

## Fisher's Exact Test

Assume you have collected data on principals and superintendents concerning their agreement or disagreement to the statement "high school athletes observed drinking or using drugs should be barred from further athletic competition". You record their responses in a table as below:

	Disagree	Agree
Superintendents	2	8
Principals	4	5

You ask, are the responses of superintendents and principals significantly different? Another way to ask the question is, "what is the probability of getting the pattern of responses observed *or a more extreme pattern?*". The probability of any given pattern of responses in this 2 by 2 table may be calculated from the hypergeometric probability distribution as

$$P = \frac{(A+B)!(C+D)!(A+C)!(B+D)!}{N!A!B!C!D!}$$

where A, B, C, and D correspond to the frequencies in the four quadrants of the table and N corresponds to the total number of individuals sampled.

When you elect the Statistics / NonParametric / Fisher's Exact Test option from the menu, you are shown a specification form which provides for four different formats for entering data. We have elected the last format (entry of frequencies on the form itself):

	Col. 1	Col. 2
Row 1	2	8
Row 2	4	5

Figure 1. Fisher's Exact Test Form

When we click the Compute button we obtain:

Fisher Exact Probability Test

Contingency Table for Fisher Exact Test

	Column	
Row	1	2
1	2	8
2	4	5

Probability := 0.2090

Cumulative Probability := 0.2090

Contingency Table for Fisher Exact Test

	Column	
Row	1	2
1	1	9
2	5	4

Probability := 0.0464

Cumulative Probability := 0.2554

Contingency Table for Fisher Exact Test

	Column	
Row	1	2
1	0	10
2	6	3

Probability := 0.0031

Cumulative Probability := 0.2585

Tocher ratio computed: 0.002

A random value of 0.893 selected was greater than the Tocher value.

Conclusion: Accept the null Hypothesis

Notice that the probability of each combination of cell values as extreme or more extreme than that observed is computed and the probabilities summed.