Calculating Chi Square

<table>
<thead>
<tr>
<th>Cell</th>
<th>Obs.</th>
<th>Exp.</th>
<th>(O-E)</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi Square =

**Step by Step:**

Step One: Put everything into a cross-tab
Step Two: Calculate the Marginals
Step Three: Calculate the expected frequencies per cell. You do this by multiplying the row marginal times the column marginal and dividing by the total in the sample. Do this for each cell.
Step Four: Subtract the expected frequencies from the observed frequencies. Do this for each cell
Step Five: Square each value.
Step Six: Take this value and divide it by the expected frequency for each cell.
Step Seven: Add these values together—This is your Chi Square Value

**To make it interpretable:**

Step One: Determine the degrees of freedom where df = (# of rows-1)(# of columns-1).
For a 2x2 table, this would be 1.
Step Two: Look up the chi square value for each significance level, given your degrees of freedom. If your chi square value is greater than that value, then your chi square is “significant” at that level. In other words, if you have one degree of freedom and your chi square value is 3.9, then it is significant at the .05 level.
Step Three: Interpret this properly: You have a 5% chance of committing a type I error. In other words, you are 95% sure that your findings would be “true” in the population.

\[
\text{Chi-square} = \sum \frac{(f_0 - f_e)^2}{f_e}
\]

- \( f_0 \) (observed frequencies)
- \( f_e \) (expected frequencies)

\[
f_e = \frac{(\text{row total})(\text{column total})}{n}
\]