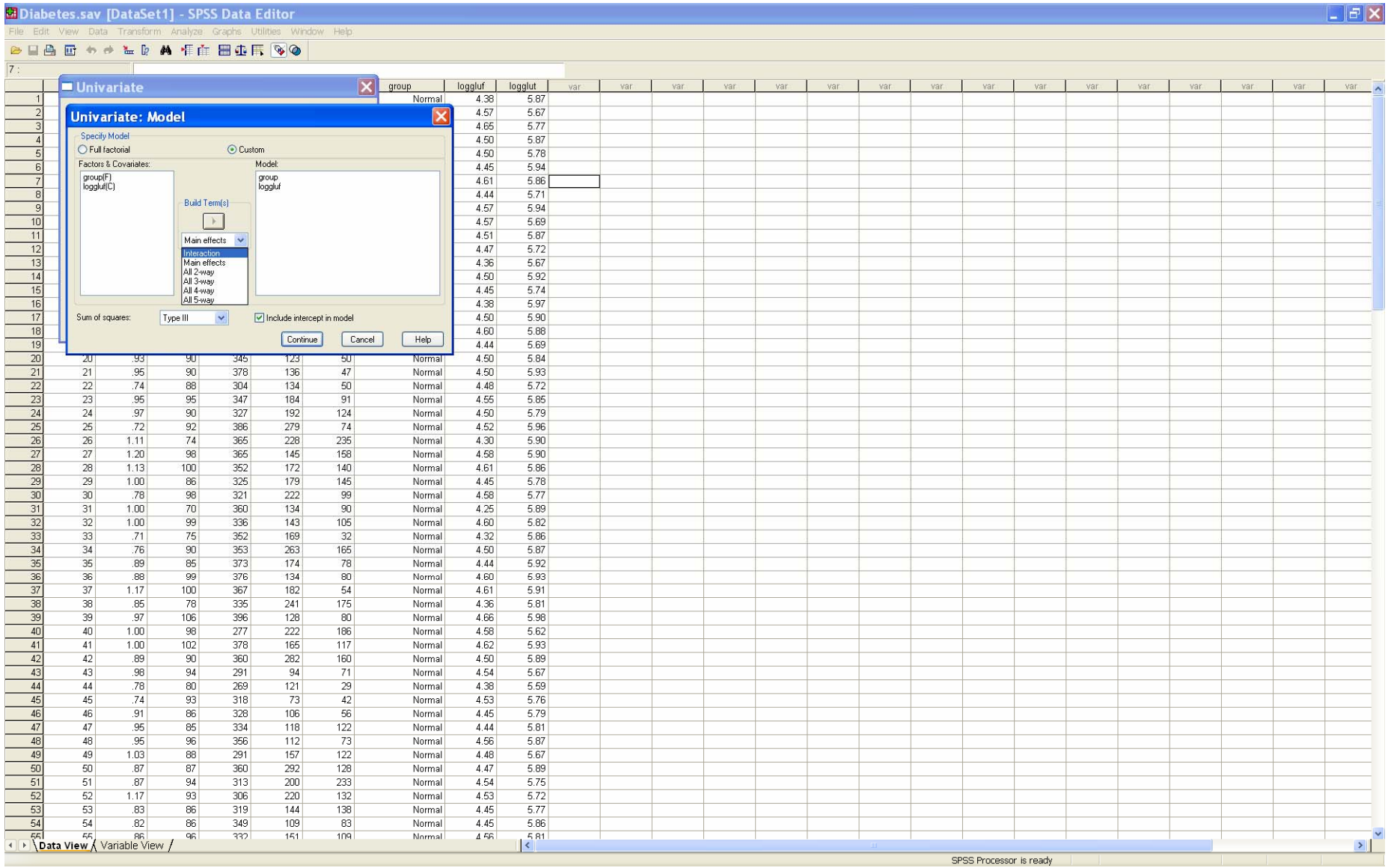
We wish to specify a *Custom* main effects plus interaction model.



