accuracy vs. precision

- confidence level
- width of an interval
- trade-offs

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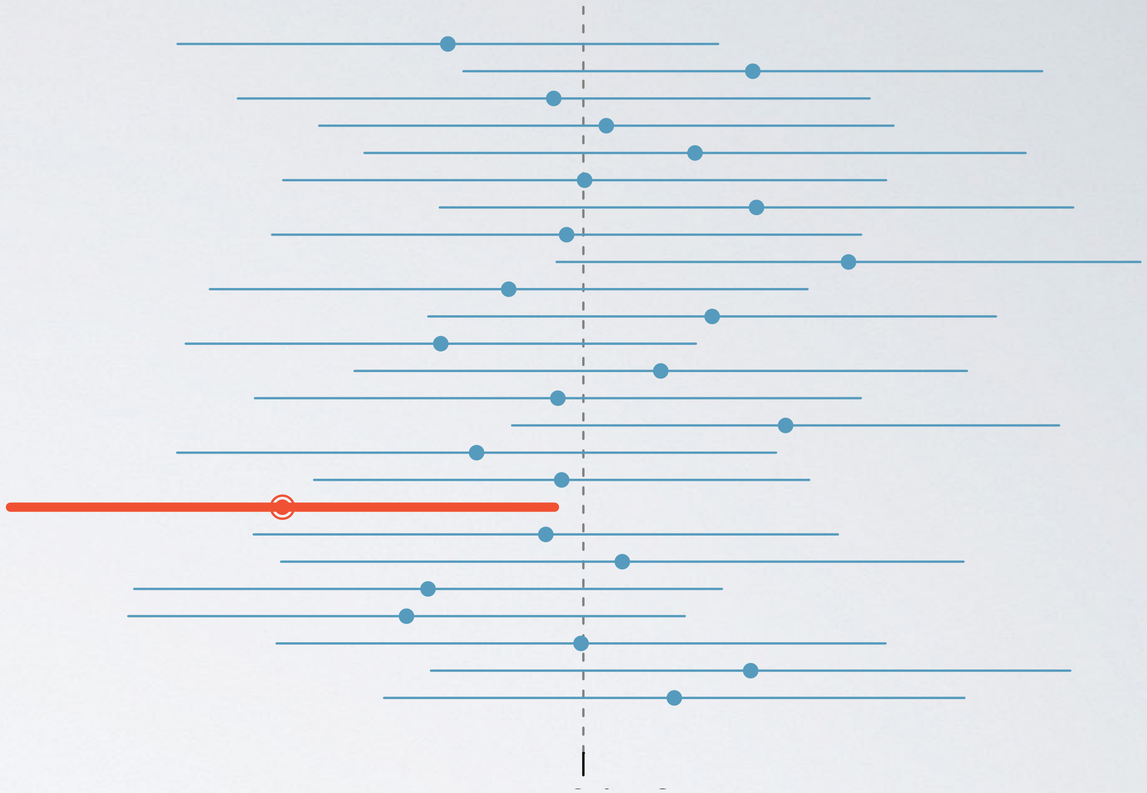
confidence level

- Suppose we took many samples and built a confidence interval from each sample using the equation

