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Application of "dependent t-test" by using SPSS for conducting physical education researches

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Abstract
In the field of physical education, quantitative and qualitative researches are conducted. To analyze data parametric and non-parametric statistics are used. Parametric statistics are used in case of interval and ratio scale. Dependent t-test is parametric statistics used to compare two different observations of the same group. The assumption of normality is required to apply dependent t-test. If assumption of normality is not fulfilled, option of parallel non-parametric statistics is available.

Keywords: dependent t-test, normality, related samples

Introduction

Prologue

Dependent t-test is a Statistical technique used to find out significance difference among it means of two observations. In dependent "t-test", two related samples (two observation of the same group) are required and on the other hand in independent t-test, two independent samples are required. In this, additional assumption of homogeneity of variance in not required since there in no independence among the groups.

Example

A researcher wants to find out the effect of "Pranayama Practice" on "blood glucose level". Researcher used single group design, and collected "blood glucose" level twice i.e. before treatment (Pranayama Practice) and after treatment i.e. pre-test and post-test.

Table 1: Scores of "blood glucose level" before and after treatment i.e. pre and post-test.

S. No.	Blood Glucose level	
	Pre-test (O_1)	Post-test (O_2)
1.	94	91
2.	96	94
3.	92	91
4.	91	90
5.	96	92
6.	94	92
7.	93	91
8.	96	94
9.	99	96
10.	96	97
11.	94	93
12.	99	92
13.	96	94
14.	94	93
15.	99	96
16.	96	96
17.	92	91
18.	99	92
19.	96	94
20.	94	95
21.	99	99
22.	96	96
23.	93	92
24.	92	92
25.	91	90

Hypothesis

It is hypothesized that there shall not be any significant

difference among the means of two observations (Pre-test and Post-test).

Ho: $\mu^1 = \mu^2$

Objective

The objective is to find out the effect of Pranayama practice on glucose level.

Or the objective is to find out significance difference between two observations i.e. before pranayama practice and after pranayama practice in relation to "blood glucose level".

Subjects

Total 25 subjects are selected. Data were collected twice i.e. before treatment and after treatment (Pre and Post)

Analysis

1. In data view, two columns are used to feed data i.e. in first columns, scores of pre-test are entered and in column two, scores of post-test are entered.