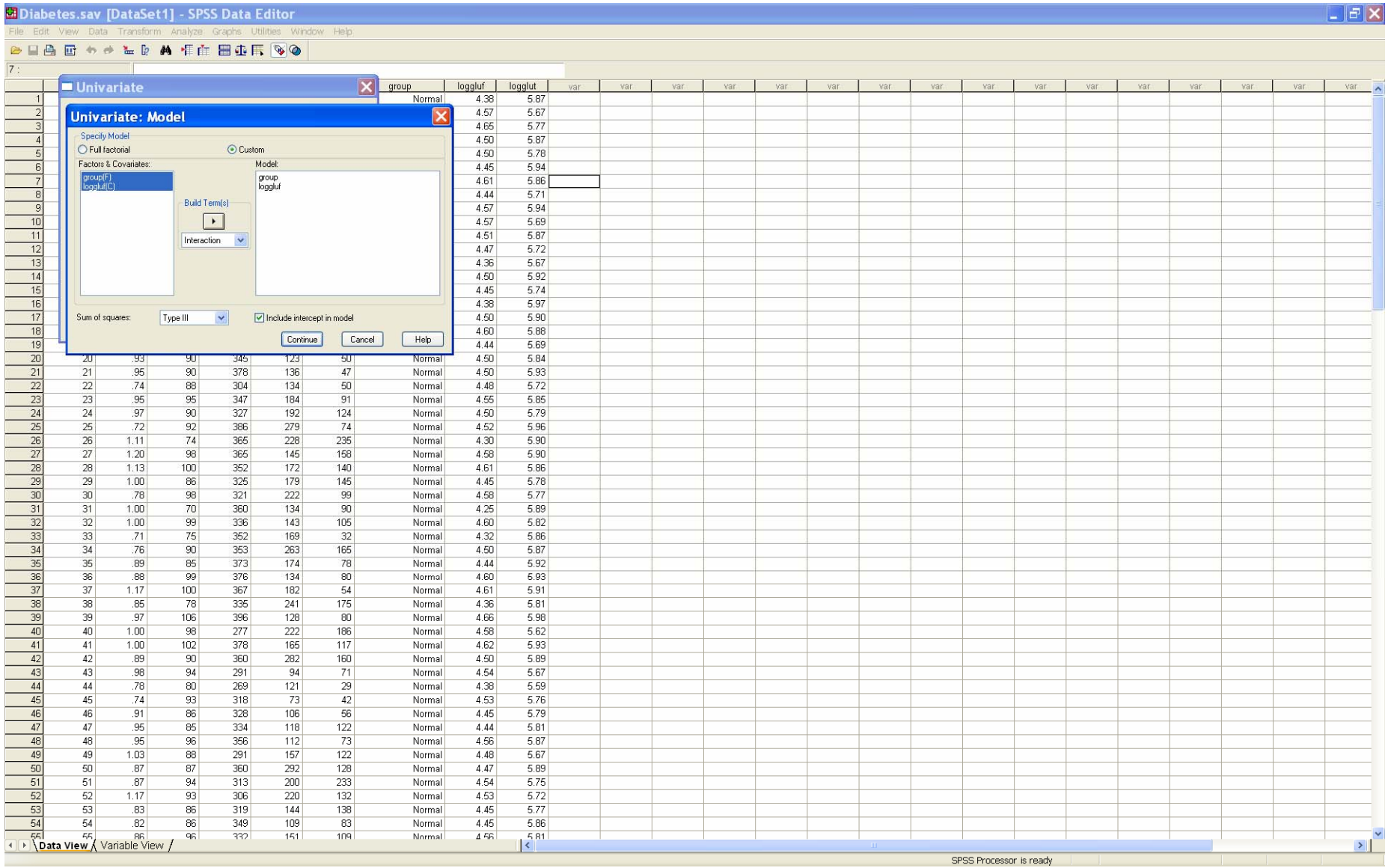
We select the factor and covariate as main effects.



