Tutorial 01, Hilary Term

Research Methods for Political Science (PO3600)

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Session Outline

1. Recap
2. Plotting relationships between variables
3. Calculating correlations
4. Computing t-tests and confidence intervals

Tutorial next week

Monday, 29th of January, 11-12am, Room ARTS 3020

Loading and plotting data

- Go to the course page on Blackboard and download the `norris.sav` dataset
- Create descriptive statistics for `Co2_2001` and `Power2001`.
- What do these variables mean and how are the variables distributed?

Confidence intervals

- Use `Co2_2001` and compute a 95% confidence interval for the mean of this variable. Interpret the result.
- Compute a 90% confidence intervals and compare it with the 95% confidence intervals. Which one is wider and why?

Recap: Confidence interval

$$CI = \bar{x} \pm z \times \sigma \tag{1}$$

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Standard deviation: $\sigma = \sqrt{\frac{\sum(x-\bar{x}^2}{n}}$

Confidence level determined through z. 95% confidence interval has a z-score of 1.96.

One-sample t-test

Hypothesis: The average CO2 emissions in 2001 does not equal 20 metric tons per capita.

$H_0 : \bar{x} = 20$

$H_1 : \bar{x} \neq 20$

- Compute a one-sample t-test. Compare the results from the confidence interval and the t-test. What information is revealed by each?

Recap: One-sample t-test

$$t = \frac{\bar{x} - \mu}{\sqrt{\sigma}}, \tag{2}$$

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- $\bar{x}$: sample mean
- μ: assumed population mean
- n: sample size
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Standard deviation: $\sigma = \frac{\sum(x-\bar{x})^2)}{n-1}$

Standard error of the mean: $SE = \frac{\sigma}{\sqrt{n}}$

If the absolute value of the t-test statistics is greater than the critical value, then the difference is significant. Otherwise it is not!

Two-sample t-test

- Use the variables `Co2_2001` and `Power2001`.
- Compute and interpret a two-sample independent t-test.

Recap: Two-sample t-test

$$t = \frac{\bar{x}_A - \bar{x}_B}{\sqrt{S^2/n_A + S^2/n_B}} \tag{3}$$

S^2 is an estimator of the *common variance* of the two samples.

$$S^2 = \frac{\sum (x - \bar{x}_A)^2 + \sum (x - \bar{x}_B)2}{n_A + n_B - 2} \tag{4}$$