The Pearson's Chi-Square Test of Independence -- Analysis of k-Between-Group Data with a Qualitative DV or Analysis of Pattern of Relationship Between Two Qualitative Variables

Application: To test if two or more populations have different patterns of response to a qualitiative DV. This can also be characterized as a test of a pattern of relationship between two qualitiative variables.

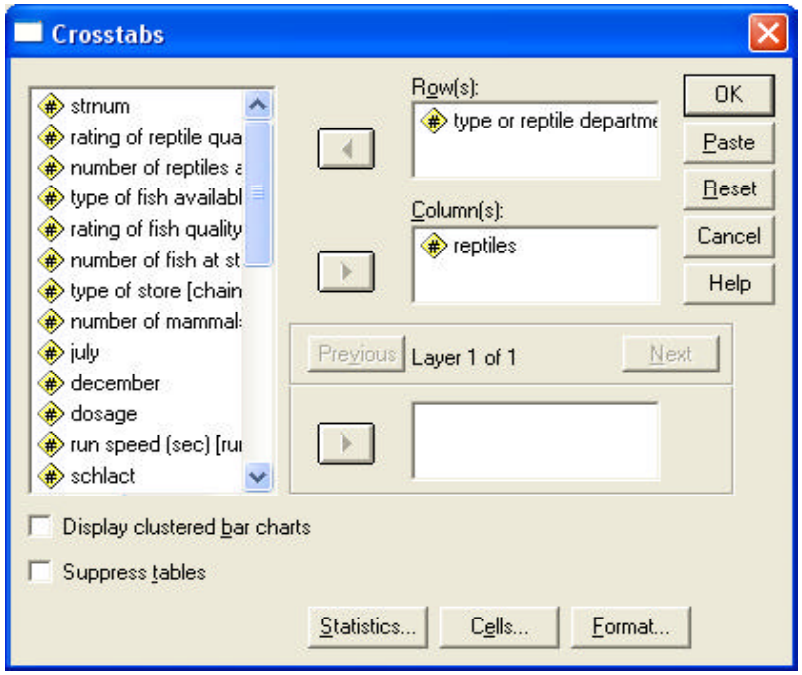
Ninety pet stores in the midwest were surveyed, producing the data detailed in the SPSS code below.

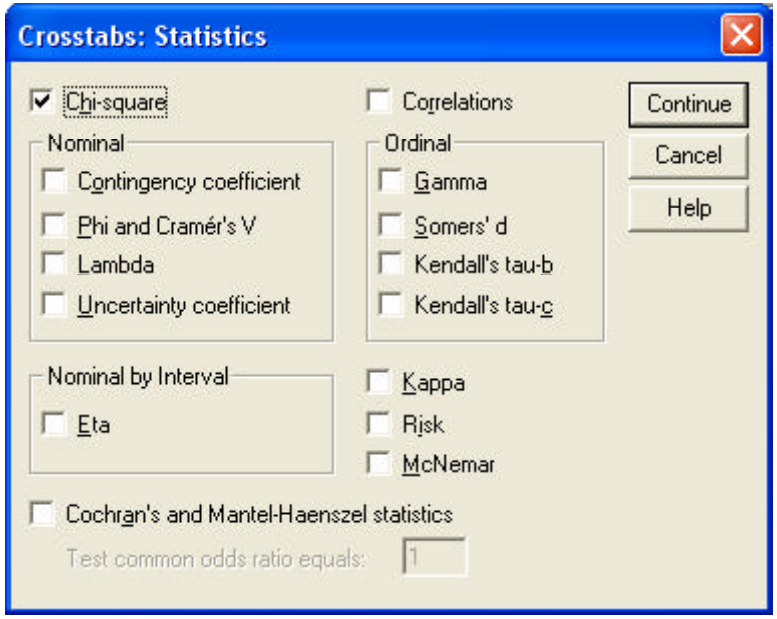
Research Hypothesis: The researcher hypothesized that stores carrying only snakes and stores only carrying lizards would tend to be stores without separate reptile department, while those stores carrying both types of reptiles would tend to be stores with separate reptile departments.

H0: There is no pattern of relationship between whether or not pet stores have separate reptile departments and whether they display only lizards, only snakes or both.