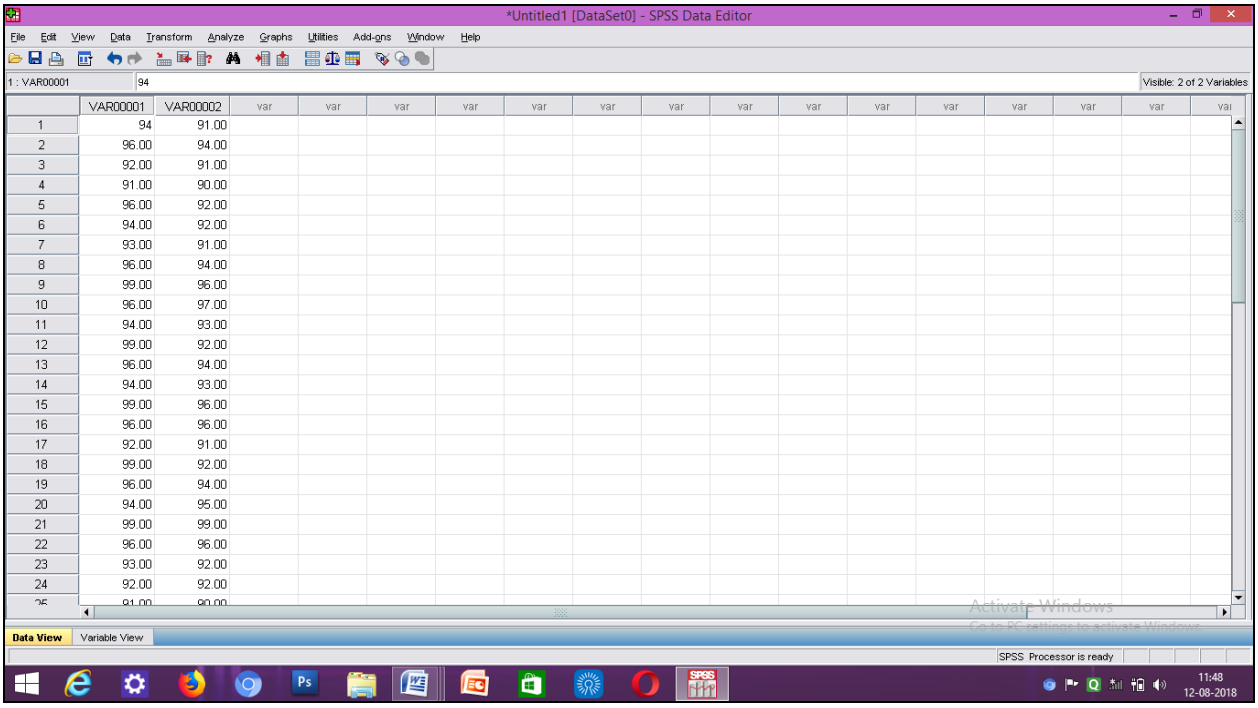

Fig 1: Data entry

2. In variable view, give name to both columns (first and second) i.e. pre to first column and post to second column.

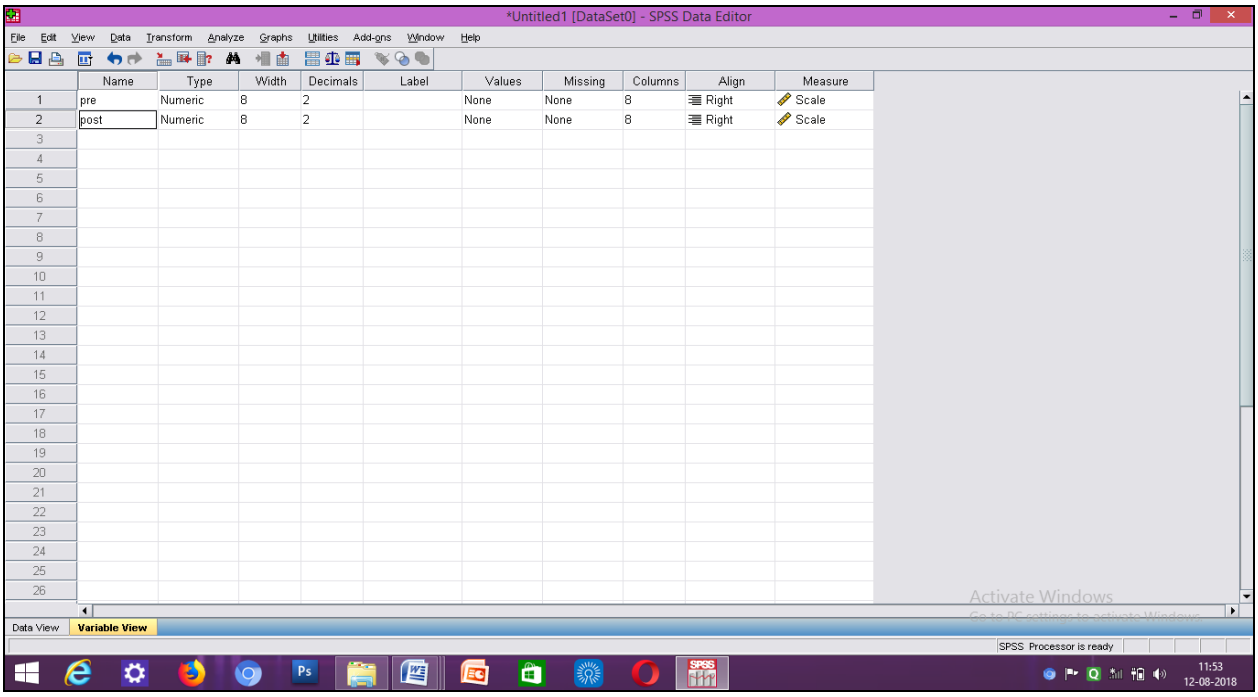

Fig 2: Naming columns in variable view.

