

812 Section # 13

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1 Chi-Squared, Continued

1.1 Definitions for Chi-Squared Tests

Degrees of Freedom

$$(rows - 1) (columns - 1)$$

Expected Cell Values

$$E_i = \frac{(row) (column)}{\text{grand total of all data}}$$

χ^2 Test Statistic

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

Exercise 1 Continuing from class yesterday...

Exercise 2 Suppose we have the following observed data:

		Wars After Conflict Termination	
		No Wars	Some Wars
Termination Type	Military Victory	29	5
	Negotiated Settlement	6	6

Does how a country ended its previous conflict influence whether there are wars in the future (i.e., are future wars independent of past conflict termination type)?

- How many degrees of freedom should we use to perform this test?
- What is the p-value for this hypothesis test?
- Can you reject the null hypothesis that whether a country experiences wars is independent of how previous conflict was terminated?

2 Standard Errors, Confidence Intervals, and T-tests

Exercise 3 Two alien groups are discovered on the moon. One is purple, and one is orange. They are both short, but the purple one seems to be a bit taller. The distributions are assumed to be normal. A scientist is interested in whether the purple aliens are on average more than 2 inches taller than the orange aliens. To address this question, she collects a random sample of the heights of ten aliens in each group and tests the hypothesis that the difference of means is greater than 2 against the null that the difference is exactly 2. She believes that the two groups have equal variances. Here is the sample of alien heights that she collected:

Purple	Orange
40.0	37.0
39.5	37.5
38.5	36.9
39.5	37.7
41.4	37.5
39.2	38.1
39.1	36.7
41.2	37.9
40.5	37.5
39.7	37.0

- Can the scientist reject H_0 using a one-tailed t-test?
- What is the p-value of this test?
- What if we were interested in testing the hypothesis that $\mu_P > \mu_O$ against the null that $\mu_P = \mu_O$?
- The scientist is also believes that the population mean height of the purple alien is bigger than 39. How would she test this hypothesis?

3 To R!

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