Mann-Whitney U-test -- Analysis of 2-Between-Group Data with a Quantitative Response Variable

Application: To compare the distributions of scores on a quantitative response variable (which is either ordinal, not normally distributed or from a small sample) obtained from 2 groups. The U-test is often used as a nonparametric substitute for the between groups t-test.

Research Hypothesis: The researcher hypothesized that stores with separate reptile departments would have reptiles of better overall quality than stores that did not have separate reptile departments.

H0: Pet shops that do not have separate reptile departments have the same distribution of reptile quality ratings as shops that do have separate reptile departments.•

Step 1 -- Getting the Univariate Statistics

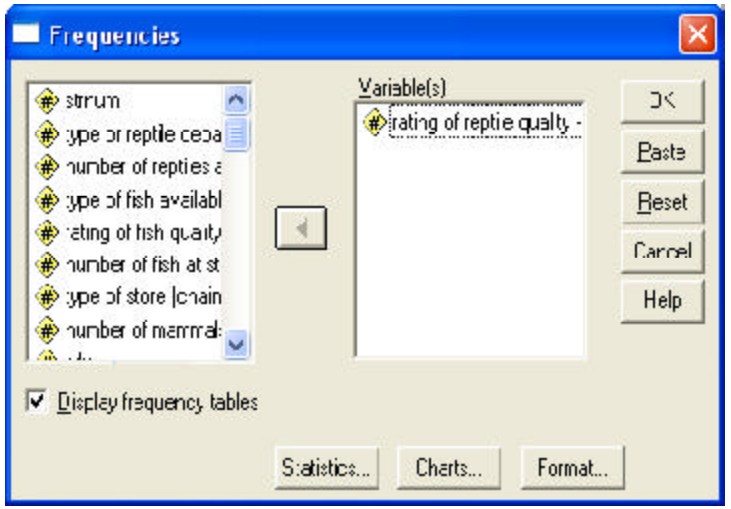
SPSS has no convenient way of getting nonparametric univariate stats for separate groups. What we have to do is to "split" fhe file into two subfiles, based on the grouping variable. Then we can get the nonparametric univariate statistics for each group. Then we have to "un-Split" the file.

