

What am I learning today?

How to calculate margin of error and write a confidence statement

**Main Ideas/
Questions**

Sampling Review

Notes

What are the two biased sampling methods?

voluntary response
convenience

What are the three non-biased sampling methods?

SRS
systematic
stratified
*random sampling!

Bias and
Variability

Bias – Consistent, repeated deviation of the sample statistic from the population parameter

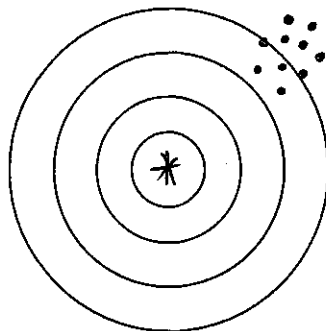
Variability – Describes how spread out the values of the sample statistic are

***Smaller sample → big variability

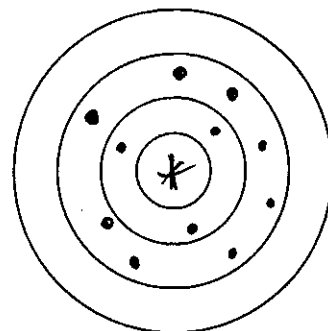
***Larger sample → low variability

A good sampling method has both small bias and small variability

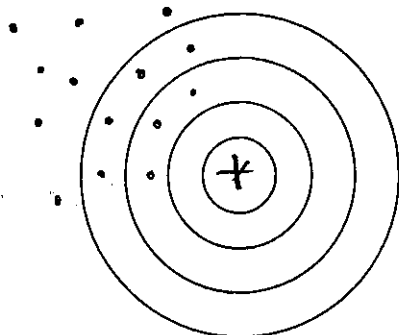
*parameter
• statistic



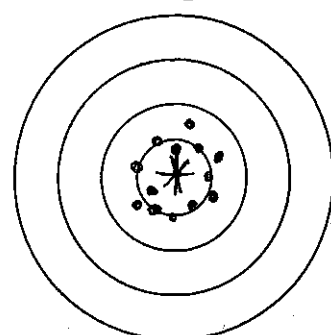
High bias, low variability



Low bias, high variability



High bias, high variability



Low bias, low variability
The best sample

**Main Ideas/
Questions**

Margin of Error

Notes

Margin of Error (M.O.E.) – The maximum expected difference between the true population parameter and sample statistic

Calculation: $\frac{1}{\sqrt{n}}$ n = sample size

Sample Size	Margin of Error
144	0.08 → 8%
400	0.05 → 5%
1000	0.03 → 3%
2000	0.02 → 2%
3000	0.018 → 1.8%
4000	0.015 → 1.5%

$\rightarrow \frac{1}{\sqrt{144}}$

*large margin of error means results are not accurate.

What happens to the margin of error as we increase the sample size?
 AS sample size increases, margin of error decreases

***For this class, we only use a 95% confidence statement**

Confidence Statement – A confidence statement has two parts: a margin of error and a level of confidence. The level of confidence says what percent of all possible samples will satisfy the margin of error.

Confidence statement ALWAYS describe the **population**

Examples

*how many?
 $\frac{\%}{100} (\text{total})$

Example 1: In a survey of 800 people, 20% said they get a haircut once per month.

a) What is the margin of error for the survey?
 $\frac{1}{\sqrt{800}} = 0.04$ $20 - 4 = 16\%$
 $20 + 4 = 24\%$
 $\pm 4\%$

b) Write a confidence statement for this data.

I am 95% confident that between 16% to 24% of all people get a haircut once a month.

Example 2: A survey reported that 2048 respondents out of 3200 had detected a virus on their computer at least once during the last two years.

a) What is the margin of error for the survey?
 $\frac{1}{\sqrt{3200}} = 0.02$ $\pm 2\%$ $64 - 2 = 62$
 $64 + 2 = 66$
 $\pm 2\%$

b) Write a confidence statement for this data.

I am 95% confident that between 62% to 66% of all computers had a virus within the last two years.

$\frac{\% \text{ with a virus}}{\text{total}} = \frac{2048}{3200} = 0.04$
 $\boxed{64\%}$