

Textbook: Chapter 1 (pg 16-45)

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Definitions

- Case study: an observation technique in which one person is studied in depth in the hope of revealing universal principles
- Confounding variable: a factor other than the independent variable that might produce an effect in an experiment
- Control group: in an experiment, the group that is not exposed to the treatment; contrasts with the experimental groups and serves as a comparison for evaluating the effect of the treatment
- Correlation: a measure of the extent to which two factors vary together, and thus of how well either factor predicts the other
- Correlation coefficient: a statistical index of the relationship between two things (from -1 to +1)
- Critical thinking: thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, discerns hidden values, evaluates evidence and assesses conclusions.
- Culture: the enduring behaviors, ideas, attitudes, values and traditions shared by a group of people and transmitted from one generation to the next
- Debriefing: the post-experimental explanation of a study, including its purpose and any deceptions, to its participants
- Dependent variable: the outcome factor; the variable that may change in response to manipulations of the independent variable
- Double-blind procedure: an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies.
- Experiment: a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By random assignment of participants, the experimenter aims to control other relevant factors.
- Experimental group: in an experiment, the group that is exposed to the treatment, that is, to one version of the independent variable
- Hindsight bias: the tendency to believe, after learning an outcome, that one would have foreseen it (aka. I knew it all along phenomenon)
- Hypothesis: a testable prediction, often implied by a theory
- Independent variable: the experimental factor that is manipulated; the variable whose effect is being studied
- Informed consent: an ethical principle that research participants be told enough to enable them to choose whether they wish to participate
- Mean: the arithmetic average of a distribution, obtained by adding the scores and then dividing by the number of scores
- Median: the middle score in a distribution; half the scores are above it and half are below it
- Mode: the most frequently occurring score in a distribution
- Naturalistic observations: observing and recording behavior in naturally occurring situations without trying to manipulate and control the situation
- Normal curve (distribution): a symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (about 68% fall within one standard deviation) and fewer and fewer near the extremes
- Operational definition: a statement of the procedures (operations) used to define research variables. For example, human intelligence may be operationally defined as "what an intelligence test measures"
- Placebo effect: experimental results caused by expectations alone; any effect on behavior caused by the administration of an inert substance or condition, which the recipient assumes is an active agent
- Population: all the cases in a group being studied, from which samples may be drawn
- Random assignment: assigning participants to experimental and control groups by chance, thus minimizing preexisting differences between those assigned to the different groups
- Random sample: a sample that fairly represents a population because each member has an equal chance of inclusion
- Range: the difference between the highest and lowest scores in a distribution
- Replication: repeating the essence of a research study, usually with different participants in different situations,

- to see whether the basic finding extends to other participants and circumstances
- Scatterplot: a graphed cluster of dots, each of which represents the values of two variables. The slope of the points suggests the direction of the relationship between the two variables. The amount of scatter suggests the strength of the correlation (little scatter indicates higher correlation and vice versa)
- Standard deviation: a computed measure of how much scores vary around the mean score
- Statistical significance: a statistical statement of how likely it is that an obtained result occurred by chance
- Survey: a technique for ascertaining the self-reported attitudes or behaviors of a particular group, usually by questioning a representative, random sample of the group
- Theory: an explanation using an integrated set of principles that organizes observations and predicts behaviors or events

The Need for Psychological Science

- We rely too heavily on intuition and common sense, this is demonstrated by three phenomena:
 - o Hindsight bias: the tendency to believe, after learning an outcome, that one would have foreseen it (aka. I knew it all along phenomenon)
 - o Overconfidence
 - Humans tend to think we know more than we do
 - o Perceiving Order in Random Events
 - Random sequences often don't look random and are over-interpreted
 - With a large enough sample, even extremely unlikely events occur

The Scientific Attitude: Curious, Skeptical and Humble

- Curiosity is a passion to explore and understand without misleading or being misled
- Skepticism- testing out hypotheses to see if they are true
 - o When ideas compete, skeptical testing can reveal which one best matched the facts
- Psychologists ask two questions:
 - o What do you mean?
 - o How do you know?
- Humility: an awareness of our own vulnerability to error and an openness to surprises and new perspectives

Critical Thinking

- Definition: thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, discerns hidden values, evaluates evidence and assesses conclusions. Smart thinking.
- Helps remove bias
- Can result in surprising truths and debunk popular misconceptions
- Ask questions like:
 - o How do they know that?
 - o What's the person's agenda?
 - o What is the conclusion based on?
 - o Are there alternate explanations?

