FRIEDMAN TEST – Chocolate Mini roll taste test

This example uses data from a taste test carried out by students. The students were given three pieces of chocolate swiss roll, each from different brands. It is unlikely that you are reading this because you are planning a chocolate swiss roll taste test, but this method can also be used to analyse any ordinal data generated by a sample of individuals who have tried three or more alternatives.

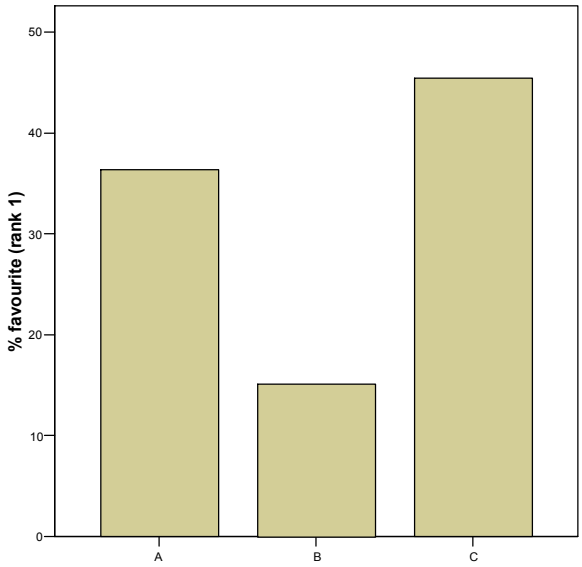
Presenting the results

The students tasted the swiss rolls, in random order, and then gave them a rating of 1, 2 or 3 to show their order of preference. The results are shown below, note that as ratings are ordinal, the median is used to show the typical value.

Descriptives

		Statistic
A	Median	2.0000
B	Median	3.0000
C	Median	2.0000

% rating swiss rolls 1, 2 and 3 as their favourite



The results show that, in this sample of students, swiss rolls A and C got the same median rating, although C had more students rating it as '1' (the best). Swiss roll B, with the lowest median rating and the least percentage of students describing it as their favourite, performed worst.

Testing hypotheses

A hypothesis test is needed 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 Friedman test is appropriate for drawing conclusions about how all students rate swiss rolls because:

(1) the taste test has a related samples design – the same people rated each product and there are three products to compare

(2) the values being compared, that is, the preference ratings, are ordinal measurements

The hypotheses are:

Null hypothesis (H_0): median ratings are the same for all three products

Alternative hypothesis (H_1): median ratings are not the same for all three products

Note that because the ratings are ordinal, the hypotheses refer to the *medians*. The output from SPSS consists of two tables. The first gives the average rank for each product: this is not a particularly helpful summary statistic as the median rating is more relevant. The second table shows the test statistic(Chi-Square), degrees of freedom (df) and the P-value, labelled 'Asymp.Sig.'. Note that although the test statistic is labelled Chi-Square, it does not mean that a chi-squared test has been carried out! Several statistical tests can lead to test statistics that are labelled 'χ^2'.

NPar Tests
Friedman Test

Ranks

	Mean Rank
A	1.74
B	2.55
C	1.71

Test Statistics[a]

N	33
Chi-Square	15.085
df	2
Asymp. Sig.	.001

a. Friedman Test

The hypothesis test allows you to say:
The data provides statistically significant evidence that the median preference ratings were not the same for all three products (Friedman test: $\chi^2 = 15.09$, df = 2, P = 0.001). Notice that this does not tell the reader which swiss rolls were the students' favourite/ least favourite, so it is important to summarise the results for each product, as shown above.

Alternative use for the Friedman test:
In this example, the dependent variable, preference rating, was ordinal. The Friedman test can also be used in comparing three or more related samples when the dependent variable is quantitative, but does not satisfy the assumptions required by a parametric method.