STATISTIKA PENELITIAN

Paired Sample t test

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The paired-samples *t* test is used in **repeated measures** or **correlated groups** design, in which each subject is tested twice on the same variable. A common experiment of this type involves the *before and after* design. The test can also be used for the **matched group** design in which pairs of subjects that are matched on one or more characteristics (e.g., IQ, grades, and so forth) serve in the two conditions. As the subjects in the groups are matched and not independently assigned, this design is also referred to as a **correlated groups** design.

Checklist of Requirements

- In any one analysis, there must be only two sets of data.
- The two sets of data must be obtained from (1) the same subjects, or (2) from two matched groups of subjects.

Assumption

The sampling distribution of the means should be normal

Example

A researcher designed an experiment to test the effect of drug X on eating behavior. The amount of food eaten by a group of rats in a one-week period, prior to ingesting drug X, was recorded. The rats were then given drug X, and the amount of food eaten in a one-week period was again recorded. The following amounts of food in grams were eaten during the "before" and "after" conditions.

	Food Eaten	
	Before Ingesting Drug X	After Ingesting Drug X
s1	100	60
s2	180	80
s3	160	110
s4	220	140
s5	140	100
s6	250	200
s7	170	100
s8	220	180
s9	120	140
s10	210	130

Variables	Column	Code
• BEFORE	• 1	• Food eaten in grams
• AFTER	• 2	• Food eaten in grams

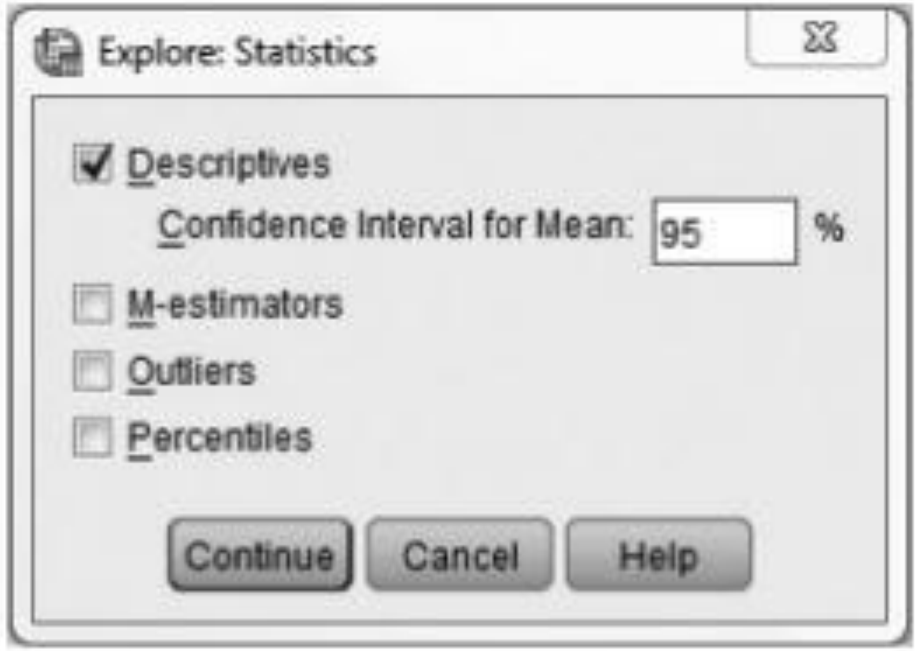
Testing Assumption

For the present example, normality will be tested using the normal Q–Q plot, the detrended normal Q–Q plot

