

Testing Association: A Two-Step Test or The Cochran-Mantel-Haenszel Test

Philip E. Cheng

Michelle Liou

John A. D. Aston

Institute of Statistical Science, Academia Sinica, Taiwan, R.O.C.

Likelihood ratio tests for independence and for interaction are examined for $2 \times 2 \times K$ contingency tables. A likelihood identity characterizes data information shared between the two tests and yields a natural two-step likelihood ratio test for both interaction and independence, plus efficient interval estimation for the common odds ratio. An invariance principle of the information identity is developed to extend the two-step test for alternative hypotheses of non-uniform interactions. Analysis of p-value and power assures that the two-step likelihood ratio test is asymptotically unbiased and most powerful. The theory not only underlines a note on odds ratios confidence interval by Fisher (1962), but develops linear information models, a contrast to hierarchical log-linear models.

[Philip E. Cheng, Institute of Statistical Science, Academia Sinica, 128, Academia Rd. Sec. 2, Taipei 115, Taiwan; pcheng@stat.sinica.edu.tw]