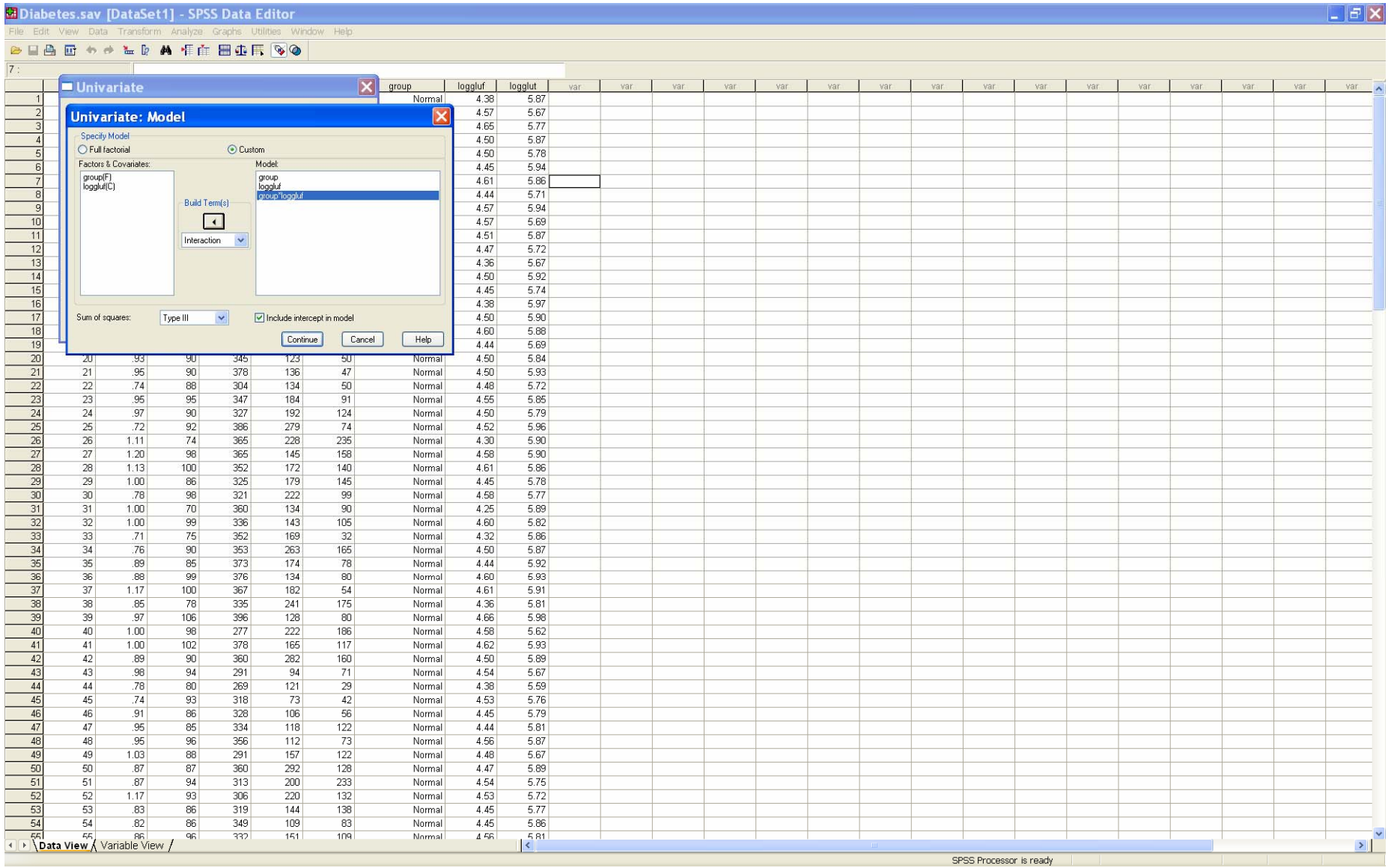
Select *Interaction* from the *Build Terms* pulldown.



Highlight the two variables, and click the *Build Terms* arrow.