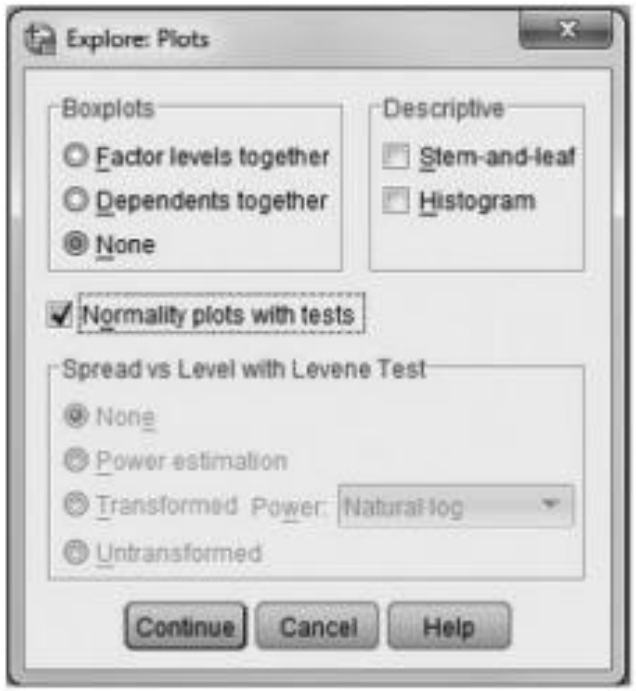
1. From the menu bar, click **Analyze**, then **Descriptive Statistics**, and then **Explore....** The following **Explore** window will open.

2. Transfer the **BEFORE** and **AFTER** variables to the **Dependent List:** field by clicking these variables (highlight) and then clicking .

3. Click Statistics... to open the **Explore: Statistics** window. Check the **Descriptives** field and click Continue to return to the **Explore** window.



4. In the **Explore** window click Plots... to open the **Explore: Plots** window. Check the **Normality plots with tests** field.