Analyze ➔ Descriptive Statistics ➔ Crosstabs

- highlight the variable you want to define the rows (be sure it is qualitative) and click arrow
- highlight the variable you want to define the columns (be sure it is qualitative) and click arrow
- "Statistics" — check that you want a "Chi-square analysis"





Output:

Count	REPTILES lizards 1.00	snakes 2.00	both 3.00	Row Total
REPTDEPT				
1.00 not separate	19	20	8	47 52.2
2.00 separate	5	6	32	43 47.8
Column	24	26	40	90
Total	26.7	28.9	44.4	100.0

Chi-Square	Value	DF	Significance
Pearson	**29.98658**	**2**	**.00000**

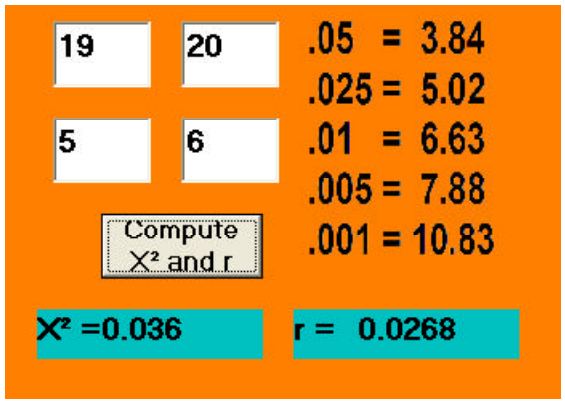
This is the p-value
There is a pattern of relationship between the two variables.

Having found an overall effect, we need to perform follow-up analyses to test if the pattern of data matches the research hypothesis.

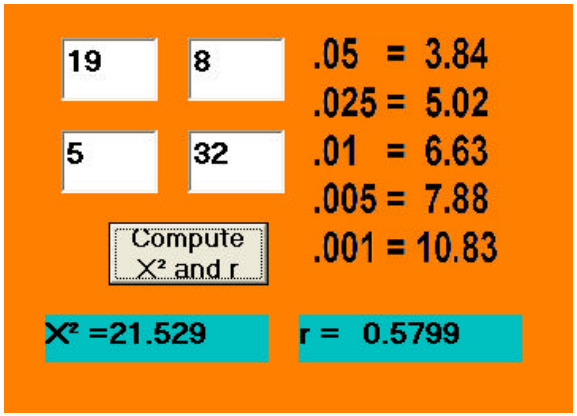
Do do this we need to look at pairwise comparisons, specificaly, looking at each 2x2 table.

It is possible to do this using SPSS. We could select each pair of conditions and get the 2x2 contingency table. However, it is much simpler to use the Effect Size Computator.

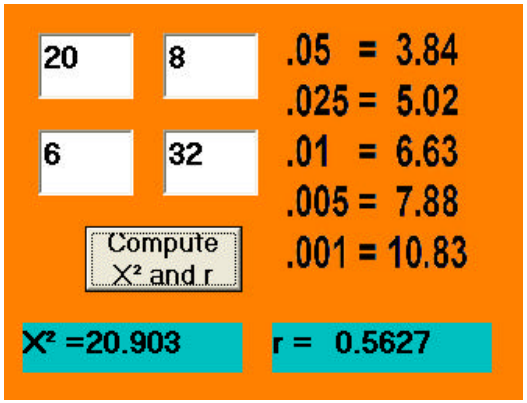
With X^2 < 3.84, p > .05 -- there is no relationship between type of reptile carried and type of store. As hypothesized, stores that carry only lizards and stores that carry only snakes both tend to not have separate reptile departments.



With X^2 > 10.83, p < .001 -- there is a relationship between type or reptile carried and type of score. As hypothesized, stores that carry only lizards tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments.



With X^2 > 10.83, p < .001 -- there is a relationship between type or reptile carried and type of score. As hypothesized, stores that carry only snakes tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments.



Reporting the Results:

For the sample of 90 stores shown in Table 1, there was about an equal number that had and did not have separate reptile departments. With regard to the types of reptiles displayed, about an equal number displayed only snakes as displayed only lizards, with somewhat more displaying both types. There was a relationship between the variables, $X^2(2)=29.987$, p<.001. Follow-up analyses revealed that, as hypothesized, stores that carry only lizards and stores that carry only snakes both tend to not have separate reptile departments, $X^2(1)=.036$, p>.05, stores that carry only lizards tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments, $X^2(1)=22.529$, p<.001, and stores that carry only snakes tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments, $X^2(1)=20.903$, p<.001.