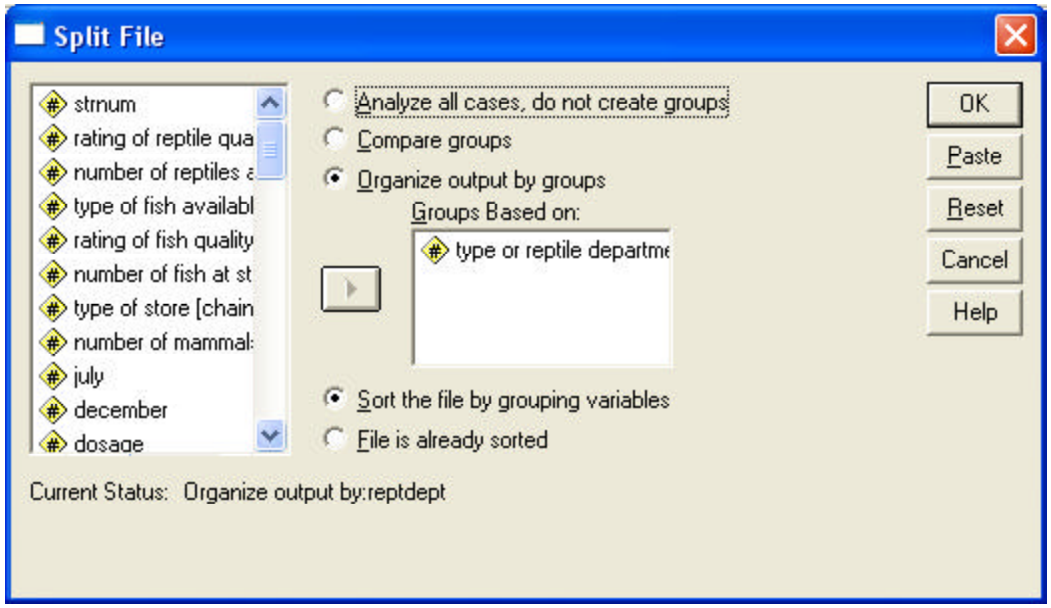
Data ➔ Split File

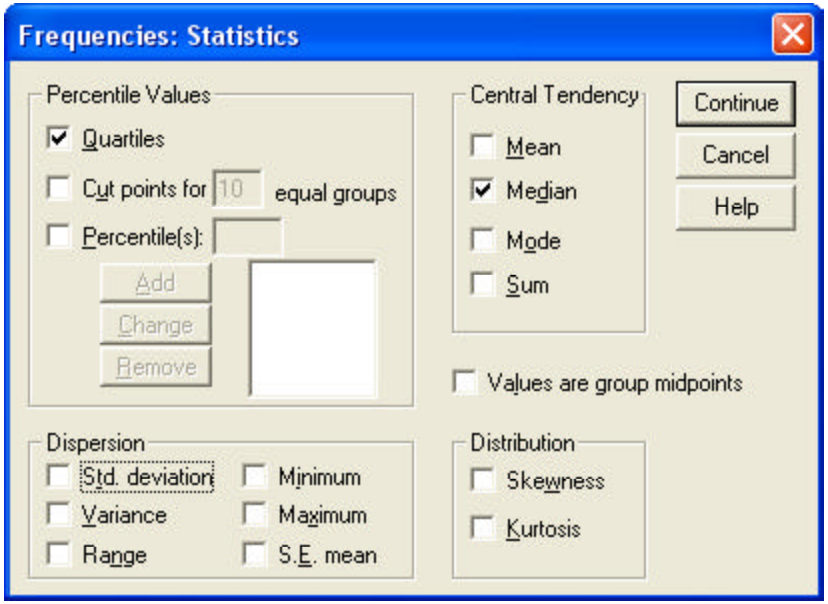
- click "Organize output by groups"
- highlight the grouping varible (IV) and click the arrow to move it into the "Groups based on" window

Analyze/Statistics ➔ Summarize ➔ Frequencies

- highlight the response variable and click the arrow button
- Click "Statistics" — check "Quartiles" and "Median"







'type of reptile department' = not separate

Statistics[a]

'rating of reptile quality - 1-10 scale'

N	Valid	6
	Missing	0
Median		4.00
Percentiles	25	2.00
	50	4.00
	75	5.50

a. 'type of reptile department' = not separate

'type of reptile department' = separate

Statistics[a]

'rating of reptile quality - 1-10 scale

N	Valid	6
	Missing	0
Median		7.50
Percentiles	25	6.25
	50	7.50
	75	9.00

a. 'type of reptile department' = separate

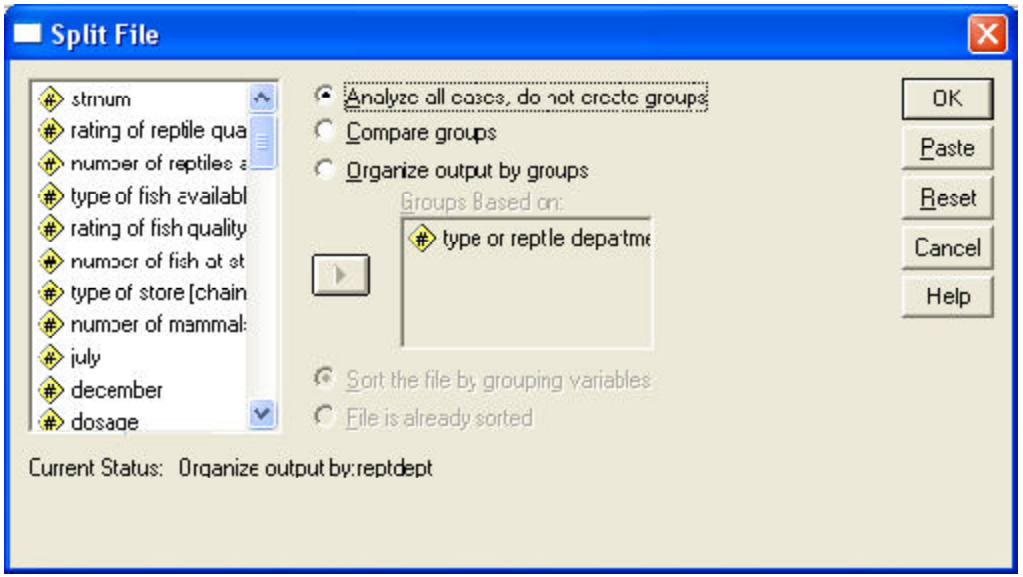
Step 2: Obtain the comparison of the two groups.

