

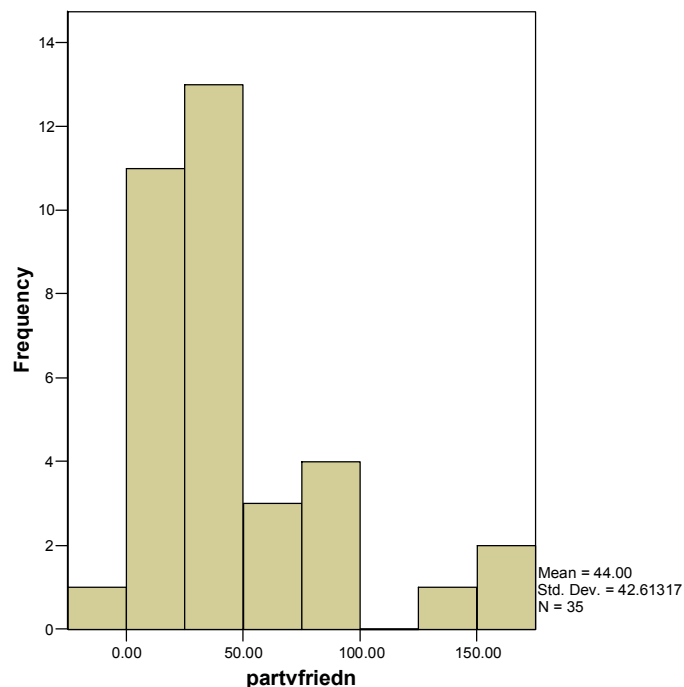
Example: WILCOXON TEST

A survey collected information about how much students spend when buying presents for different people. Each student recorded the amount they would spend on a present for a partner and also when buying a present for a friend of the same sex. In evolutionary terms, we might expect students to spend more on the (potential) mothers/fathers of their children than on friends of the same sex.

To see how typical spending differs when buying presents for partners rather than friends involves making a comparison between two sets of measurements. The dependent variable, or measurement being compared, ie spending, is quantitative. The comparison is made between paired or related samples since the same individuals provide data on spending on friends and partners. Initially this would suggest a paired t-test but this is a parametric test and assumes that the variable

'partvfriend= spending on partner- spending on friend'

is Normally distributed. The diagram below plots the difference in spending on presents for partners and friends for the students in the sample. You can see that the distribution is skewed and so does not support the assumption that the differences are Normally distributed.



The Wilcoxon test is a suitable test to use because:

- (1) two paired/related samples are being compared (the same people answered both questions)
- (2) although the measurement being compared (spending) is quantitative it does not meet the assumptions required by a parametric test

The test hypotheses are:

Null (H_0): median spending is the same when buying presents for friends or partners

Alternative (H_1): median spending is not the same when buying presents for friends or partners

With SPSS, the test output is:

NPar Tests

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
friendpresent - partnerpresent	Negative Ranks	33 ^a	17.89	590.50
	Positive Ranks	1 ^b	4.50	4.50
	Ties	1 ^c		
	Total	35		

a. friendpresent < partnerpresent

b. friendpresent > partnerpresent

c. friendpresent = partnerpresent

Test Statistics^b

	friendpresent - partnerpresent
Z	-5.016 ^a
Asymp. Sig. (2-tailed)	.000

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

The test statistic and the P-value (labelled 'Asymp. Sig. (2-tailed)') are shown in the second table. The z-value may be reported but only the P-value is needed to decide the conclusion. SPSS displays the P-value to three decimal places so that very small P-values appear as 0.000. These are not reported as 0 but as '<0.001'.

In this case, $P < 0.001$ is smaller than 0.05 hence the null hypothesis is rejected.

The hypothesis test allows you to say:

'The data provides statistically significant evidence that students' median spending on partners differs from median spending on friends of the same sex (Wilcoxon, $z = -5.016$, $P < 0.001$).'

Note. Alternative use of Wilcoxon test

Another situation in which the Wilcoxon test can be used is for comparing two related or paired samples when the variable being compared between samples (dependent variable) is ordinal.