

Pearson's chi-squared test

A chi-squared test, also written as χ^2 test, is any [statistical hypothesis](#) test where the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test. The chi-squared test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

Pearson's chi-squared test (χ^2) is a statistical test applied to sets of categorical data to evaluate how likely it is that any observed difference between the sets arose by chance. It is suitable for unpaired data from large samples.

It is the most widely used of many chi-squared tests (e.g., Yates, likelihood ratio, portmanteau test in time series, etc.) – statistical procedures whose results are evaluated by reference to the chi-squared distribution. Its properties were first investigated by Karl Pearson in 1900.

In contexts where it is important to improve a distinction between the test statistic and its distribution, names similar to Pearson χ -squared test or statistic are used.

It tests a null hypothesis stating that the frequency distribution of certain events observed in a sample is consistent with a particular theoretical distribution. The events considered must be mutually exclusive and have total probability 1. A common case for this is where the events each cover an outcome of a categorical variable. A simple example is the hypothesis that an ordinary six-sided die is "fair" (i. e., all six outcomes are equally likely to occur.)

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