

FRIEDMAN'S TEST



DR. SANGEETA MOHANTY

FRIEDMAN'S TEST IS AN EXTENSION OF THE WILCOXON TEST. WILCOXON TEST CAN BE APPLIED TO REPEATED-MEASURES DATA IF PARTICIPANTS ARE ASSESSED ON TWO OCCASIONS OR MATCHED IN PAIRS. IN CONTRAST, FRIEDMAN'S TEST ALLOWS THE ANALYSIS FOR THE SAME SAMPLE OF DATA ASSESSED ON TWO OR MORE OCCASIONS OR CONDITIONS OR MATCHED-SUBJECTS. IT IS USED TO TEST FOR DIFFERENCES BETWEEN THE GROUPS WHEN THE DEPENDENT VARIABLE BEING MEASURED IS ORDINAL.

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INTRODUCTION

FRIEDMAN'S TEST IS AN EXTENSION OF THE WILCOXON TEST. WILCOXON TEST CAN BE APPLIED TO REPEATED-MEASURES DATA IF PARTICIPANTS ARE ASSESSED ON TWO OCCASIONS OR MATCHED IN PAIRS. IN CONTRAST, FRIEDMAN'S TEST ALLOWS THE ANALYSIS FOR THE SAME SAMPLE OF DATA ASSESSED ON TWO OR MORE OCCASIONS OR CONDITIONS OR MATCHED-SUBJECTS. IT IS USED TO TEST FOR DIFFERENCES BETWEEN THE GROUPS WHEN THE DEPENDENT VARIABLE BEING MEASURED IS ORDINAL.

CASE ANALYSIS-1

PROBLEM

A SAMPLE OF 15 STUDENTS WERE ASKED TO RATE THREE DIFFERENT TYPES CHOCOLATE A, B AND C ON (1-10) POINT SCALE (1=LOWEST, 10=HIGHEST). THE RATINGS ARE GIVEN IN FOLLOWING TABLE.

TABLE-1: INPUT DATA

SL.No.	RATING		
	A	B	C
1	2	6	2
2	8	9	3
3	6	8	5
4	5	5	6
5	1	4	4
6	10	7	7
7	7	1	8
8	8	2	9
9	9	6	8
10	6	5	8
11	5	8	5
12	8	9	6
13	7	5	2
14	6	6	2
15	9	9	1

WE WANT TO DETERMINE WHETHER THE PREFERENCES SHOWN BY THE STUDENTS IN THE TASTE TEST PROVIDE STATISTICALLY SIGNIFICANT EVIDENCE THAT MEDIAN RATINGS DIFFER BETWEEN THE THREE PRODUCTS.

THE HYPOTHESES ARE:

NULL HYPOTHESIS (H_0): AVERAGE RATINGS ARE THE SAME FOR ALL THREE PRODUCTS.

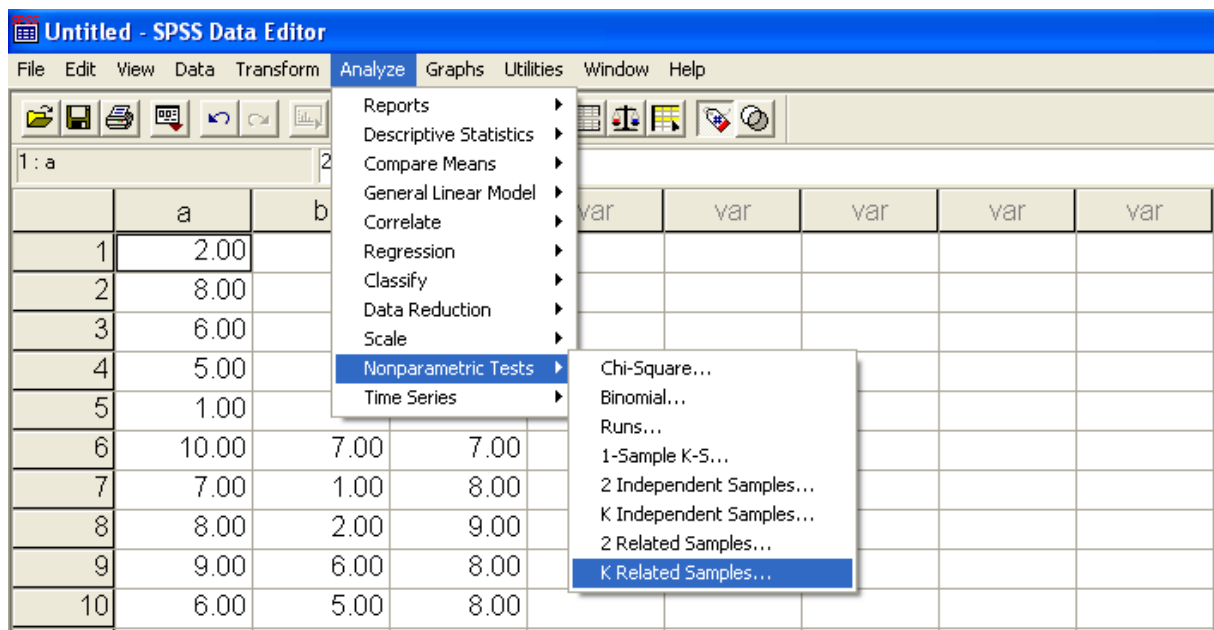
ALTERNATIVE HYPOTHESIS (H_1): AVERAGE RATINGS ARE NOT THE SAME FOR ALL THREE PRODUCTS.

TABLE-1 IS USED AS INPUT DATA TO PERFORM THE TEST USING SPSS.

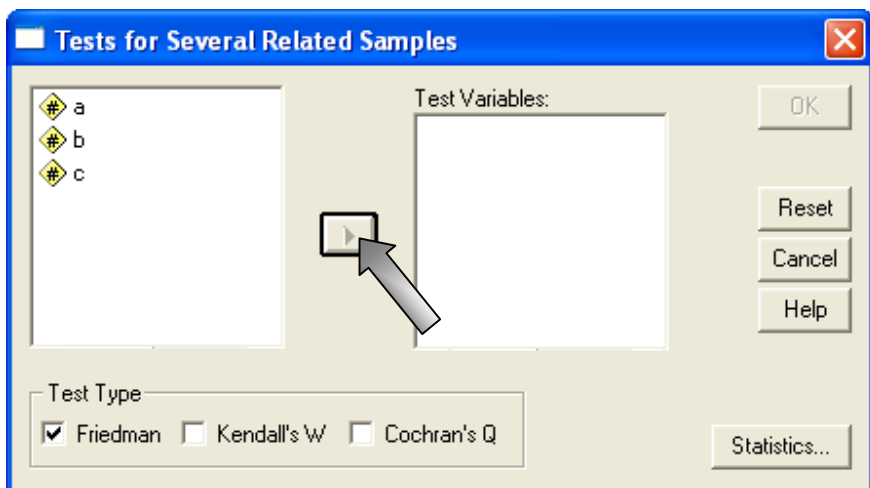
PERFORMING THE ANALYSIS WITH SPSS

FOR SPSS VERSION 11, CLICK ON **ANALYZE** → **NON PARAMETRIC TESTS** → **K RELATED SAMPLES**.

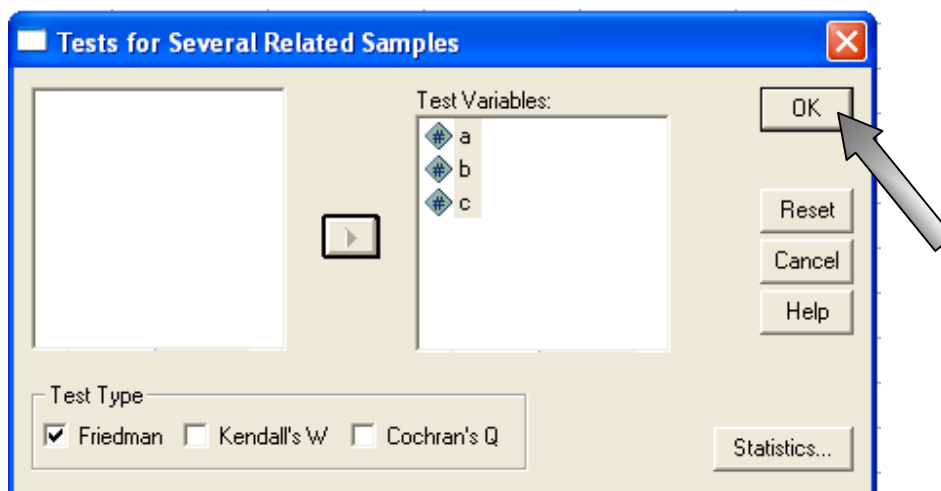
THIS WILL BRING UP THE SPSS SCREEN DIALOGUE BOX AS SHOWN BELOW.



