

Basic Research Methods

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Theory

- A general principle that's proposed to explain how a number of separate facts are related.
 - It's an idea about a relationship.
- To test whether a theory is correct or not, we need to do *research*.
- Since theories are stated in general terms, we need to define accurately what we will be doing in our experiment to test if the theory is true or not.

Variables & Hypothesis

- Independent Variable
 - The variable that is manipulated by the experimenter
 - Also called the input variable
- Dependent Variable
 - The results of the experiment
 - Also called the outcome variable
- By defining the variables that are used to test a theory a *Hypothesis* is derived, which is a testable form of a theory.

Sample Theory

- “Sports car drivers are aggressive in the way they drive.”
 - Independent Variable is the type of car the subject drives (compact, sedan, SUV, sports, etc.)
 - Dependent Variable is aggressive behavior
- Define “aggressive”
 - Exceeding the speed limit
 - Cutting off other drivers in traffic
 - Running a traffic light

Sample Hypothesis

- “Sports car drivers exceed the speed limit more often than drivers of other types of cars.”
- “Sports car drivers exceed the speed limit by more (measured in mph) than drivers of other types of cars.”

Research Biases

- Some aspects of research that can contaminate results, affecting accuracy
 - Called a bias
- Selection Bias
 - Differences between groups that are present at the beginning of the experiment and are not calibrated or adjusted for.
- Placebo Effect
 - Influencing of performance due to the subject's belief about the results.
 - The proverbial sugar pill.
- Experimenter Bias
 - Conflict of interest. The researcher has a stake in controlling the outcome of the experiment for some personal gain.

Controlling Bias

- Random Assignment to control for Selection Bias
 - Subjects are assigned to groups by chance
- Blind Study to control for the Placebo Effect
 - Subjects are unaware of the expected results of the experiment
- Double-Blind Study to control for Experimenter's Bias
 - The administrator of the study is also unaware of the expected results of the experiment

Control and Treatment Groups

- One common experimental methodology is to compare the effect of a treatment on two roughly homogenous populations
 - The Control Group performs a task without the treatment
 - The Treatment Group performs the same task but receives the treatment
 - If similarity of the groups is a given, a difference in outcomes is ascribed to the treatment

Standardization

- Specific set of instructions for conducting the experiment and collecting the data
 - Subjects are all given the same instructions
 - Experiment is conducted in the same manner
 - Data is collected in the same way
- Allows for replication of the experiment to validate its findings
 - Other populations
 - Other researchers

Other types of investigations

- Observation
 - Observing behavior in a “natural” environment
 - Often involves counting and measuring behaviors, such as how often, or how “intense”
 - Not manipulated by the researcher
 - Qualitative data primarily
 - Subject to the Hawthorne Effect
 - Behaviors can be hard to define operationally (e.g. what is aggressive behavior?)

Other types of investigations

- Case Study
 - Follows a single case, often over an extended period of time
 - Can involve many measures and instruments, from observations, to interviews, to the application of a treatment
 - Can yield both qualitative and quantitative data
 - Good for specific interventions
 - Hard to generalize results to other cases and other populations

Other types of investigations

- Survey
 - Used to gather opinions along with demographic data
 - Assembles large quantities of data in a relatively short period of time, and from larger samples (especially considering internet surveys)
 - Data is generally not very reliable, it's often “noisy”, and it fluctuates widely
 - Subject to all kinds of bias, such as the Placebo Effect (subject anticipates a “correct” answer) and Experimenter's Bias (the way the questions are worded favor certain responses)

Human Subjects Research

- Although Social Science research does not involve, say, injecting patients with experimental drugs, it is subject to the same protocols as clinical medicine in order to protect the subjects of the experiment.
- US law regarding research on human subjects was formed in reaction to the war crimes of the Axis powers in WWII, and also to cases in the US such as the Tuskegee syphilis experiment.

Human Subjects Research

- In survey research and opinion polling the subject is often called a *respondent*.
- US Federal Guidelines defines a human subject as:
 - “A living individual about whom an investigator conducting research obtains 1) Data through intervention or interaction with the individual, or 2) Identifiable private information.”

Human Research Subjects' Rights

1. To have enough time to decide whether or not to be in the research study and to make that decision without any pressure from the people who are conducting the research. 2. To refuse to be in the study at all, and to stop participating at any time after you begin the study. 3. To be told what the study is trying to find out, what will happen to you, and what you will be asked to do if you are in the study. 4. To be told about the reasonably foreseeable risks of being in the study. 5. To be told about the possible benefits of being in the study. 6. To be told whether there are any costs associated with being in the study and whether you will be compensated for participating in the study. 7. To be told who will have access to information collected about you, and how your confidentiality will be protected. 8. To be told whom to contact with questions about the research, about research-related injury, and about your rights as a research subject. If the study involves treatment or therapy: 9. To be told about the other non-research treatment choices you have. 10. To be told where treatment is available should you have a research-related injury, and who will pay for research-related treatment.

- From the University of Iowa Institutional Review Board

SBU's Institutional Review Board

- In order to receive approval to conduct a study, the investigator must:
 - Complete the CORIHS training on Human Subjects Research and obtain certification
 - Fill out the application and submit it to the review board
 - Submit a study protocol
 - Submit all measurement instruments, such as surveys, pre- and post- tests, etc.
 - Submit permissions as required