

## Are Collected Data Accurate? Bias In Sampling

J. Garvin



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## Bias

When a sample is surveyed, responses are used to make predictions about the population.

If the sample is not representative of the population, then the results may be inaccurate.

If a survey is ambiguous, subjective, or *biased*, then the results may be inaccurate.

*Bias* is any factor that favours certain outcomes or responses, or influences an individual's responses.

Bias may be unintentional (accidental), or intentional (to achieve certain results).

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## Forms of Bias

### Sampling Bias

Selected individuals or elements of the sample are not reflective of the population.

For example, attendees at a Star Trek convention may report that their favourite genre is science fiction.

While this may be representative of the population at the convention, it might not reflect the general population's opinion.

Often, sampling bias can be minimized by selecting individuals from a wider variety of groups.

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## Forms of Bias

### Non-Response Bias

Certain groups are under-represented because they elect not to participate.

For example, a restaurant may give each table a "customer satisfaction" survey with their bill.

Generally, there are two types of people that respond to these surveys: those that really enjoy the service, or those that hate it.

A large portion of diners – those whose opinions are somewhere in between – are not well represented.

When surveying, one method to ensure that a variety of groups are represented is to include questions that identify the group itself.

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## Forms of Bias

### Measurement Bias

An inappropriate data-collection method results in a consistent over- or underestimation of some characteristic of a population.

For example, a principal might want to get an estimate of the number of students who use their cell phones in the hallways.

She might decide to have teachers keep a tally of how many students they see using their cell phones, as they patrol the halls.

Since many students hide their phones when they see a teacher coming, this may not be an accurate data-collection method.

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## Forms of Bias

Other forms of measurement bias comes in the form of *leading questions*.

### Leading Questions

Steer an individual toward certain responses.

For example, the question "do you prefer Coke, Pepsi or another brand of cola best?" is a leading question because a respondent might choose one of the listed colas simply because they were mentioned.

One way to avoid leading questions is to avoid listing specific options.

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## Forms of Bias

Similar to leading questions are *loaded questions*.

### Loaded Questions

Contain wording or information intended to sway a respondent's opinion.

For example, the question "do you support your MP's thoughtless decision to introduce anti-abortion legislation" suggests that the MP is acting without doing much research.

To avoid loaded questions, do not use words or phrases that are based on individual opinions.

## Forms of Bias

### Response Bias

Respondents deliberately give false information.

For example, the results of a survey of college fraternity students indicate that each student drinks approximately 50 alcoholic beverages per week.

While possible, the data are probably skewed by those students who are exaggerating the number of drinks they consume.

When analyzing data, it is important to ask how realistic the data are.

## Forms of Bias

### Your Turn

Identify the type of bias in each scenario.

- A questionnaire asks "who was Canada's greatest Prime Minister: Pierre Trudeau, Sir John A. MacDonal, Brian Mulrooney, or another?" Leading question.
- On its website, a band asks its fans to list their favourite artists. Sampling bias.
- A mall employee asks random walkers-by to participate in a brief survey about shopping habits. Non-response bias.

## Questions?

