

Confidence Intervals, what are they?

1. Many teens have posted profiles on sites such as Facebook and MySpace. A sample survey asked random samples of teens with online profiles if they included false information in their profiles. Of 170 younger teens (aged 12 to 14) polled, 117 said “Yes.” Of 317 older teens (ages 15 to 17) polled, 152 said “Yes.” A 95% confidence interval for the difference in the population proportions (younger teens – older teens) is 0.120 to 0.297. Interpret the confidence interval and the confidence level.

2. The admissions director from a big university found that (107.8, 116.2) is a 95% confidence interval for the mean IQ score of all freshmen. Comment on whether or not each of the following explanations is correct.

- (a) There is a 95% probability that the interval from 107.8 to 116.2 contains μ .
- (b) There is a 95% chance that the interval (107.8, 116.2) contains \bar{x} .
- (c) This interval was constructed using a method that produces intervals that capture the true mean in 95% of all possible samples.
- (d) 95% of all possible samples will contain the interval (107.8, 116.2).
- (e) We are confident that 95% of all freshmen have an IQ between 107.8 and 116.2.
- (f) We are 95% confident that the future samples of freshmen will have a mean IQ between 107.8 and 116.2.
- (g) The probability that the interval (107.8, 116.2) captures μ is either 0 or 1, but we don’t know which.

3. An online poll posed the following question:

It is now possible for school students to log on to Internet sites and download homework. Everything from book reports to doctoral dissertations can be downloaded free or for a fee. Do you believe that giving a student who is caught plagiarizing an F for their assignment is the right punishment?

Of the 20,125 people who responded, 14,793 clicked “Yes.” That is 73.5% of the sample. based on this sample, a 95% confidence interval for the percent of the population who would say “Yes” is 73.5+0.61%. Which of the three inference conditions is violated? Why is this confidence interval worthless?

4. A polling organization announces that the proportion of American voters who favor congressional term limits is 64%, with a 95% confidence margin of error of 3%. If the opinion poll had announced the margin of error for 80% confidence rather than 95% confidence, then would the new margin of error be the same, less or more than the 3%? Explain.

5. **Blast from Past:** Does living near power lines cause leukemia in children? The national Cancer Institute spent 5 years and \$5 million gathering data on this question. The researchers compared 638 children who had leukemia with 620 who did not. They went into the homes and actually measured the magnetic fields in children’s bedrooms, in other rooms, and at the front door. They recorded facts about the power lines near the family home and also near the mother’s residence when she was pregnant. Result: no connection between leukemia and exposure to magnetic fields the kind produced by power lines was found.

- (a) Was this an observational study or an experiment? Justify your answer.
- (b) Does this study show that living near power lines does not cause cancer? Explain.