



CHI-SQUARE TEST OF INDEPENDENCE

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- this test is used to look into whether the measures taken on the two criterion variables are either independent or associated with one in a given population using such variables as level of education and income, performance in class and IQ, etc.



WHEN DO WE USE THE CHI- SQUARE TEST OF INDEPENDENCE?

- When we try to find out if there is a significant relationship between two variables.



HOW DO WE USE THE CHI- SQUARE TESTS OF INDEPENDENCE?

- use the formula

$$X^2 = \sum \frac{(O - E)^2}{E}$$

Where:

X^2 = Chi-square test

O = observed frequency

E = expected frequencies

Σ = summation



EXAMPLE

- Ninety individuals, male and female, were given a test in psychomotor skills and their scores were classified into high and low. Use the X^2 - test of independence at .05 level of significance. the table is shown



HOW TO SOLVE THE CHI-SQUARE TEST OF INDEPENDENCE USING SCIENTIFIC POCKET CALCULATOR?

Score

Sex	High		Low		Total
	O	E	O	E	
Male	18		28		46
Female	32		12		44
Total	50		40		90

For expected values: Multiply the column total with the row total and divide the product by the grand total.

$$\frac{50 \times 46}{90} = 25.56$$

$$\frac{40 \times 46}{90} = 20.44$$

$$\frac{50 \times 44}{90} = 24.44$$

$$\frac{40 \times 44}{90} = 19.56$$



COMPUTATION

Score

Sex	High		Low		Total
	O	E	O	E	
Male	18	(25.56)	28	(20.44)	46
Female	32	(24.44)	12	(19.56)	44
Total	50		40		90



$$\begin{aligned} X^2 &= \sum \frac{(O - E)^2}{E} \\ &= \frac{(18 - 25.56)^2}{25.56} + \frac{(32 - 24.44)^2}{24.44} + \frac{(28 - 20.44)^2}{20.44} + \frac{(12 - 19.56)^2}{19.56} \\ &= 2.236 + 2.338 + 2.796 + 2.922 \end{aligned}$$

$$\underline{\underline{X^2 = 10.292}}$$



SOLVING BY THE STEPWISE METHOD

I. PROBLEM: IS there a significant relationship between sex and scores in psychomotor skill?

II. HYPOTHESES:

H_0 : There is no significant relationship between sex and scores in psychomotor skills.

H_1 : There is a significant relationship between sex and scores in psychomotor skills.



III. Level of Significance:

$$\alpha = .05$$

$$df = (c-1)(r-1)$$

$$= (2-1)(2-1)$$

$$= (1)(1)$$

$$= 1$$

$$X^2_{.05} = 3.841 \text{ tabular value}$$

IV. Statistics

X^2 - test of independence



V. Decision Rule:

If the X^2 computed value is greater than the X^2 tabular value, disconfirm H_0 .

VI. Conclusion:

The X^2 computed value of 10.292 is greater than the X^2 tabular value of 3.841 at .05 level of significance with one degree of freedom. This leads to the confirmation of the alternative hypothesis which means that a significant relationship exists between sex and score in psychomotor skill. It implies that the female's high scores are more in psychomotor skills than their male counterpart.

