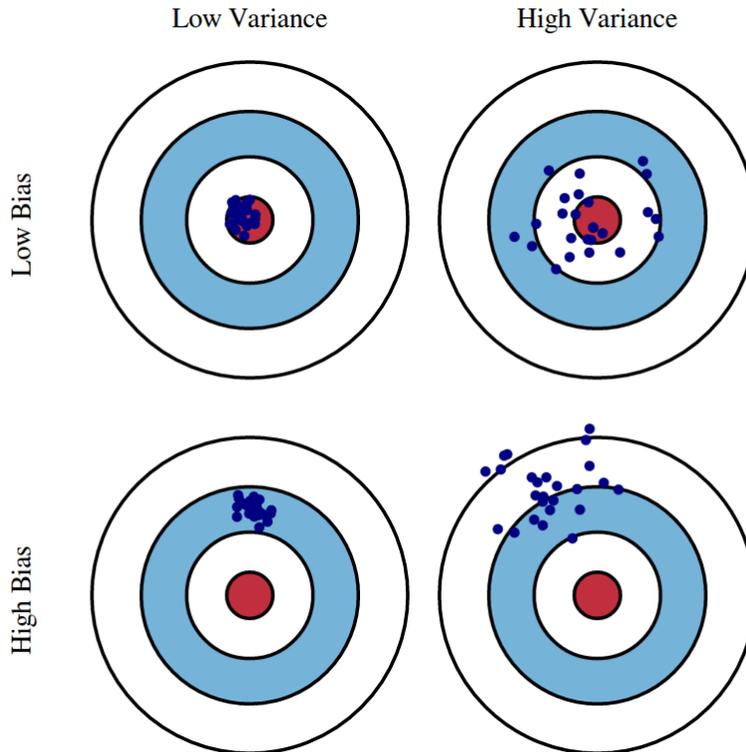


Lesson 26: Bias

Samples are **biased** if they are systematically not representative of the desired population.



Sampling Errors

These are errors that come from the act of choosing a sample. The way the subjects are selected is flawed, causing the results to be inaccurate. Virtually any experiment involving a sample will have sampling error. We can minimize sampling error through various statistical techniques; the most obvious is to increase the sample size.

Sampling errors occur in when the method of selecting subjects is flawed.

Type of Sampling Error Bias	Description	Example
Random Sampling Error	Errors caused by chance variation.	A researcher selects an SRS of 20 ACT takers from a population of 1000. By chance, her sample selects a group of low academic achievers (Ave ACT of 15) and her results are not representative of the population.
Under-coverage	When some groups in the population are left out of the process of choosing a sample.	A classic example of under-coverage is the Literary Digest voter survey, which predicted that Alfred Landon would beat Franklin Roosevelt in the 1936 presidential election. The survey sample suffered from under-coverage of low-income voters, who tended to be Democrats.

Non-sampling error

These occur when the sample data are incorrectly collected, recorded or analyzed. Such an error results from an error other than chance sample fluctuations. Usually occurs when the sample is selected in a non-random fashion with obvious sources of bias.

Non-sampling errors occur when there are flaws in the collection process or analysis of the data.

Type of non-Sampling Error Bias	Description	Example
Non-response	Occurs when an individual chosen for a sample can't be contact or refuses to respond. Non-response is a big problem in mail surveys.	The administration sends out 100 survey questions to a sample of parents in order to gage their attitudes toward the school. Only 23 surveys are returned. We have a non-response rate of 77%.
Untruthful answers	Reasons for lying: Answers are embarrassing. Answers are not socially acceptable Trying to please the interviewer Solution: secret ballots, anonymous surveys, "sensitive question" techniques.	Sensitive Questions: How often do you run red lights? Do you use corporal punishment with your children? One year after the Detroit race riots of 1967, interviewers asked a sample of black residents in Detroit if they felt they could trust most white people, some white people, or none at all. When the interviewer was white, 35% answered "most"; when the interviewer was black, 7% answered "most"
Ignorance	People will give silly answers just so that they won't appear like they know nothing about the subject.	In a study educators were asked how they would rank Princeton's undergraduate business program. In every case, it was rated among the top 10 departments in the country, even though Princeton doesn't offer an undergraduate business major.
Lack of memory	Giving a wrong answer simply because respondent doesn't remember the correct answer.	Students were asked to report their grade point averages. Researchers then determined the actual GPA's. Over 17% of the students reported a GPA that was .4 or more above their actual average, and about 2% reported a GPA more than .4 below their actual GPA. (more inflated their GPA's!)
Timing	When a survey is taken can have an impact on the answers.	In January, the National Football League reported a poll that revealed football as the nation's favorite sport (this is at the time of the Super Bowl)
Phrasing of questions	Subtle differences in phrasing make large differences in the results.	a) Should the president have the line-item veto to eliminate waste? 97% said "yes" b) Should the president have the line item veto? 57% said "yes"

Example Problem: Find all the flaws in the following sampling techniques.

A new grading policy is proposed that changes the grade required to pass a course (grade of D-) from 60% to 70%.

Three methods of surveying the students was proposed in order to gage student opinion:

An administrator stands outside the library during common time and asks a sample of 50 students if they agree with the new policy.

The freshman class advisor holds a meeting and surveys all freshman students.

A link is created on the school website where students can take a survey about the policy. The survey question is "Given that colleges judge our school based on the level of rigor, the administration is proposing to raise the grade required to pass a class a small amount. Do you agree we should implement this change and help our students gain entry to college?"

Daily Data Collection

In groups: Create one GOOD and one BAD method for surveying the students at our school about the grading policy described above. Volunteers will be called upon to share their methods to the class.

HW 26 - Section 4-1:27, 29, 31, 33, 35, 37-42

Project on Implicit Bias

Study for Quiz 8 over lessons 24, 25, 26 reviews 8