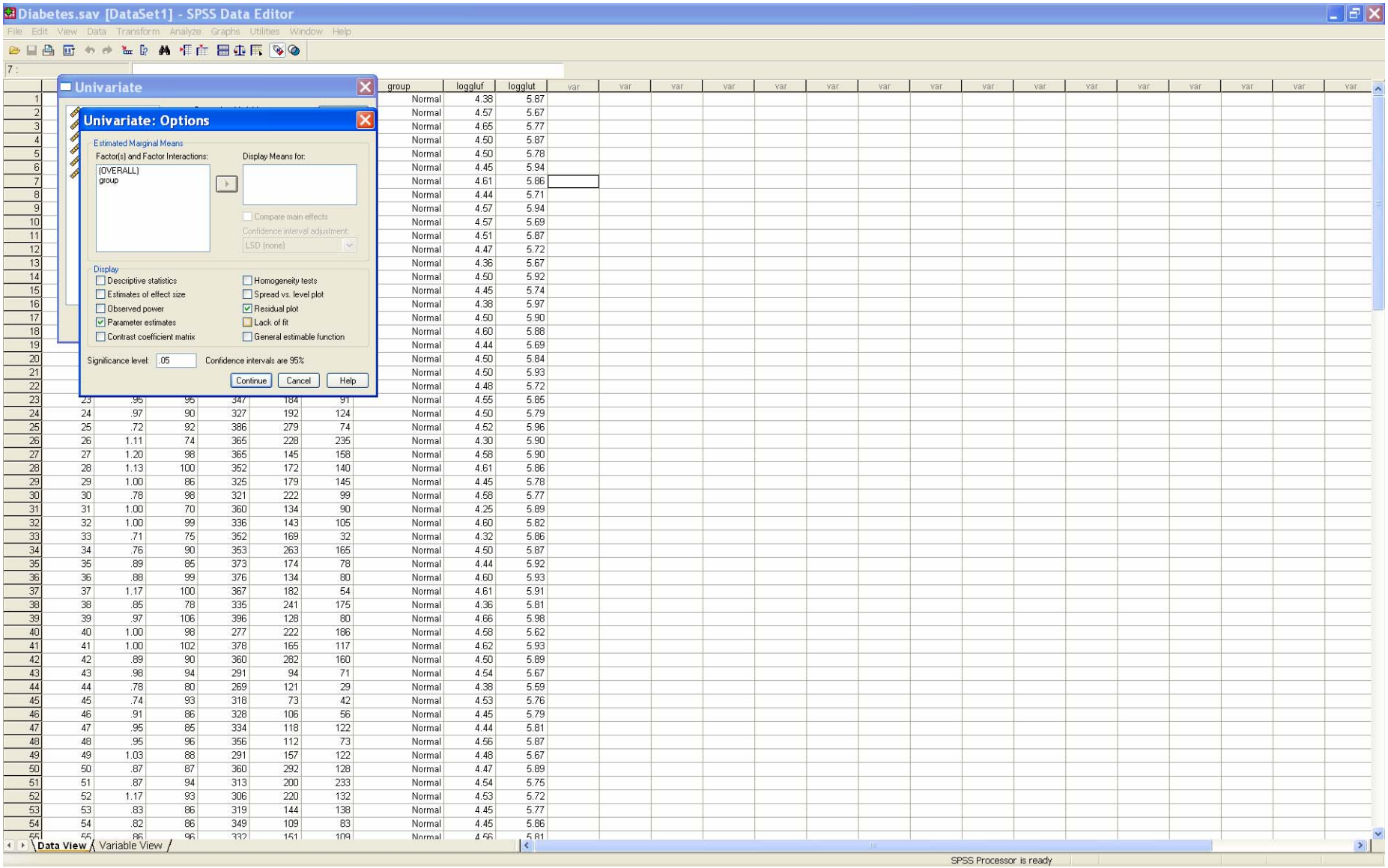


The *Custom* model has been built. Click *Continue*.

