CHI-SQUARE – A TEST OF INDEPENDENCE

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The Chi-square test represents a useful method of comparing experimentally obtained results with those to be expected theoretically on some hypotheses. This equation for chi square (x^2) is stated as follows:

$$x^2 = \sum \left[\frac{(fo - fe)^2}{fe} \right]$$

In which fo = frequency of occurrence of observed or experimentally determined facts,

fe = expected frequency of occurrence on some hypothesis.

The more closely the observed results approximate to the expected, the smaller the chi square and the closes the agreement between observed data and the hypothesis being tested. Contrawise the bigger the chi square the greater the probabity of a real divergence of experimentally observed from expected results.

Two situations are given below. Free floating responses of Roschach Inkblot test (RIBT) of colours responses with form are catagorized following ways. Do these results indicate a significant trend of opinion ?

Brown Sugar	Buprenorphine addicts	Alcoholics	
Observed frequency (fo)	24	12	12	= 48
Expected frequency (fe)	16	16	16	= 48

(fo -fe)	08	04	04
$(fo - fe)^2$	64	16	16
$\dfrac{(fo - fe)^2}{fe}$	04	01	01

$$x^2 \quad \sum = \left[\frac{(fo - fe)^2}{fe} \right] = 6 \quad df = 2 \quad P = .05 \text{ (Table E)}$$

Entering Table E we find in row   df = 2, a x^2 of almost 6. Results may be marked 'significant' at the .05 level, and therefore null hypothesis of equal probability is rejected. Our results favours the proposition.

In the first situation steps which are adopted are as following :

- Establishing null hypothesis

- Computation of the value of x^2

- Determining the number of degree of freedom by the formula

df = (r-1(c-1)

Determining the critical value of x^2 with its computed value. If computed x^2 is equal to or greater than the critical value, then it is taken to be significant enough for the rejection of the null hypothesis.

In the second situation the free floating responses of Rorschach Ink Blot Test (FC) was represented into 2x2 fold contingency table. The situation is 46

brown sugar addicts and 44 non brown sugar addicts (buprenorphine addicts and alcoholics) have given responses into binary Categories like 1 & 0. The question is whether the FC responses were related to their substance of addiction.

Brown Sugar group	A	B	A+B
	17	23	=40
Non Brown Sugar group	C	D	C+D
	28	22	50

	(A+C)	(B+D)	90
	45	45	

In a fourfold table, chi square is given by the following formula

$$x^2 = \frac{N(AD - BC)2}{(A+B)(C+D)(A+C)(B+D)}$$

Substituting for A, B, C, D, in the formula

$$x^2 = \frac{90\,(374 - 644)2}{40X50X45X45} = 1.62$$

And for df = 1 from Table E

Critical value of x^2 = 3.84

Our computed value   1.62

The value of x^2 is less than table value , that signifies FC responses were not associated with their substance of addiction.

Therefore we can say x^2 test may be useful applied for testing the relationship between two variables.

Testing a null hypothesis , stating that the two given variables are independent of each other.

Computing the value of the contingency co-efficient , a measure of relationship existing between the two variables.

To sum up, in the present study the x^2 test is used for two broad purposes, it is used as a test of 'goodness of fit' and secondly as a 'test of independence'

In social science research x^2 is usually applied for testing the null hypothesis of independence , in the present situation it favours the proposition, but the question arises in the 'goodness of fit' , if there are differences in observed frequency in real life situation, does the equal probability – goodness of fit is well justified ? Future studies are called for these present replication and confirmation of propositions.

REFERENCES

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