How Do Psychologists Ask and Answer Questions

- The Scientific Method: a self-correcting process for evaluating ideas with observation and analysis
 - o Theory: an explanation using an integrated set of principles that organizes observations and predicts behaviors or events
 - A good theory produces testable hypotheses (predictions)
 - Theories can bias observation- we may see what we expect to see (interpret ambiguous data to fit the theory)
 - A theory is useful if it:
 - Organizes a range of self-reports and observations
 - Implies prediction that anyone can use to check the theory or to derive practical applications
 - o Hypothesis: a testable prediction, often implied by a theory
 - Specify what results would support a theory and vice versa
 - o Operational definition: a statement of the procedures (operations) used to define research variables. For example, human intelligence may be operationally defined as "what an intelligence test measures"
 - Used to minimize bias
 - Using operational definitions, others can replicate the data
 - o Replication: repeating the essence of a research study, usually with different participants in different

- situations, to see whether the basic finding extends to other participants and circumstances
 - We can test our hypotheses and refine theories using:
 - Descriptive methods: describe behaviors, often through case studies, surveys or naturalistic observations
 - Correlational method: associate different factors
 - Experimental method: manipulate factors to discover their effects
- Description
 - The Case Study
 - Definition: an observation technique in which one person is studied in depth in the hope of revealing universal principles
 - They show what can happen and they often suggest directions for further study
 - However, individual cases may mislead us if the individual is atypical
 - Unrepresentative information can lead to mistaken judgments and false conclusions
 - Naturalistic Observations
 - Definition: observing and recording behavior in naturally occurring situations without trying to manipulate and control the situation
 - Does not explain behavior, it describes behavior (may not always understand the "why" behind the behavior)
 - The Survey
 - Definition: a technique for ascertaining the self-reported attitudes or behaviors of a particular group, usually by questioning a representative, random sample of the group
 - Wording effects
 - Even subtle changes in the order or wording of question can have major effects
 - Some words have negative connotations
 - ◆ Example: revenue enhancers vs. taxes
 - Random sampling
 - People tend to generalize
 - Depending on sample, generalizations based on that sample may be incredibly inaccurate
 - The best basis for generalization is from a representative sample of a population, or a random sample
 - Population: all the cases in a group being studied, from which samples may be drawn
 - Random sample: a sample that fairly represents a population because each member has an equal chance of inclusion
 - Large representative samples are better than small representative samples
 - Small representative samples are better than large unrepresentative samples
 - You cannot compensate for an unrepresentative sample by simply adding more people
 - Sampling bias- when the survey groups is not representative of the population being studied
- Correlation
 - Descriptions (survey, naturalistic observations) can show that one trait/behavior is related to another (the two correlate)
 - Correlation: a measure of the extent to which two factors vary together, and thus of how well either factor predicts the other
 - Positive correlation: direct relationship (positive value)
 - Negative correlation: inverse relationship (negative value)
 - Correlation coefficient: a statistical index of the relationship between two things (from -1 to +1); how well one predicts the other
 - Scatterplot: a graphed cluster of dots, each of which represents the values of two variables. The slope of the points suggests the direction of the relationship between the two variables. The amount of scatter suggests the strength of the correlation (little scatter indicates higher correlation and vice versa)
 - Correlation and Causation
 - Association does NOT prove causation
 - Correlation indicates the possibility of a cause-effect relationship, but does not prove such
- Experimentation
 - Experiment: a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By random assignment of participants, the experimenter aims to control other relevant factors.
 - Manipulate factors of interest to determine their effect
 - Holding constant other factors