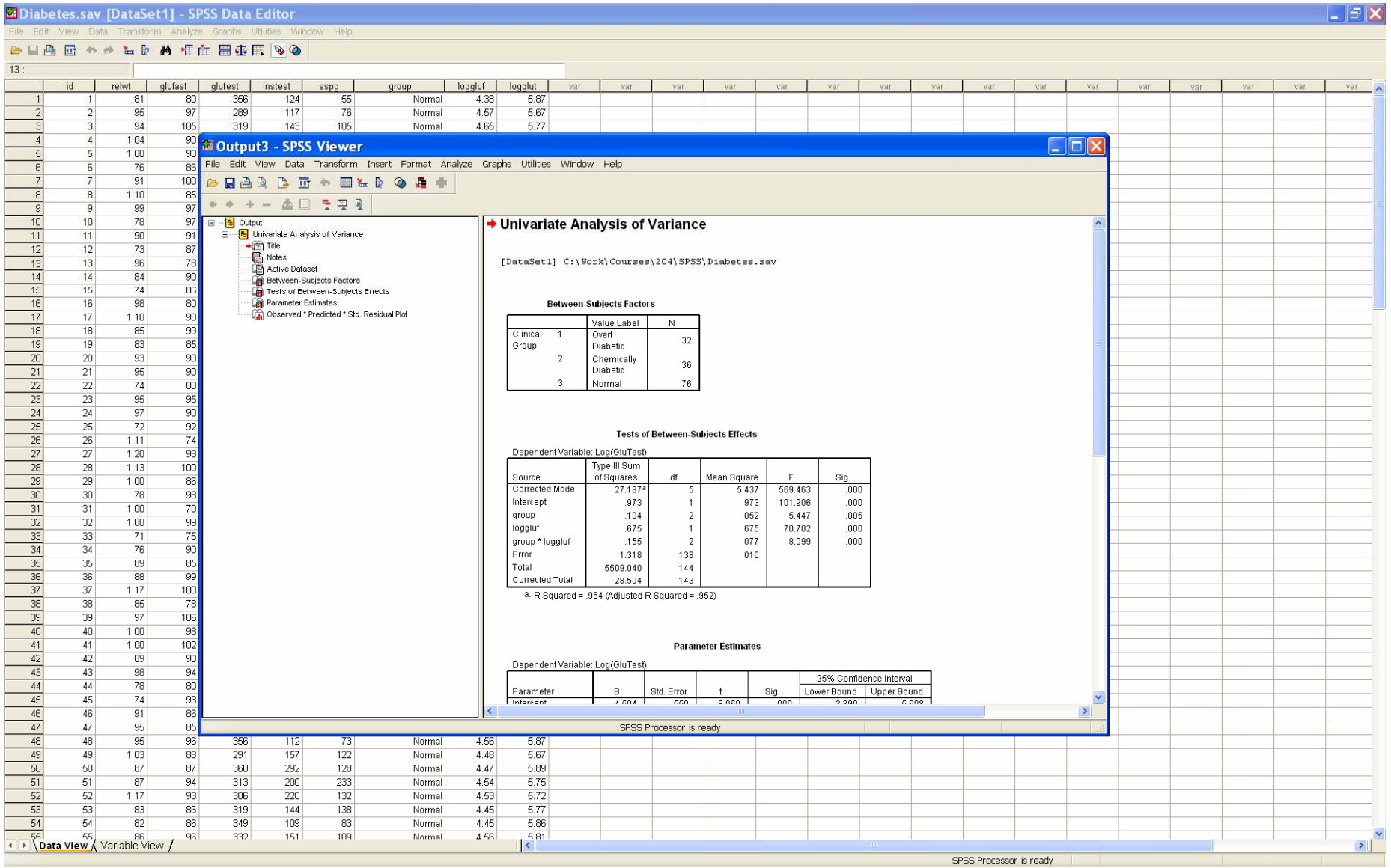


The model is now built. On the *General Linear Model* dialog, click *Options.*

Select *Parameter Estimates* and *Residual plot*



The output is generated.



The ANOVA table describes the results. It can be read in the same way as an ordinary ANOVA table. We note significant main effects and interaction.

