what are some Examples of Using Chi-Square Tests?

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Chi-square tests are statistical analyses that are commonly used in various fields, such as market research, medical research, genetics, and quality control. They are used to determine the relationship between different variables and to evaluate the effectiveness of a treatment or production process. In market research, chi-square tests are used to analyze the relationship between demographics and consumer preferences, while in medical research they are used to compare the effectiveness of different treatments. In genetics, chi-square tests are used to analyze inheritance patterns, and in quality control, they are used to evaluate the quality of a production process. Overall, chi-square tests are valuable tools for making informed decisions and drawing meaningful conclusions in various industries and research fields.

4 Examples of Using Chi-Square Tests in Real Life

In statistics, there are two different types of Chi-Square tests:

1. - Used to determine whether or not a categorical variable follows a hypothesized distribution.

2. - Used to determine whether or not there is a significant association between two categorical variables.

In this article, we share several examples of how each of these types of Chi-Square tests are used in real-life situations.

Example 1: Chi-Square Goodness of Fit Test

Suppose a shop owner claims that an equal number of customers come into his shop each weekday.

To test this hypothesis, he records the number of customers that come into the shop on a given week and finds the following:

Monday: 50 customers
Tuesday: 60 customers
Wednesday: 40 customers
Thursday: 47 customers
Friday: 53 customers

He can use a Chi-Square Goodness of Fit Test to determine if the distribution of the customers that come in each day is consistent with his hypothesized distribution.

Using the , he can find that the p-value of the test is 0.359.

Category	Observed	Expected
Category 1	50	50
Category 2	60	50
Category 3	40	50
Category 4	47	50
Category 5	53	50
Category 6		
Category 7		
Category 8		

CALCULATE

X^2 Test Statistic: **4.360000**

p-value: **0.359472**

Since this p-value is not less than .05, there is not sufficient evidence to say that the true distribution of customers is different from the distribution that the shop owner claimed.

Example 2: Chi-Square Goodness of Fit Test

Suppose a biologist claims that an equal number of four different species of deer enter a certain wooded area in a forest each week.

To test this hypothesis, she records the number of each species of deer that enter the wooded area over the course of one week:

Species #1: 22
Species #2: 20
Species #3: 23
Species #4: 35

Using the , she can find that the p-value of the test is 0.137.

Category	Observed	Expected
Category 1	22	25
Category 2	20	25
Category 3	23	25
Category 4	35	25
Category 5		
Category 6		
Category 7		
Category 8		

CALCULATE

X^2 Test Statistic: **5.520000**

p-value: **0.137447**

Since this p-value is not less than .05, there is not sufficient evidence to say that the true distribution of deer is different from the distribution that the biologist claimed.

Example 3: Chi-Square Test of Independence

Suppose a policy maker in a certain town wants to know whether or not gender is associated with political party preference.

He decides to take a simple random sample of 500 voters and survey them on their political party preference. The following table shows the results of the survey:

	Republican	Democrat	Independent	Total
Male	120	90	40	250
Female	110	95	45	250
Total	230	185	85	500

He can use a Chi-Square Test of Independence to determine if there is a statistically significant association between the two variables.

Using the , he can find that the p-value of the test is 0.649.

	Group 1	Group 2	Group 3	Group 4	Group 5
Category 1	120	90	40		
Category 2	110	95	45		
Category 3					
Category 4					
Category 5					

CALCULATE

X^2 Test Statistic: **0.864035**

p-value: **0.649198**

Since the p-value is not less than .05, there is not sufficient evidence to say that there is an association between gender and political party preference.

Example 4: Chi-Square Test of Independence

Suppose a researcher wants to know whether or not marital status is associated with education level.

He decides to take a simple random sample of 300 individuals and obtains the following results:

	High School	Bachelor's	Master's or Higher	Total

Married	20	100	35	155
Single	50	80	15	145
Total	70	180	50	300

He can use a Chi-Square Test of Independence to determine if there is a statistically significant association between the two variables.

Using the , he can find that the p-value of the test is 0.000011.

	Group 1	Group 2	Group 3	Group 4	Group 5
Category 1	20	100	35		
Category 2	50	80	15		
Category 3					
Category 4					
Category 5					

CALCULATE

X^2 Test Statistic: **22.771333**

p-value: **0.000011**

Since the p-value is less than .05, there is sufficient

evidence to say that there is an association between marital status and education level.

The following tutorials provide an introduction to the different types of Chi-Square Tests:

The following tutorials explain the difference between Chi-Square tests and other statistical tests: