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Confidence intervals for a ratio of binomial proportions

A general problem of the interval estimation for a ratio of two proportions according to data from two independent samples is considered. Each sample may be obtained in the framework of direct or inverse binomial sampling. Asymptotic confidence intervals are constructed in accordance with different types of sampling schemes with an application, where it is possible, of unbiased estimations of success probabilities and also their logarithms. Since methods of constructing confidence intervals in the situations when values for the both samples are obtained for identical sample schemes are already developed and well known, the main purpose of this paper is the investigation of constructing confidence intervals in two cases that correspond to different sampling schemes. In this situation it is possible to plan the sample size for the second sample according to the number of successes in the first sample. This, as it is shown by the results of statistical modeling, provides the intervals with confidence level which closer to the nominal value.

My goal is to show that the normal approximations for estimates of the ratio of proportions and their logarithms are reliable for a construction of confidence intervals. The main criterion of our judgment is the closeness of the confidence coefficient to the nominal confidence level. It is proved theoretically and shown by statistically modeled data that the scheme of inverse binomial sampling with planning of the size in the second sample is preferred.