Tests of Between-Subjects Effects

Dependent Variable: Log(GluTest)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27.187[a]	5	5.437	569.463	.000
Intercept	.973	1	.973	101.906	.000
group	.104	2	.052	5.447	.005
loggluf	.675	1	.675	70.702	.000
group * loggluf	.155	2	.077	8.099	.000
Error	1.318	138	.010		
Total	5509.040	144			
Corrected Total	28.504	143			

a. R Squared = .954 (Adjusted R Squared = .952)

The high R squared value means that the model fit is quite good overall.

The parameter estimates/standard errors are also computed.

The SPSS parameterization of the model is used.

Parameter Estimates

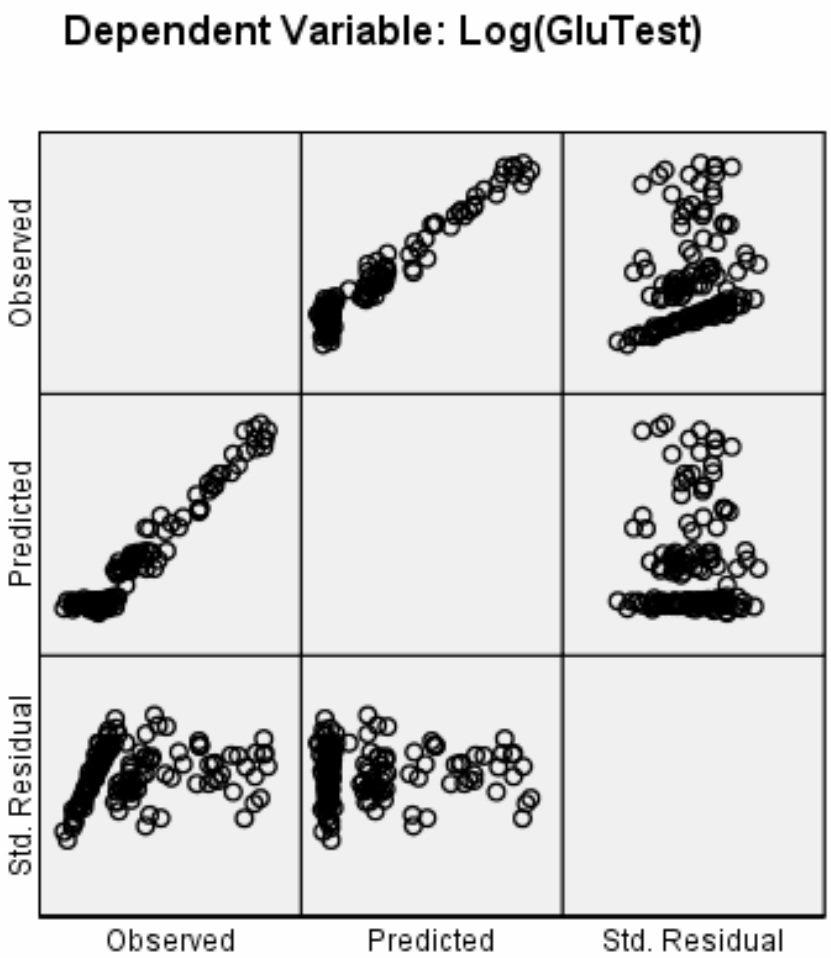
Dependent Variable: Log(GluTest)

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	4.504	.559	8.060	.000	3.399	5.608
[group=1]	-2.037	.619	-3.289	.001	-3.262	-.813
[group=2]	-1.436	.958	-1.499	.136	-3.330	.458
[group=3]	0[a]	.	.	.	.	.
loggluf	.299	.124	2.414	.017	.054	.544
[group=1] * loggluf	.535	.134	4.001	.000	.270	.799
[group=2] * loggluf	.382	.210	1.820	.071	-.033	.797
[group=3] * loggluf	0[a]	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

In the main effects plus interaction model, there are six parameters; we are fitting three separate straight lines to the three subgroups, and there are two parameters in each straight line.

The residual plots demonstrate no significant pattern.



No real pattern in the residuals indicates a reasonable fit.

However, there is mild evidence that the residual variance is not constant.

Model: Intercept + group + loggluf + loggluf