Lesson 09 - Size of Effect - Confidence Intervals (one proportion)

Lesson Objectives: 1. Construct confidence intervals (theory based) on a single proportion

3x Methods of finding a CI

1. Plausible values method → requires many significance tests to determine which parameter values are rejected and which are plausible.
2. 2SD method → approximation, only applies to 95% CI (statistic ± 2*SD($\hat{p}$))
3. Theory Based method → Can be used for any confidence level.
(one sample z-interval) Validity conditions → ≥10 successes & ≥10 failures

Confidence Interval = Statistic ± Margin of Error

Margin of Error = multiplier × Standard error

Standard error = $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ (Standerdard error of sample proportion $\hat{p}$)

Confidence Interval = $\hat{p}$ ± multiplier × $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

*multiplier based on confidence level (i.e. 90%, 95%...

R Code -
multiplier = qnorm(1 − siglevel/2)

Where significance level is 0.05 etc...

- Increasing confidence level (ie. 90%→95%) increases the multiplier and widens the interval

- Confidence Interval Interpretation
  - goal is to give an interval of plausible values for π.
  - We are 95% Confident that the population proportion (π) is in the given interval.

Confidence level - "A statement of reliability in the confidence interval method."

- A 95% confidence level means that 95% of all samples would produce an interval that succeeded in capturing the unknown value of the parameter