- Researchers use an experimental and control group, participants are randomly assigned into a group
 - Experimental group: in an experiment, the group that is exposed to the treatment, that is, to one version of the independent variable
 - Control group: in an experiment, the group that is not exposed to the treatment; contrasts with the experimental groups and serves as a comparison for evaluating the effect of the treatment
 - Random assignment: assigning participants to experimental and control groups by chance, thus minimizing preexisting differences between those assigned to the different groups
 - Eliminates all the factors except the one being studied
 - Therefore, if the two groups have different results, the treatment had an effect
 - Double-blind procedure: an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies.
 - This design controls for the possibility of the placebo effect
 - Placebo effect: experimental results caused by expectations alone; any effect on behavior caused by the administration of an inert substance or condition, which the recipient assumes is an active agent
 - Independent and Dependent Variables
 - Independent variable: the experimental factor that is manipulated; the variable whose effect is being studied
 - Confounding variable: a factor other than the independent variable that might produce an effect in an experiment
 - Random assignment controls for confounding variables
 - Dependent variable: the outcome factor; the variable that may change in response to manipulations of the independent variable
 - Both dependent and independent variable are given operational definitions (a statement of the procedures [operations] used to define research variables)
 - Experiments are intended for the laboratory environment to be a simplified reality
 - It is the resulting principle, not the specific findings, that can be applied to everyday behaviors
- Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What is Manipulated	Weakness
Descriptive	To observe and record behavior	Do case studies, naturalistic observations or surveys	Nothing	No control of variables; single case may be misleading
Correlational	To detect naturally occurring relationships; assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Does not specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	Independent variable	Sometimes not possible; results may not be true in all contexts; not ethical to manipulate certain variables

Statistics

- Statistics are tools used in research to better interpret data
- Describing Data
 - Make a simple bar graph (always look at the units on the axes)
 - Measures of Central Tendency- a single score that represent a whole set of scores
 - Mean: the arithmetic average of a distribution, obtained by adding the scores and then dividing by the number of scores
 - There can be a few extreme (high or low) scores that distort the value
 - Median: the middle score in a distribution; half the scores are above it and half are below it
 - Mode: the most frequently occurring score in a distribution
 - Measure of Variation- how similar or diverse the score are

- Averages derived from data with low variability are more reliable than scores derived from data with high variability
- Range: the difference between the highest and lowest scores in a distribution
 - Gives a crude estimation of variance (can also be skewed by a couple extreme scores)
- Standard deviation: a computed measure of how much scores vary around the mean score
 - If the data is closely packed around the mean or more dispersed
 - Normal curve (distribution): a symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (about 68% fall within one standard deviation; 95% fall within two standard deviations) and fewer and fewer near the extremes
- Significant Differences
 - Average scores can differ slightly due to chance fluctuations, not actual differences
 - When is an observable difference reliable?
 - Representative samples are better than biased samples
 - Less-variable observations are more reliable than those that are more variable
 - More cases are better than fewer
 - Averages based on more cases are more reliable
 - When is a difference significant?
 - Statistical testing can estimate the probability of the result occurring by chance
 - Statistical significance: a statistical statement of how likely it is that an obtained result occurred by chance
 - When the sample averages are reliable and when the difference between them is relatively large (difference is probably not due to chance)
 - Most find it significant if it is less than 5%

Does behavior depend on culture and gender?

- Culture: the enduring behaviors, ideas, attitudes, values and traditions shared by a group of people and transmitted from one generation to the next
- Culture shapes behavior
- There are differences between those of different genders
- Biological processing unites those of different cultures and gender

Human and Animal Research

- Humans are animals, research animals can be very informative
 - Treatments for human diseases
 - Can better understand humans by looking at simpler organisms
- There are standards for the treatment and care of lab animals in many countries
- Human studies
 - Are much more mild (not harmful)
 - Participants are not given all the information beforehand so that they don't purposefully try to confirm or deny the researchers predictions
 - AMA ethics code for researchers
 - Obtain informed consent from participants
 - Informed consent: an ethical principle that research participants be told enough to enable them to choose whether they wish to participate
 - Protect them from harm and discomfort
 - Keep information about the individuals confidential
 - Fully debrief people
 - Debriefing: the post-experimental explanation of a study, including its purpose and any deceptions, to its participants