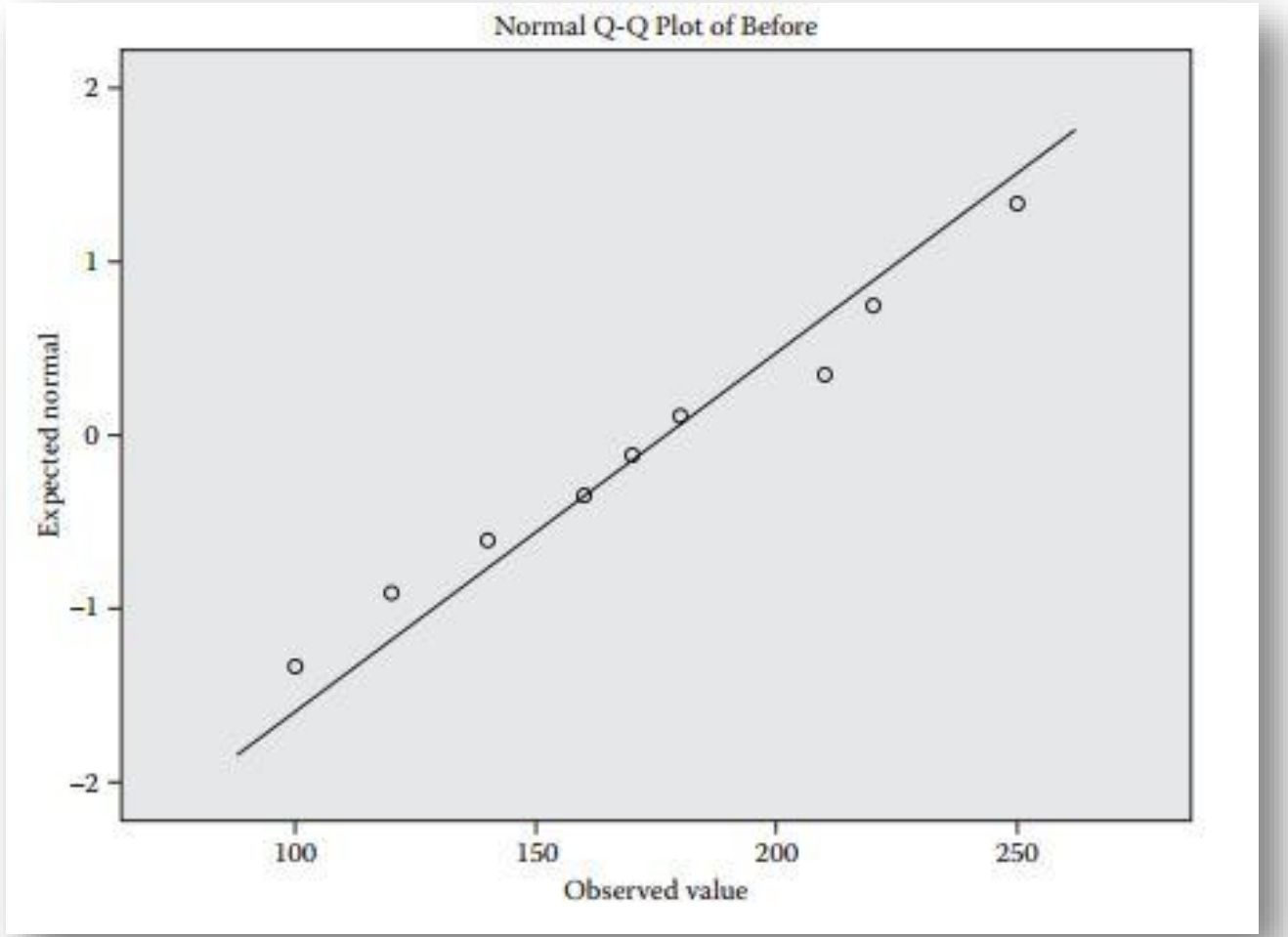


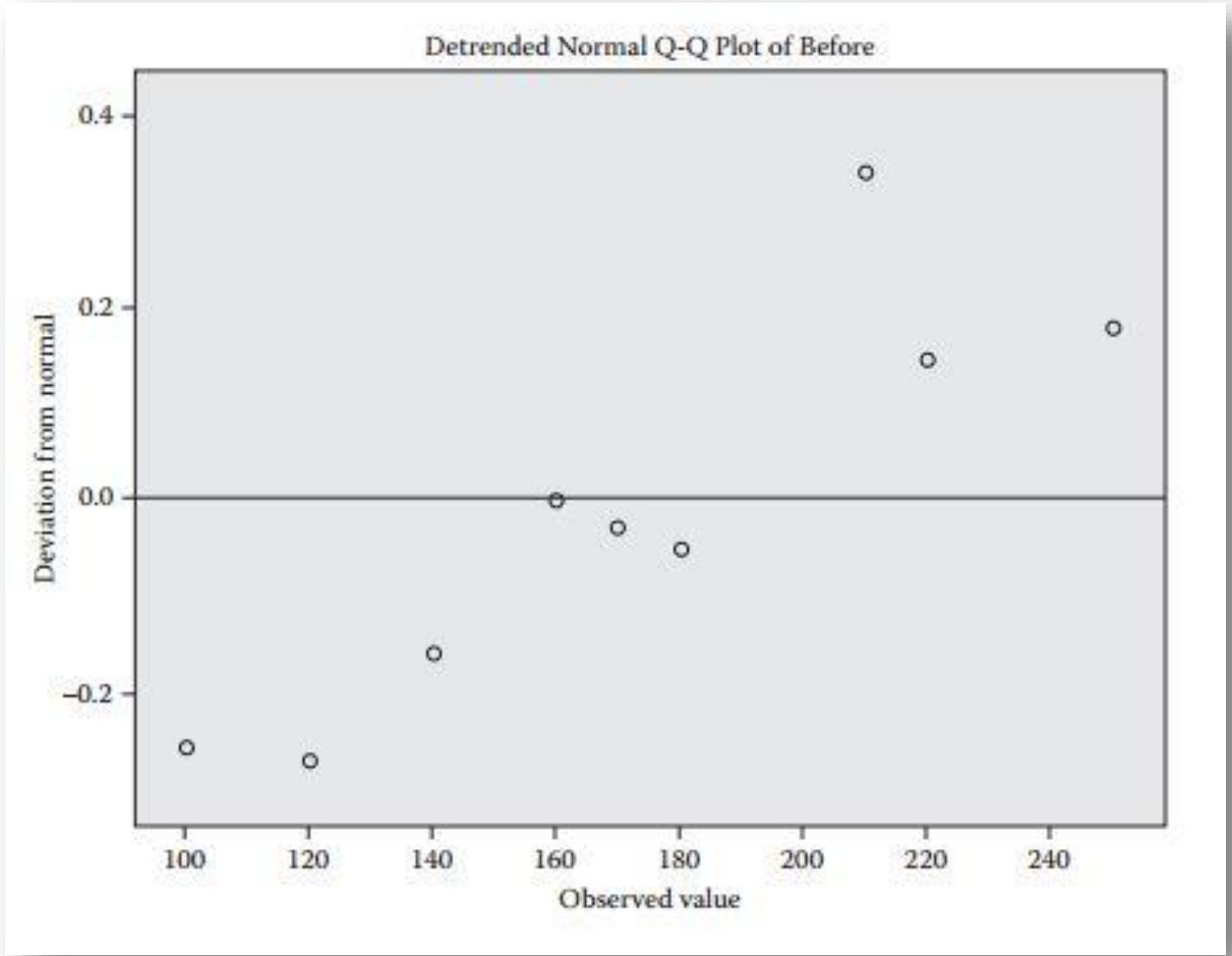
Click Plots... to return to the **Explore** window.