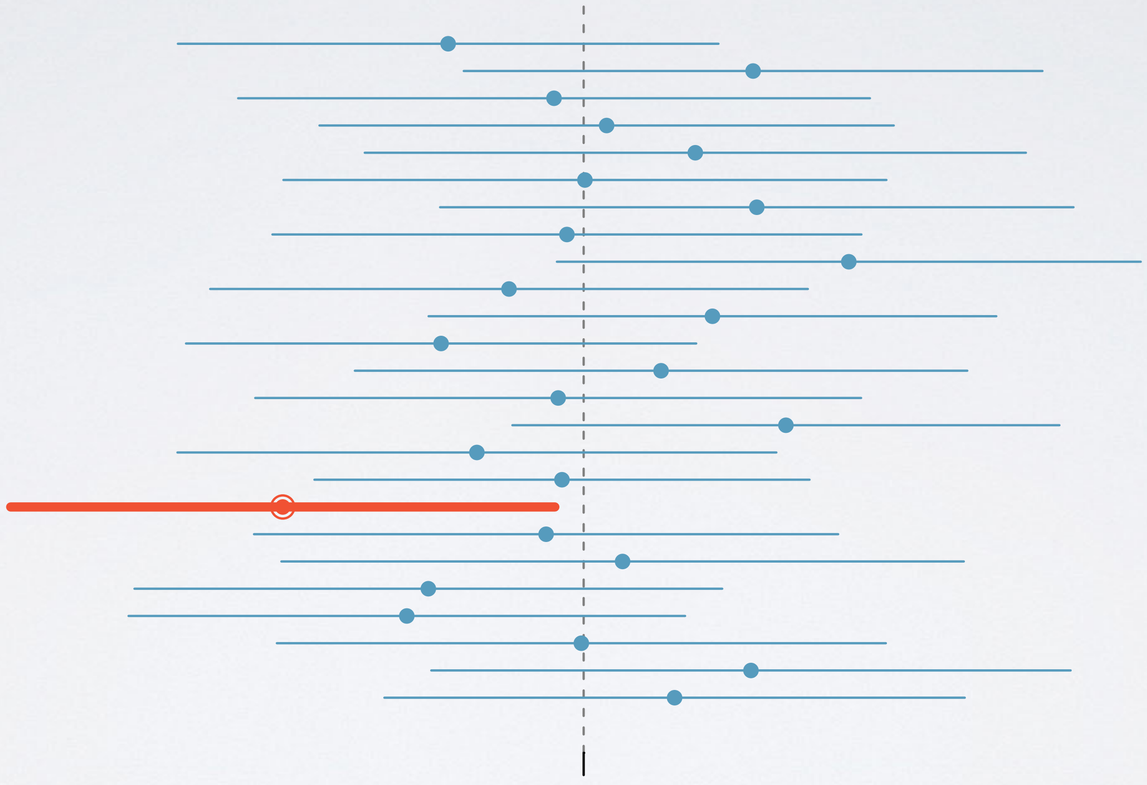
$$point\ estimate \pm 1.96 \times SE$$

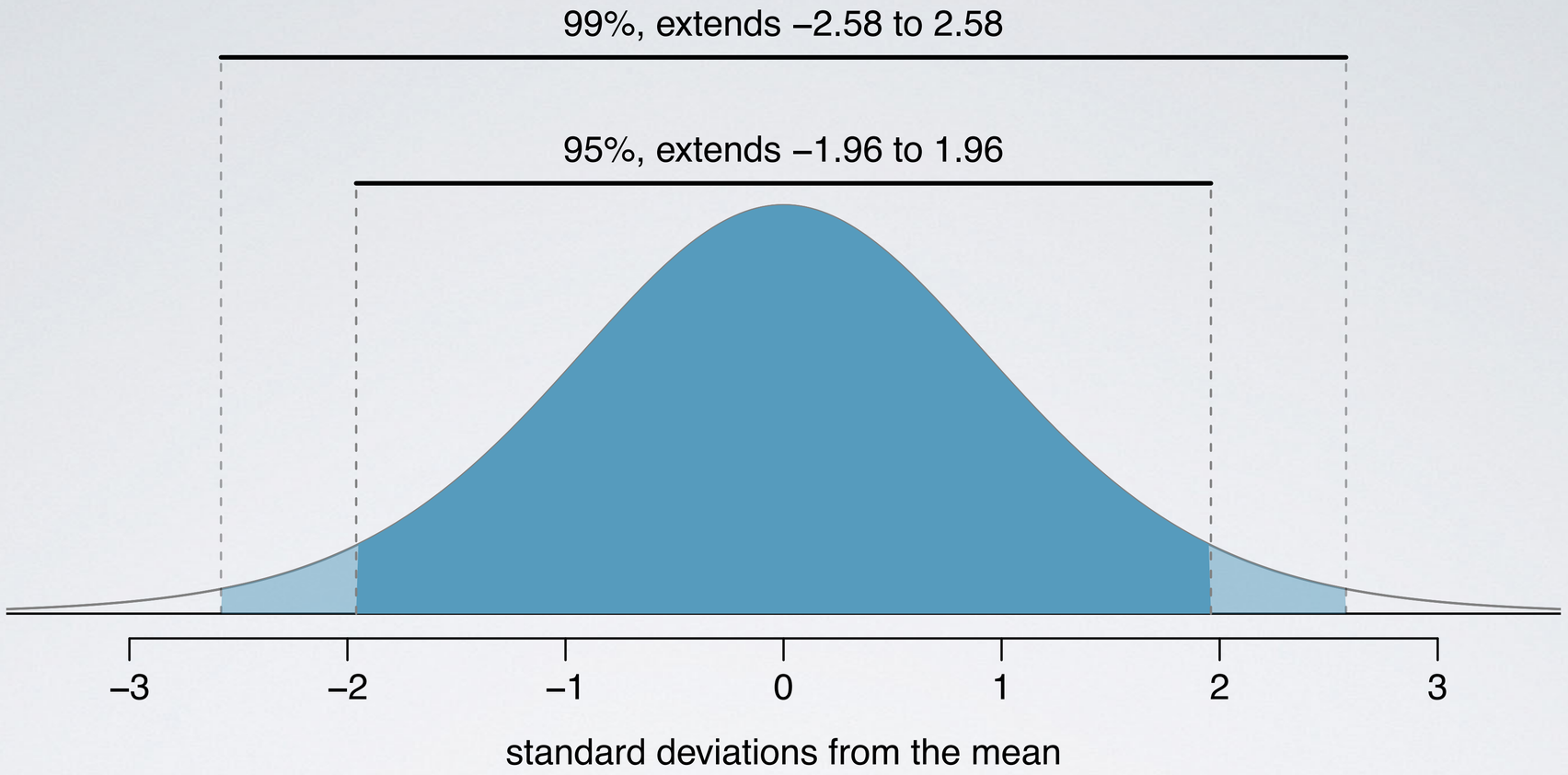
- Then about 95% of those intervals would contain the true population mean (μ).
- Commonly used confidence levels in practice are 90%, 95%, 98%, and 99%.



