The process of scientific inquiry involves...

1. Posing a question or stating an hypothesis.
2. Identifying the population(s) to be studied.
3. Designing the study: the variables of interest
4. Sampling the population
5. Conducting the statistical analysis
6. Drawing conclusions
7. Stating a new hypothesis

New Vocabulary

Observational studies vs Experiment

Observational Studies and Confounded Variables

Sampling:
- Convenience Sampling
- Simple Random Sampling (SRS)
- Stratified Sampling
- Systematic Sampling
- Cluster Sampling

Types of Bias

Undercoverage
Non-response
Observational vs Experimental Studies

Types of Studies

<table>
<thead>
<tr>
<th>Observational</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observes</td>
<td>Imposes some treatment</td>
</tr>
<tr>
<td>Does not influence responses</td>
<td>Tries to influence responses</td>
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</tbody>
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Observational Studies vs Experiment

Which of these studies is an observational study and which is an experiment?

1. Is the average amount of sugar per serving in cereals on the lowest shelf higher or lower than average sugar per serving for cereals on the highest shelf?

2. Is the average wait time at the bookstore the same on Monday as on Tuesday during the first week?

3. Which gender is more likely to take the bus?

4. Do women take more time to compare two brands of chips or to compare two brands of soda?
Observational or Experimental?

Eating lots of whole grains could ward off high blood pressure, according to a study in the American Journal of Clinical Nutrition. In the study, men with the highest whole-grain consumption were 19 percent less likely to develop high blood pressure than men who ate the least amount of whole grains.

Observational Studies and Confounded (lurking) Variables

A study was done in Chicago regarding the number of firefighters at a fire and the cost of damage done by the fire. They found that the more firefighters that go to a fire the higher the cost of damage done.

When we are unable to distinguish the effects of two variables they are called confounded.
Facebook causes lower grades?

Aryn Karpinski, an education researcher at Ohio State University, found that Facebook user GPAs were in the 3.0 to 3.5 range on average, compared to 3.5 to 4.0 for non-users.

Facebook users also studied anywhere from one to five hours per week, compared to non-users who studied 11 to 15 or more hours per week.

However, Karpinski emphasized that correlation does not equal causation, meaning Facebook use might not be the culprit behind lower GPAs or less study time.

Sampling

Types of Bias

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Simple Random Sampling (SRS)
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Systematic Sampling
🌟 Cluster Sampling
Designing Experiments

Experiment vs Observational Study

Explanatory Variable vs Response Variable

Factors and Treatments

Control
Blocks
Blind
Double Blind