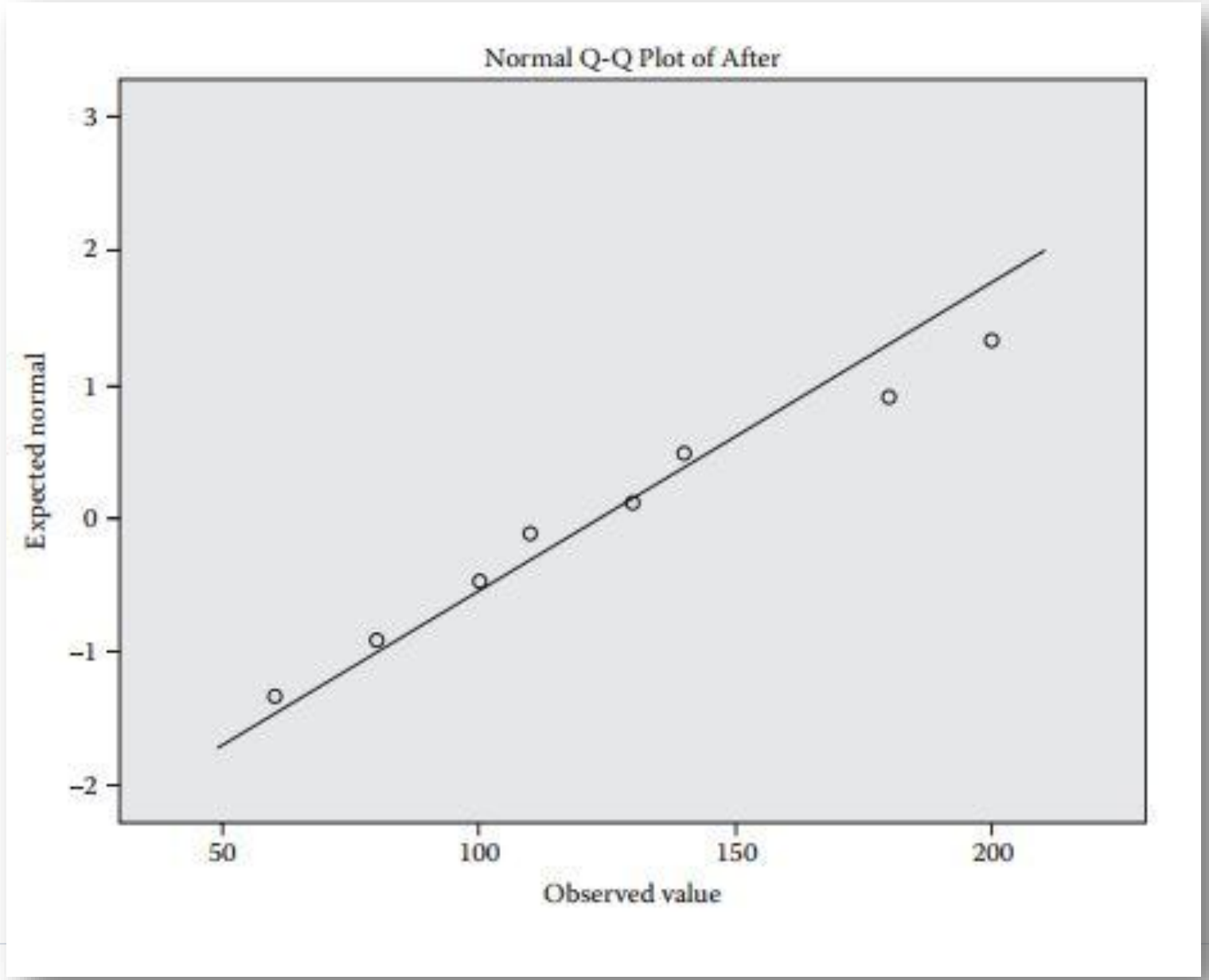
Explore Analysis (Selected) Output

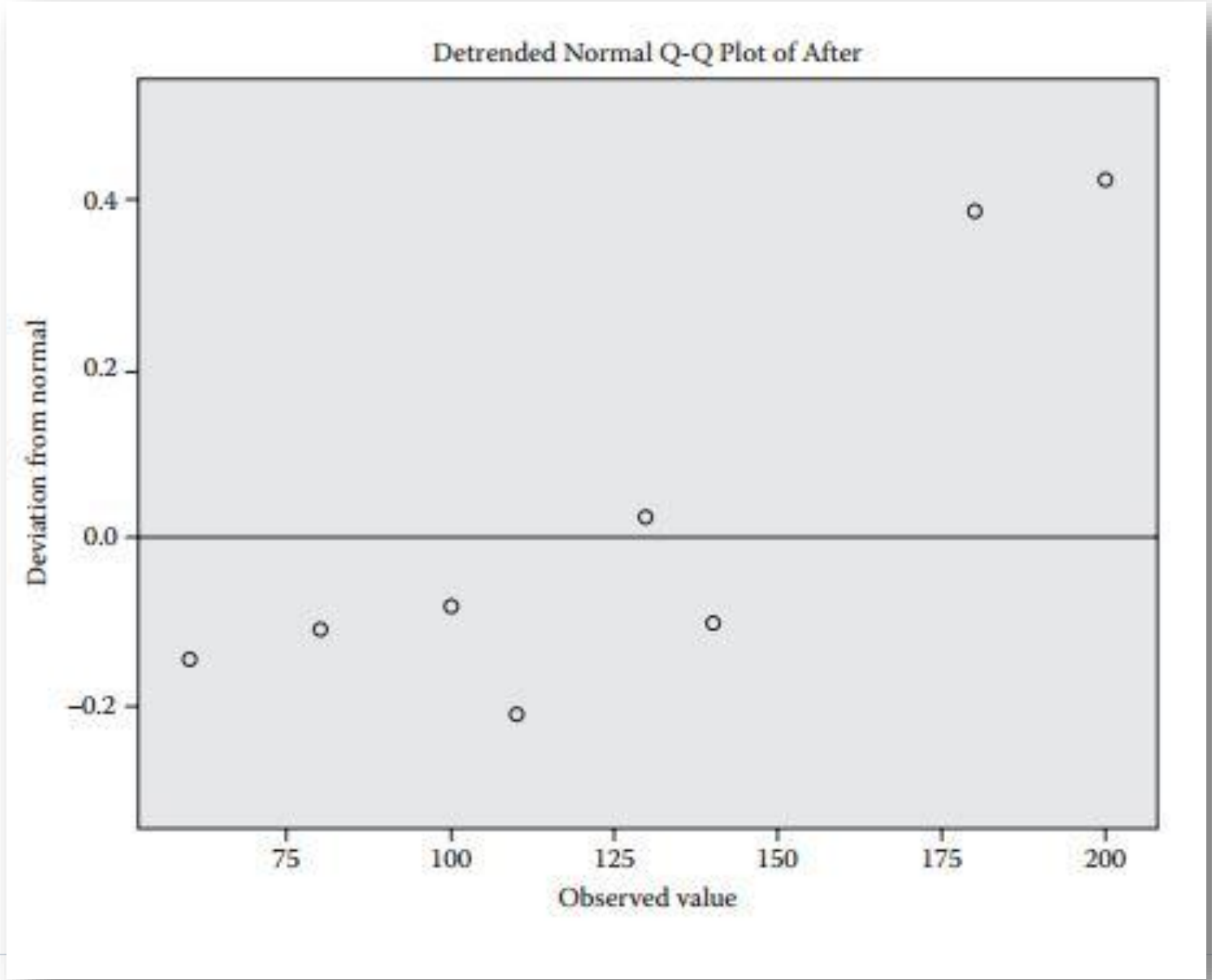
Descriptives

			Statistic	Std. Error
Before	Mean		177.0000	15.27889
	95% confidence interval for mean	Lower bound	142.4368	
		Upper bound	211.5632	
	5% trimmed mean		177.2222	
	Median		175.0000	
	Variance		2334.444	
	Std. deviation		48.31609	
	Minimum		100.00	
	Maximum		250.00	
	Range		150.00	
	Interquartile range		85.00	
	Skewness		–0.140	0.687
	Kurtosis		–0.972	1.334
After	Mean		124.0000	13.67886
	95% confidence interval for mean	Lower bound	93.0563	
		Upper bound	154.9437	
	5% trimmed mean		123.3333	
	Median		120.0000	
	Variance		1871.111	
	Std. deviation		43.25634	
	Minimum		60.00	
	Maximum		200.00	
	Range		140.00	
	Interquartile range		55.00	
	Skewness		0.421	0.687
	Kurtosis		–0.315	1.334


Normal Q-Q Plot of Before
Expected normal
2
1
0
−1
−2
100
150
200
250
Observed value


Detrended Normal Q-Q Plot of Before
Deviation from normal
0.4
0.2
0.0
–0.2
100
120
140
160
180
200
220
240
Observed value


Normal Q-Q Plot of After
Expected normal
3
2
1
0
−1
−2
50
100
150
200
Observed value


Detrended Normal Q-Q Plot of After
Deviation from normal
0.4
0.2
0.0
–0.2
75
100
125
150
175
200
Observed value