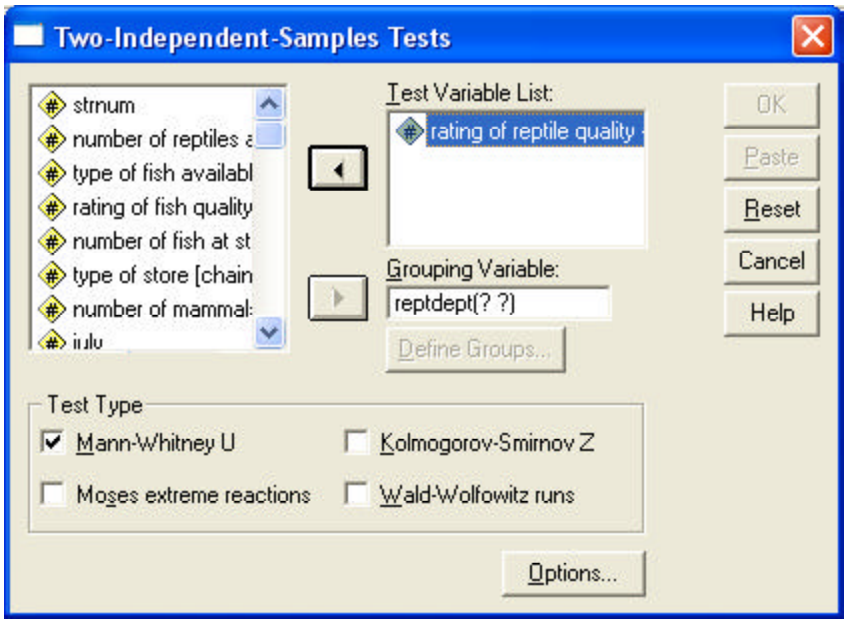
Data ➔ Split File

- click "Analyze all cases. Do not create groups."

Analyze/Statistics ➔ Nonparametric Tests ➔ 2 Indepdent Samples

- highlight the quantitative response variable and click the arrow to move it to the "Test Variable List" window
- highlight the grouping variable (be sure there are only 2 groups) and click the arrow to move it to the "Grouping Variable" window
  - clck the "Define Groups" button -- enter the values you gave each group and click "continue"
- be sure the "Mann-Whitney U" is checked





Ranks

	'type of reptile department'	N	Mean Rank	Sum of Ranks
'rating of reptile quality - 1-10 scale'	not separate	6	4.17	25.00
	separate	6	8.83	53.00
	Total	12		

Test Statistics [b]

	'rating of reptile quality - 1-10 scale'
Mann-Whitney U	4.000
Wilcoxon W	25.000
Z	-2.282
Asymp. Sig. (2-tailed)	.022
Exact Sig. [2*(1-tailed Sig.)]	.026[a]

a. Not corrected for ties.

b. Grouping Variable: 'type of reptile department'

This version of the test is used with smaller sample sizes (n<20 for each group).

When n>20 for either or both groups, this version is used, which takes advantage of the near-normal distribution of samples at least this large, and also corrects for tied scores within the sample.

Reporting Results:

Those stores without separate reptile departments displayed reptiles with a median quality rating of 4 (IQR = 2-5.5), whereas those that did have separate departments displayed reptiles with a median rating of 7.5 (IQR = 6.25-9). As hypothesized, pet stores with separate reptile departmentstended to have higher ratings than those which did not (U = 4.0, p = .026).