AFTER CLICKING **K RELATED SAMPLES**, THIS WILL BRING UP THE FOLLOWING SPSS SCREEN DIALOGUE BOX.



SELECT THE VARIABLE AND TO MOVE IT TO **TEST VARIABLES** BOX. THEN CLICK **FRIEDMAN**.



FINALLY CLICK OK TO GET THE OUTPUT.

SPSS OUTPUT

THE SPSS OUTPUTS ARE GIVEN IN FOLLOWING TABLES.

FRIEDMAN TEST

TABLE-1: RANKS

	MEAN RANK
A	2.10
B	2.10
C	1.80

TABLE-2: TEST STATISTICS

N	15
CHI-SQUARE	1.019
DF	2
ASYMP. SIG.	.601

A FRIEDMAN TEST

FROM THE OUTPUT, CHI-SQUARE = 1.019

DECISION

REJECT THE NULL HYPOTHESIS IF P-VALUE (ASYMP. SIG.) \leq 0.05

INTERPRETATION

THE P-VALUE IS 0.601 AND IT IS MORE THAN 0.05 (5% LEVEL OF SIGNIFICANCE), SO WE ACCEPT THE NULL HYPOTHESIS AND REJECT THE ALTERNATIVE HYPOTHESIS. IT IS CONCLUDED THAT MEDIAN RATINGS ARE THE SAME FOR ALL THREE PRODUCTS.

CASE ANALYSIS-2

A RESEARCHER WISHES TO EXAMINE WHETHER THE PRE PLACEMENT TRAINING CLASSES FOR MBA GRADUATES HAVE AN EFFECT ON THE PERFORMANCE LEVEL OF THE STUDENTS IN ACQUIRING THE JOB. TO TEST THIS, THE RESEARCHER RECRUITS 3 TRAINERS X, Y, Z FOR 12 MBA GRADUATES. AT THE END OF TRAINING CLASSES, STUDENTS ARE ASKED TO RECORD HOW

EFFECTIVE THE TRAINING SESSION FELT ON A SCALE OF 1 TO 10, WITH 1 BEING MOST EFFECTIVE AND 10 MOST INEFFECTIVE. A FRIEDMAN TEST IS THEN RUN TO SEE IF THERE ARE DIFFERENCES BETWEEN THE TRAINERS TYPE ON PERCEIVED EFFECT.

TABLE-1: INPUT DATA

SL. No.	RATING		
	A	B	C
1	1	2	4
2	2	4	5
3	3	5	6
4	4	2	9
5	5	4	10
6	2	3	8
7	3	2	9
8	5	6	7
9	4	5	9
10	7	9	8
11	8	8	9
12	9	10	5

NULL HYPOTHESIS (H_0): AVERAGE RATINGS ARE THE SAME FOR ALL THREE TRAINERS.

ALTERNATIVE HYPOTHESIS (H_1): AVERAGE RATINGS ARE NOT THE SAME FOR ALL THREE TRAINERS.

SPSS OUTPUT

TABLE-1: RANKS

	MEAN RANK
X	1.38
Y	1.88
Z	2.75

TABLE-2: TEST STATISTICS

N	12
CHI-SQUARE	11.872
DF	2
ASYMP. SIG.	.003

A FRIEDMAN TEST

FROM THE OUTPUT, CHI-SQUARE = 11.872

DECISION

REJECT THE NULL HYPOTHESIS IF P-VALUE (ASYMP. SIG.) \leq 0.05

INTERPRETATION

THE P-VALUE IS 0.003 AND IT IS LESS THAN 0.05 (5% LEVEL OF SIGNIFICANCE), SO THE NULL HYPOTHESIS IS REJECTED AND THE ALTERNATIVE

HYPOTHESIS IS ACCEPTED. IT IS THEREFORE CONCLUDED THAT THE AVERAGE RATINGS ARE NOT THE SAME FOR THREE TRAINERS.

SPSS COMMAND

1. CLICK ON ANALYZE AT THE SPSS MENU BAR (IN OLDER VERSIONS OF SPSS, CLICK ON STATISTICS INSTEAD OF ANALYZE).
2. CLICK ON NON-PARAMETRIC TEST FOLLOWED BY K RELATED SAMPLES.
3. SELECT THE CONCERNED VARIABLES AND MOVE THEM TO TEST VARIABLE BOX.
4. CLICK FRIEDMAN.
5. CLICK OK OF THE MAIN DIALOGUE BOX

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