Interpretation

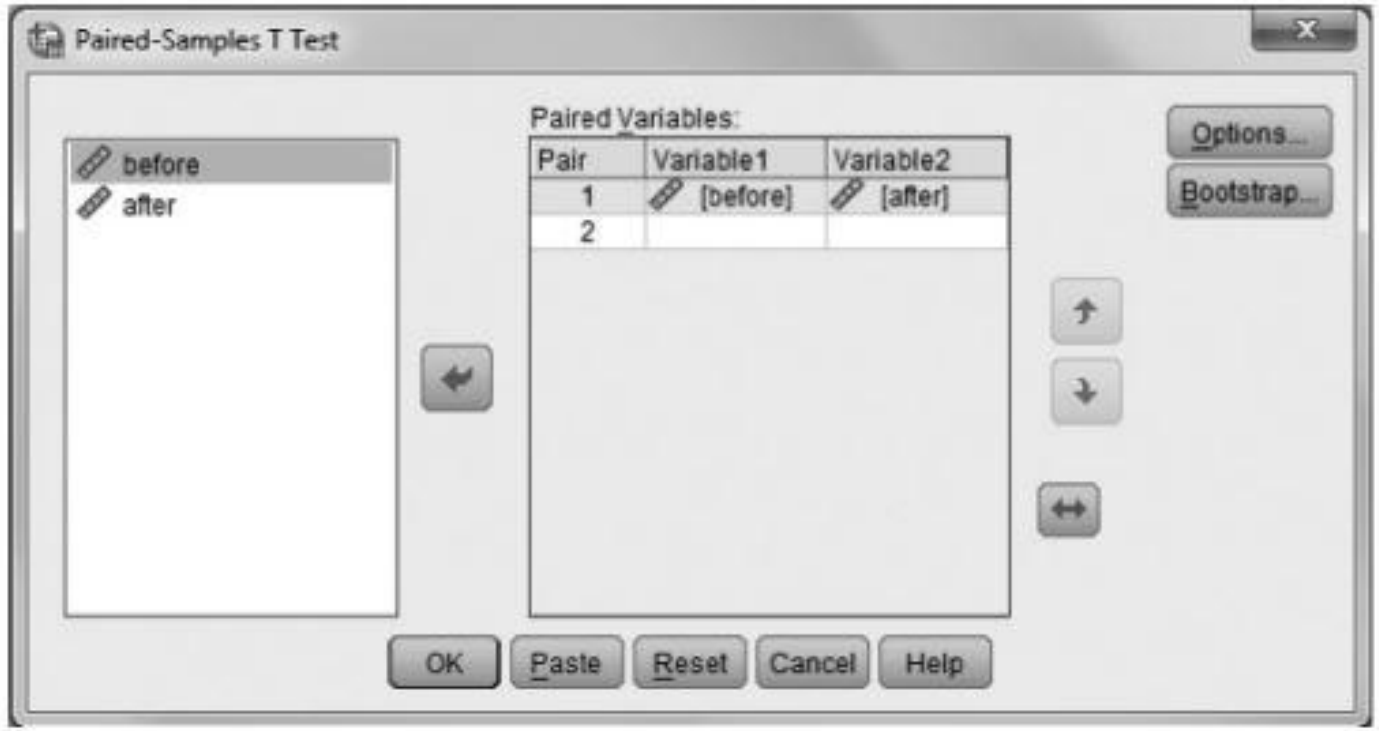
Another diagnostic test for normality is a visual check of the **Normal Q–Q Plot** that compares the cumulative distribution of the observed values with the expected values derived from the normal distribution. The normal distribution forms a straight diagonal line, and if a variable's distribution is normal, the data distribution will fall more or less on the diagonal. Inspection of the normal Q–Q plots shows very little departure from normality for both the **BEFORE** and **AFTER** variables.

Similarly, a visual check of the **Detrended Normal Q–Q Plot**, which plots the deviations of the scores from a straight line, shows little deviation from normality for both the **BEFORE** and **AFTER** variables.

Paired-Samples t Test

From the menu bar, click Analyze, then Compare Means, and then Paired-Samples t Test. The following window will open.

2. Transfer both the **BEFORE** and **AFTER** variables to the **Paired Variables:** field by clicking (highlight) these two variables, and then clicking ➔. Click OK to run the *t* Test analysis. See Table 5.2 for the results.



Paired-Samples *t* Test Output

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before	177.0000	10	48.31609	15.27889
	After	124.0000	10	43.25634	13.67886

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Before and After	10	0.745	0.013

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Pair 1	before - after	53.00000	33.01515	10.44031	29.38239	76.61761	5.076	9	.001

Results and Interpretation

The result from the analysis indicates that there is a signifcant difference in the amount of food eaten before and after drug X was ingested, $t(df = 9) = 5.08$, $p < .01$ (see Paired Samples Test table). The mean values indicate that signifcantly less food was consumed after ingestion of drug X ($M = 124.00$) than before ($M = 177.00$)

Pengambilan Keputusan

- Jika Nilai probabilitas atau Sig. 2 tailed < 0,05 maka terdapat perbedaan yang signifikan.
- Sebaliknya Jika Nilai probabilitas atau Sig. 2 tailed > 0,05, maka TIDAK terdapat perbedaan yang signifikan

Simpulkan Sendiri ……!!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Thank you!

Any questions?