3. Click on "Analyze"⟶ "Paired Samples T-test", and click.

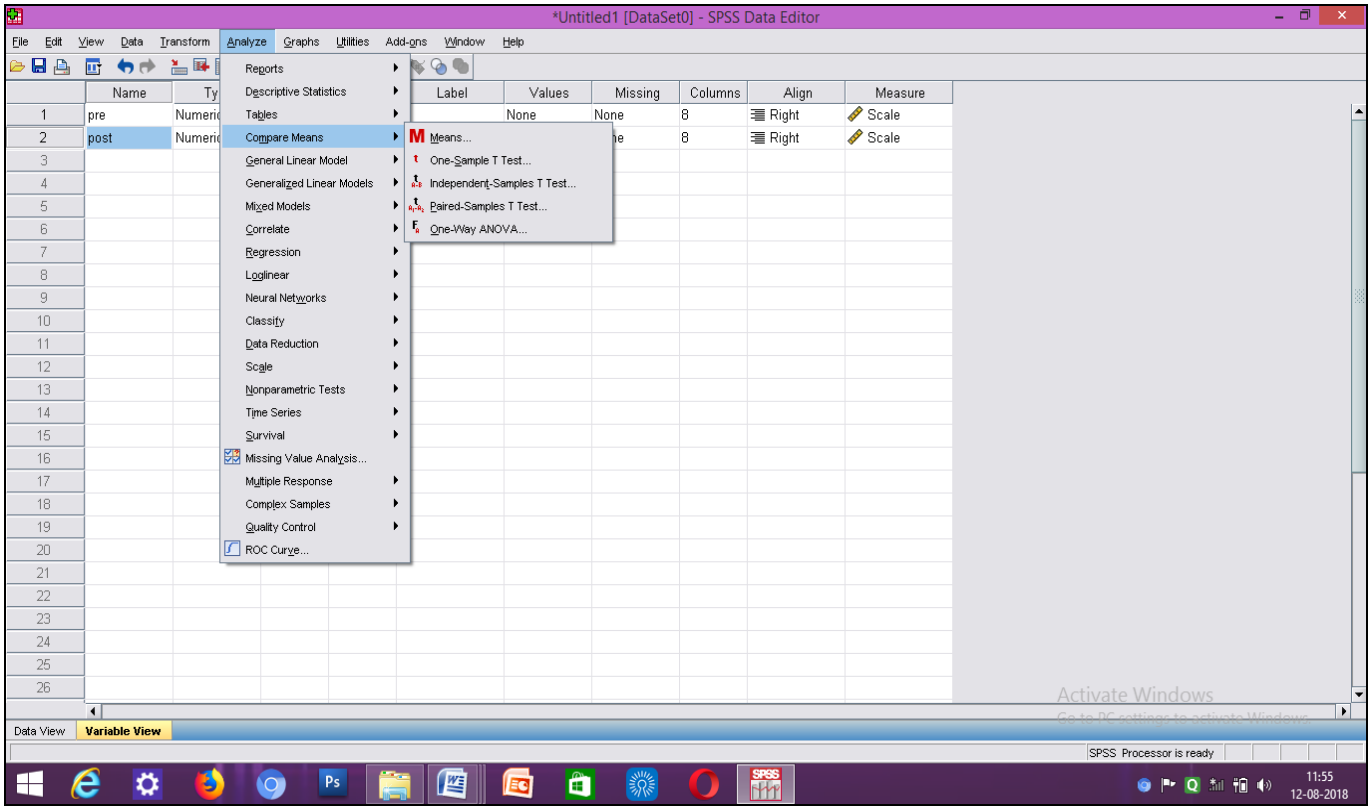

Fig 3: Selection of appropriate technique i.e. "Paired Samples T-test".

