

Observational Studies Versus Designed Experiments

Definitions

- Explanatory Variable: The variable that explains what is happening
- Response Variable: The variable that is “controlled” by the explanatory variable

Example: Number of hours playing video games explains your grade on a test.

Definitions

- Observational Study = measures the value of the response variable without attempting to influence the value of either the response or explanatory variables. That is, in an observational study, the researcher observes the behavior of the individuals without trying to influence the outcome of the study.
- Designed Experiment = applies a treatment to individuals (referred to as experimental units or subjects) and attempts to isolate the effects of the treatment on a response variable

1. Determine whether the study depicts an observational study or an experiment (Similar to p.20 #9-16)

Amato (1989) observed caretakers of children in public places in California and Nebraska. He found that 43% of the children he observed had male caretakers. Males were more involved with their children in recreational settings such as playgrounds, but in restaurants, females were more involved.

Source:
<http://peace.saumag.edu/faculty/kardas/Courses/RMPA/naturalisticobservation.html>

2. Determine whether the study depicts an observational study or an experiment (Similar to p.20 #9-16)

A team of researchers at the [University of California Berkeley](http://www.berkeley.edu) has discovered a way of genetically modifying the gender of frogs. When the scientists treated a group of male frogs with atrazine, “Some of the animals will be demasculinized, some become feminized, some become hermaphrodites and some of the frogs are actually being converted into reproductively active females.”

Source:
http://archive.dailycal.org/article/108509/herbicide_turns_male_frogs_in_to_females_researcher

3. Determine whether the study depicts an observational study or an experiment (Similar to p.20 #9-16)

Graham and Wells (2001) conducted a study of bar patrons by recording late night aggressive behavior in a Canadian tavern. They observed and interviewed 117 aggressive incidents were observed during the 93 nights of the study. Most of the observation periods were weekend nights between midnight and 2:30 a.m.; the patrons were unaware that research was being conducted. The researchers documented patterns of aggressive behavior in this particular bar. For example, they found that nearly 75% of the incidents involved males only. Also, moderate or higher levels of physical aggression were observed in 67% of the incidents. About 33% of the incidents occurred outside of the bar’s premises. Graham and Wells identified several triggers for aggression in bars, including problems with bar staff, rowdy behavior, and interpersonal relationship problems.

Source:
<http://peace.saumag.edu/faculty/kardas/Courses/RMPA/naturalisticobservation.html>

4. Determine whether the study depicts an observational study or an experiment (Similar to p.20 #9-16)

"A recent study in the *Journal of Marketing Communications* found that men with beards were deemed more credible than those who were clean-shaven. The study showed participants pictures of men endorsing certain products. In some photos, the men were clean-shaven. In others, the same men had beards. Participants thought the men with beards had greater expertise and were significantly more trustworthy when they were endorsing products like cell phones and toothpaste."

Source: <http://chronicle.com/blogs/percolator/the-trustworthiness-of-beards/22581>

5. Determine whether the study depicts an observational study or an experiment (Similar to p.20 #9-16)

"A systematic study of the beneficial and adverse consequences of long-term elevations in the plasma levels of bovine growth hormone (bGH) was conducted on two lines of transgenic pigs. Two successive generations of pigs expressing the bGH gene showed significant improvements in both daily weight gain and feed efficiency and exhibited changes in carcass composition that included a marked reduction in subcutaneous fat."

Source: <http://www.sciencemag.org/content/244/4910/1281.short>

Definitions

- Confounding = Occurs in a study when the effects of two or more explanatory variables are not separated. Therefore, any relation that may exist between an explanatory variable and the response variable may be due to some other variable or variables not accounted for in the study

Definitions

- Lurking Variable = An explanatory variables that was not considered in a study, but that affects the value of the response variable in the study

Note: "Observational studies do not allow a researcher to claim causation, only association"

Various Types of Observational Studies

- Cross-sectional Studies: collect information about individuals at a specific point in time or over a very short period of time.
- Case-control Studies: These studies are retrospective, meaning that they require individuals to look back in time or require the researcher to look at existing records

Various Types of Observational Studies

- Cohort Studies: Identifies individuals and studies them over an extended period of time

Definitions

Census = a list of all individuals in a population along with certain characteristics of each individual

Note: Census costs a lot. The U.S. Census in 2010 cost \$5.4 billion.