

STA 303 / 1002

Note Title

1/9/2012

Example: The Speck Conspiracy Trial.

- 1968, Boston

- Dr. Benjamin Speck, pediatrician
on trial for conspiring to violate the Selective
Service Act

- There were no women on his jury.

Is there evidence of gender bias in the jury
selection for Speck's trial?

How juries were selected in Boston in 1968:

- 300 names selected at random from the city directory
- before a trial, 35-200 juries selected at random from 300. This is called the "VENIRE".
- each side can then exclude juries from the venire (non-random)

For the Spock trial, the venire contained only 1 woman who was released by the prosecution.

Defense: Spock's jury had a history of women being underrepresented on juries

- compared recent verdicts of Sproule's judge with recent verdicts of other judges
Data: % of women in each verdict

Two key questions:

- (1) Is there evidence that women are underrepresented on Sproule's judge's verdicts when compared to other judges?
- (2) Is there evidence that there are differences in women's representation in verdicts of other 6 judges?

For question (c):

$$H_0: \mu_{\text{spoke}} = \mu_{\text{other judges}}$$

where μ_{g} is mean μ of women on venires in groups

$$H_a: \mu_{\text{spoke}} \neq \mu_{\text{other judges}}$$

Two sample t-test:

Assumptions necessary:

μ of women venires are independent observations from normal distributions

Test statistic $t_{\text{obs}} =$

$$\frac{\bar{x}_{\text{spoke}} - \bar{x}_{\text{other}}}{\text{S.E. of } (\bar{x}_{\text{spoke}} - \bar{x}_{\text{other}})}$$

~~In group,~~

$$\text{Var}(\bar{X} - \bar{Y}) = \frac{\sigma_x^2}{n_x} + \frac{\sigma_y^2}{n_y}$$

Where \bar{X}_g is average of observations in group g
 S.E. is "Standard error"
 = Est. of standard deviation

Ans: ① Est., $\frac{S_x^2}{n_x} + \frac{S_y^2}{n_y}$

Then t_{obs} is approx. distributed with t distribution with df calculated by Satterthwaite approximation

$$df = \left(\frac{S_x^2}{n_x} + \frac{S_y^2}{n_y} \right)^2 + \frac{\left(\frac{S_x^2}{n_x} \right)^2}{n_x - 1} + \frac{\left(\frac{S_y^2}{n_y} \right)^2}{n_y - 1}$$

Ques 2: Assume variances in each group are equal
 But variance of $\bar{X} - \bar{Y}$ $\text{Var} \left(\frac{1}{n_x} + \frac{1}{n_y} \right)$

where $S_p^2 = \frac{(n_x - 1)S_x^2 + (n_y - 1)S_y^2}{n_x + n_y - 2}$

Then this has a t -distribution with $df = n_x + n_y - 2$

We'll proceed with choice ①:

p -value $< .05$!

Strong evidence of a difference in the mean IQ scores for the judges of Spork's judge versus other 6 judges

Some comments on p -values:

Hypothesis tests do not prove hypotheses.

Wrong to say: " H_0 is false" or " H_0 is true" (same for H_a)

p -values give strength of evidence against H_0
Small p -value can happen because H_0 is not true
— unusual data

The smaller the p-value, the stronger the evidence

• If p-value is small, can reject H_0 .

• If p-value is large, does not mean we can

reject H_0

Why? There are many possible H_0 values that would also give a large p-value

• P-values do not give evidence in favor of H_0

• If p-value is large, all you can say data are consistent with H_0