4. Insert pre and post in Paired Variables, a pair will be made.

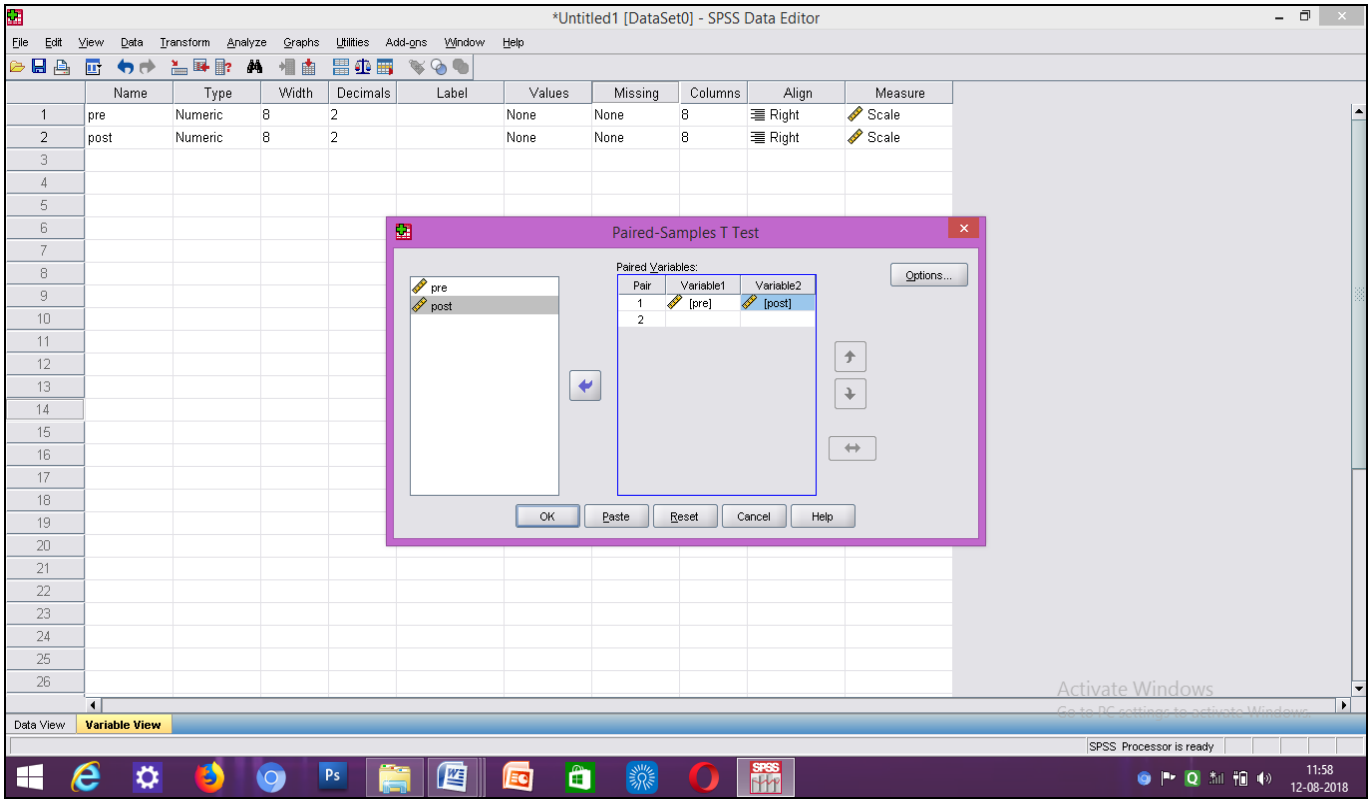

Fig 4: Pairing observations for analysis.

