SPSS Chapter 7 Example 2 - Paired-Samples t Test

A student project investigated the design of controls for an instrument panel. 25 right-handed students were asked to turn two identical knobs, one with a right-hand thread and another with a left-hand thread, a fixed distance and the time for this task was measured in seconds.
The following data is used:

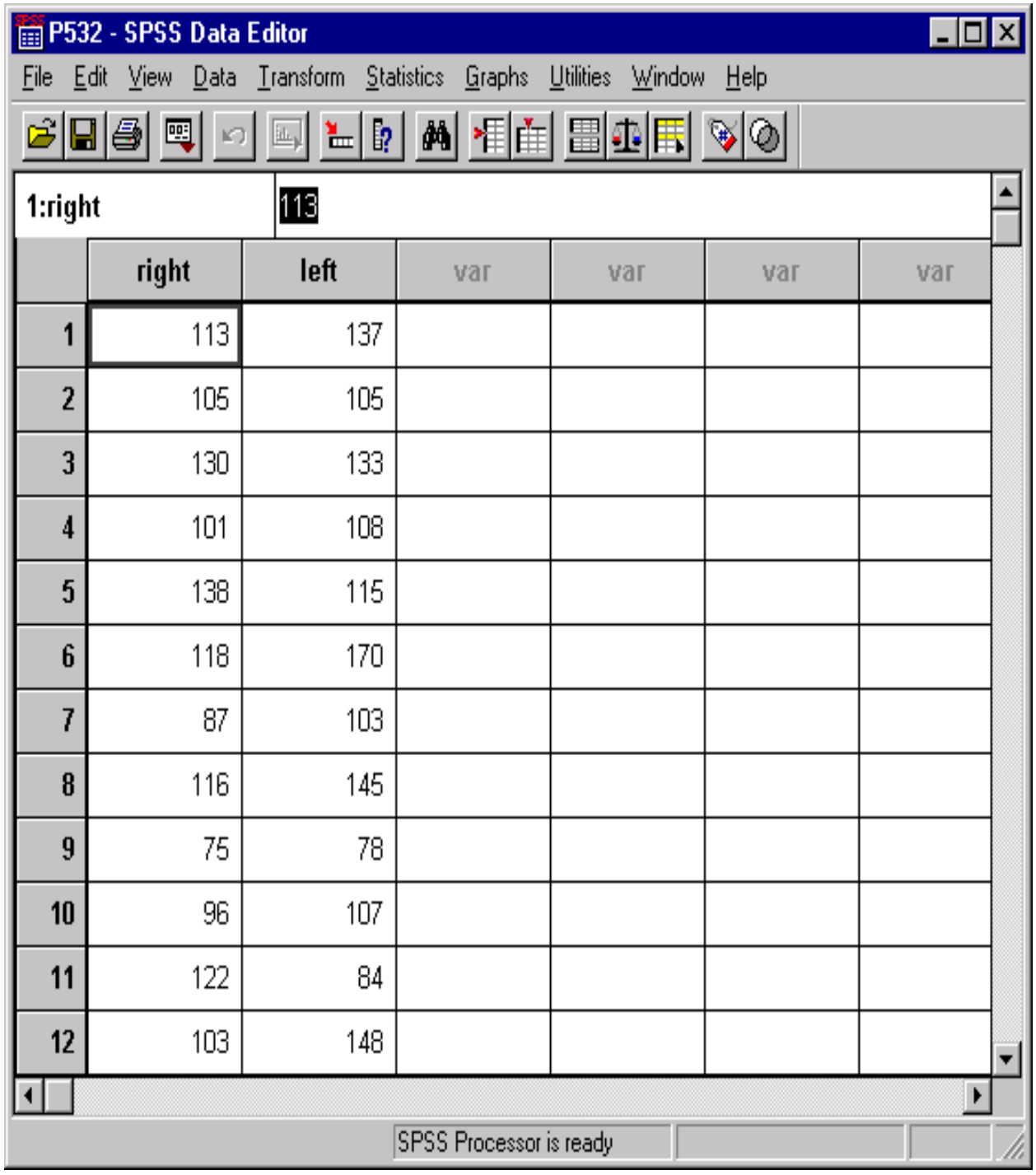
Subject	Right Thread	Left Thread	Subject	Right Thread	Left Thread
1	113	137	14	107	87
2	105	105	15	118	166
3	130	133	16	103	146
4	101	108	17	111	123
5	138	115	18	104	135
6	118	170	19	111	112
7	87	103	20	89	93
8	116	145	21	78	76
9	75	78	22	100	116
10	96	107	23	89	78
11	122	84	24	85	101
12	103	148	25	88	123
13	116	147			

We are testing the following:

H_0: $\mu_R - \mu_L = 0$

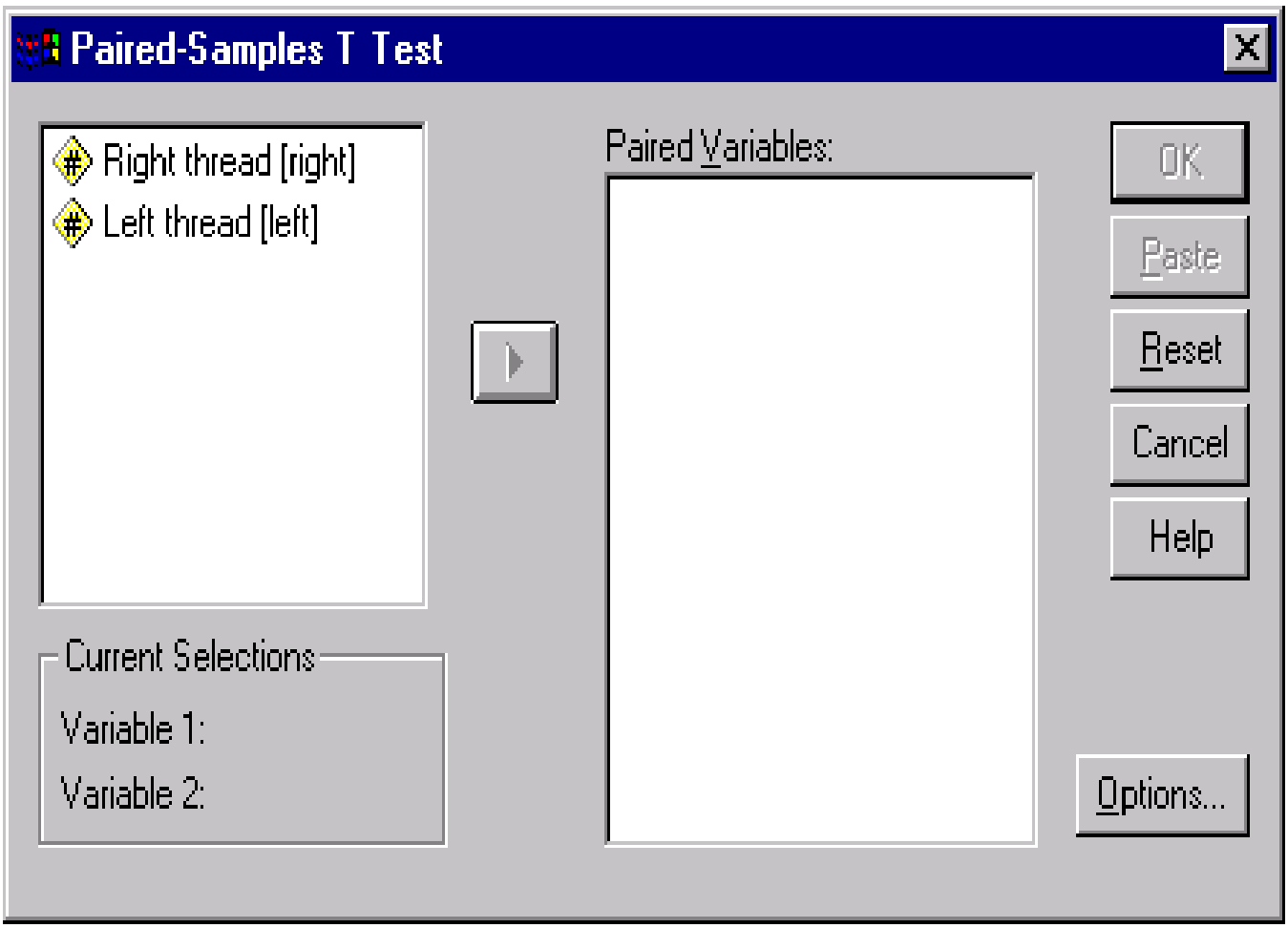
H_a: $\mu_R - \mu_L < 0$

The data were entered in SPSS and look like the following:



Follow these steps to perform this inferential statistic:

1. Click **Analyze**, click **Compare Means**, and click **Paired-Samples t Test**. The following window will appear.



2. Click "**right**" (a.k.a. "**right thread**") and it will appear next to ***Variable 1*** in the box entitled ***Current Selections***.

3. Click "**left**" (a.k.a. "**left thread**") and it will appear next to ***Variable 2*** in the box entitled ***Current Selections***.

4. Click ▸ and "**right-left**" will appear in the box entitled ***Paired Variables***.

5. A 95% confidence interval is the default for the Paired-Samples t Test. If you wish to change the confidence level, click **Options**, change "**95**" to the desired confidence level in the box entitled ***Confidence Interval***, and click **Continue**.

6. Click **OK**.

The SPSS output for this example of the Paired-Samples t Test is the following:

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Right thread	104.12	25	15.80	3.16
	Left thread	117.44	25	27.26	5.45

There are 25 pairs in this problem. The means are given above.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Right thread & Left thread	25	.542	.005

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Right thread -Left thread	-13.32	22.94	4.59	-22.79	-3.85	-2.904	24	.008

The difference between the right and left thread is -.13.32. The t statistic is testing H_0: $\mu_R - \mu_L = 0$, which in this example is t = –2.904 with 24 degrees of freedom. The p-value is .008, and this is strong evidence against H_0 that both right and left threads are equally difficult to thread. Note however the alternative hypothesis is One sided therefor we divide the probability by two(.008/2=.004). The pvalue is Smaller , .004 ,providing strong evidence against the null hypothesis.