



VRS 410 Urban Empirical Research

¹₂ Σ ₃

- Chi-Square
- SPSS Demonstration



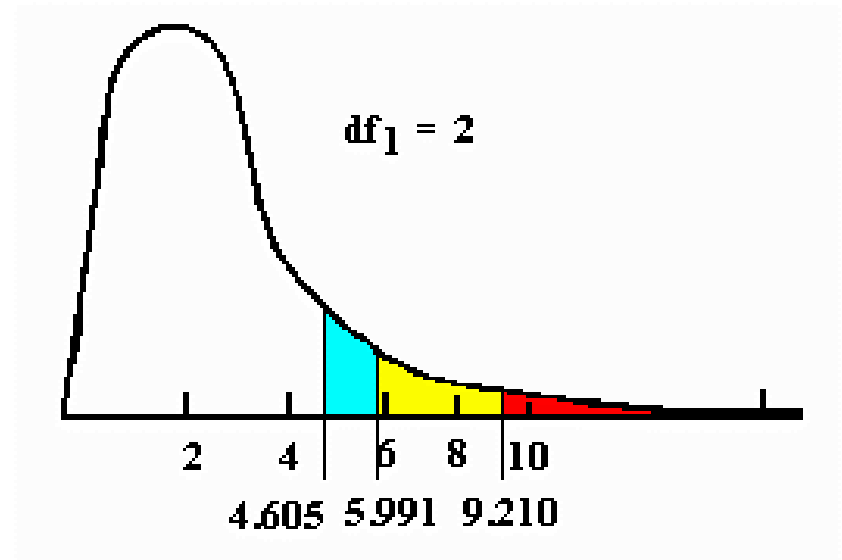
Chi-Square

- Tests for Independence
- Test based on ‘expected’ frequencies
 - if two variables are independent, freqs would be random
- Frequencies are not considered random if a critical threshold is achieved



Chi-Square's Different

- Uses nominal data
 - The chi-square distribution is different
 - based on degrees of freedom
- $$df = (\#rows - 1) * (\#cols - 1)$$





Chi-Square & Cross-tabs

- The Chi-Square distribution is based on the observed frequency of cases in specific cells of a cross tabulation (cross-tab)

– a basic table

Succeeded	62 (50)
Failed	38 (50)

– a cross-tab

	Graduated	Failed to Graduate	Total
Exper	73	12	85
Control	43	39	82
Total	116	51	167



Expected Frequencies

$$E_{ij} = \frac{T_i \times T_j}{N}$$

- E_{ij} = Expected Cell Frequency
- T_i = total rows
- T_j = Total columns



Chi-Square

	Graduated	Failed to Graduate	Total
Exper	73 (59.042)	12 (25.958)	85
Control	43 (56.958)	39 (25.042)	82
Total	116	51	167

Expected (E) is parentheses

E=expected O=Observed

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



What Chi-Square Does & Doesn't Say?

- Does say...
 - probability that not random
 - probability that not independent
 - ‘some’ relationship may exist
- Doesn't say...
 - direction of possible relationship
 - what type of relationship
 - causation