***Use the Mantel-Haenszel Test and Spearman’s R***

***for R × C Ordinal-Ordinal Contingency Tables***

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***Executive Summary Answer***

The standard test for association for a contingency table is the standard Pearson chi-square test. However, for tables that whose rows and columns are both ordered for a monotonic trend, the Mantel-Haenszel trend test should be used instead. Moreover, it allows for the stronger claim, that the row and column variables in the table trend in a statistically significant manner. It is also useful to have a measure of the association that is being tested for. Cramer’s V is an outstanding choice for measuring that association.

***Detailed Explanation***

The standard chi-square test for R × C contingency tables has (R-1) × (C-1) degrees of freedom (df). The Mantel-Haenszel test, applied when the rows and columns are in the presumed trend order, is a 1 df test. While the MH test value can never exceed that of the standard chi-square test, the reduction of the number of degrees of freedom lowers the critical value of the test that is needed for a given α level. If the rows and columns do follow the trend well, the MH chi-square value will not be much lower than that of the standard chi-square test. If it is much lower, that suggests that the table does not trend strongly as it was presumed to do. Spearman’s R value is a measure of association which ranges from -1 (complete negative association) to 1 (complete positive association), with 0 denoting “no association”.

**References**

Mantel, Haenszel, 1959. (#94) Statistical aspects of the analysis of data from retrospective studies of disease.

Zar, 1972. (#1772) Significance testing of Spearman rank correlation coefficient.

Numbers denote the rank in the highly-cited papers database.