5. Click on “ok”, output will appear.

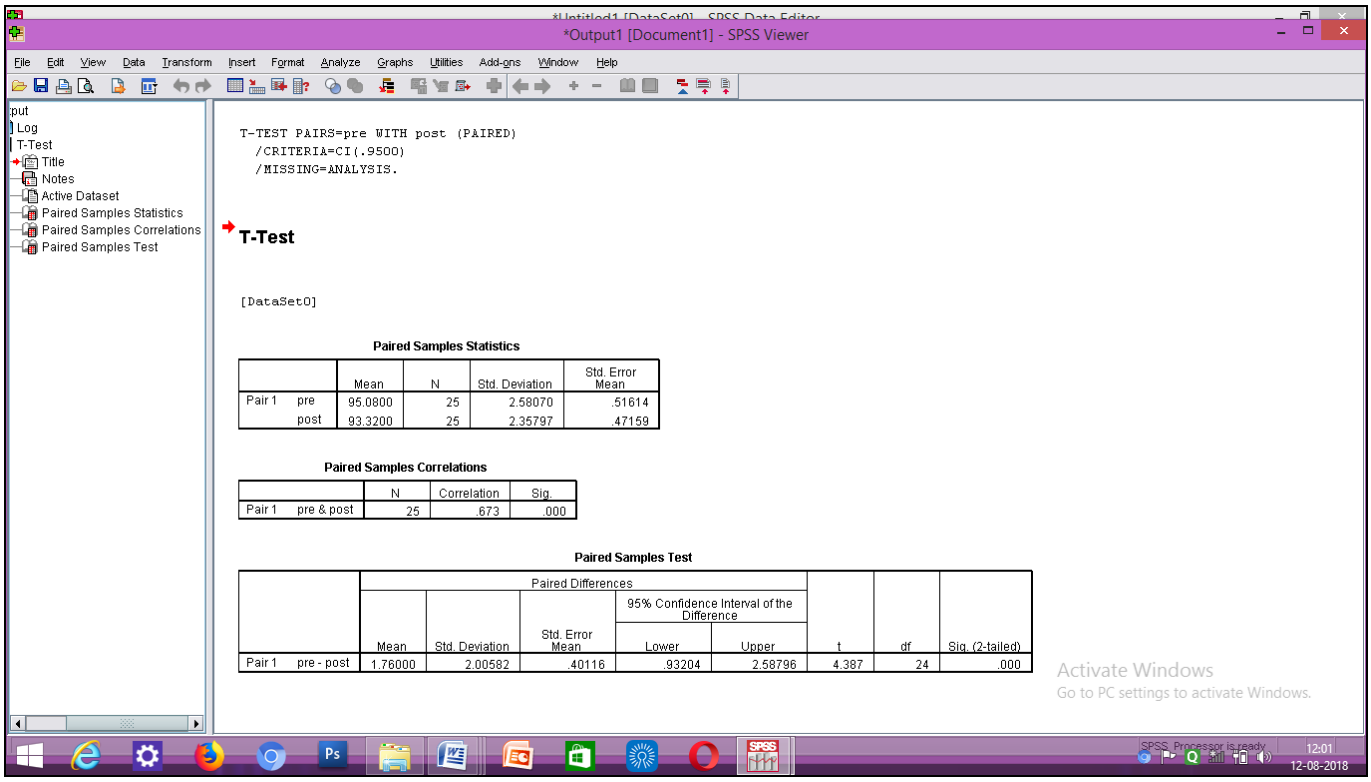

Fig 5: Output of dependent t-test i.e. “Paired Samples T-test”.

Interpretation of Results

Interpretation of results takes place on the basis of “t-value” and “significance level”. If t-value is significant at .05 level, significant difference occurs between the pre and post scores (O_1 & O_2), otherwise no significance difference occurs. In this hypothetical example significance difference is found between the pre and post test scores, since t value (4.387) is found significant at .05 level ($p < .05$). So significant effect (Blood glucose level is reduced after treatment, concluded on the basis of pre and post-test means) of Pranayama Practice is found on blood glucose level, hence formulated hypothesis is not accepted.

If normality of data is not found parallel non parametric technique i.e. “Wilcoxon Signed rank test” should be used.

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