

Stat 101 – Lecture 24

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two standard errors of p .

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Confidence Interval for p

- We are 95% confident that p will fall between

$$\hat{p} - 2\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \text{ and } \hat{p} + 2\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

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Example

$$\hat{p} = 0.40$$

$$\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{0.40(0.60)}{1004}} = 0.0155$$

$$0.40 - 2(0.0155) \text{ to } 0.40 + 2(0.0155)$$

$$0.369 \text{ to } 0.431$$

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Interpretation

- We are 95% confident that the population proportion of all adults in the U.S. who believe climate change is a real threat is between 36.9% and 43.1%.

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Interpretation

- Plausible values for the population parameter p .
- 95% confidence in the process that produced this interval.

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95% Confidence

- If one were to repeatedly sample at random 1004 adults in the U.S. and compute a 95% confidence interval for each sample, 95% of the intervals produced would contain the population proportion p .

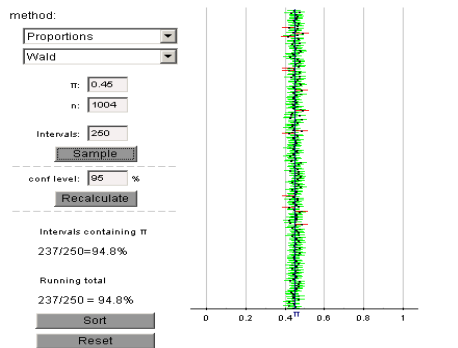
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Simulation

<http://statweb.calpoly.edu/chance/applets/Confsim/Confsim.html>

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Simulating Confidence Intervals



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Margin of Error

$$2SE(\hat{p}) = 2\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Is called the Margin of Error (ME).

This is the furthest \hat{p} can be from p , with 95% confidence.

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Margin of Error

- What if we want to be 99.7% confident?

$$ME = 3SE(\hat{p}) = 3\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

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Margin of Error

$$ME = z^* SE(\hat{p}) = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Confidence	80%	90%	95%	98%	99%
z^*	1.282	1.645	2 or 1.96	2.326	2.576

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