24 / 25 = 0.96

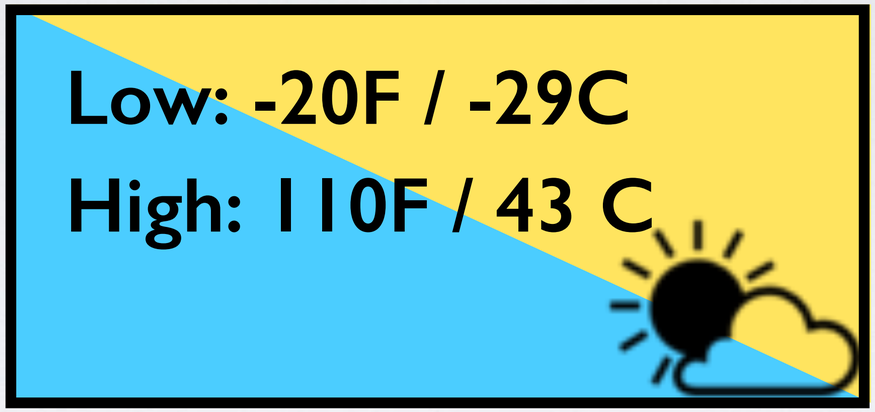
If we want to be very certain that we capture the population parameter, should we use a wider interval or a narrower interval?




99%, extends –2.58 to 2.58
95%, extends –1.96 to 1.96
–3
–2
–1
0
1
2
3
standard deviations from the mean

CL ↑ width ↑

What drawbacks are associated with using a wider interval?



CL ↑ width ↑ accuracy ↑

precision ↓

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How can we get the best of both worlds — higher precision and higher accuracy?

increase sample size

practice

The General Social Survey (GSS) is a sociological survey used to collect data on demographic characteristics and attitudes of residents of the United States. In 2010, the survey collected responses from 1,154 US residents. Based on the survey results, a 95% confidence interval for the average number of hours Americans have to relax or pursue activities that they enjoy after an average work day was found to be 3.53 to 3.83 hours. Determine if each of the following statements are true or false.

F (a) 95% of Americans spend 3.53 to 3.83 hours relaxing after a work day.

T (b) 95% of random samples of 1,154 Americans will yield confidence intervals that contain the true average number of hours Americans spend relaxing after a work day.

F (c) 95% of the time the true average number of hours Americans spend relaxing after a work day is between 3.53 and 3.83 hours.

F (d) We are 95% confident that Americans in this sample spend on average 3.53 to 3.83 hours relaxing after a work day.