Thinking About Psychology: The Science of Mind and Behavior 2e

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Methods Domain
Why is Research Important?
Research Methods


• Follow with a discussion on the unbiased scientific research.
Scientific Method

• Method of learning about the world through the application of critical thinking and tools such as observation, experimentation, and statistical analysis

• Through its use, psychology is thereby considered a science.
Research and Research Methodology

• Method of asking questions then drawing logical supported conclusions

• Researchers need to be able to determine if conclusions are reasonable or not (critical thinking).
Common Sense

• Conclusions based solely on personal experience and sensible logic
• Can lead to incorrect conclusions

Table 4.1

The Limits of Common Sense
Common sense leaves us unsure of the truth, but research helps us apply principles appropriately in different situations.

COMMON SENSE SAYS . . .
Opposites attract and Birds of a feather flock together
Out of sight, out of mind and Absence makes the heart grow fonder
Nothing ventured, nothing gained and A penny saved is a penny earned
Module 4: Research Strategies

Observation and Bias
Observation

- Gathering of information by simply watching subjects
- Can lead to bias
Confirmation Bias

• A tendency to search for information that confirms a preconception
• Means to lower confirmation bias
  – Objective observation
  – Critical thinking
Critical Thinking

• Thinking that does not blindly accept arguments or conclusions
• Questions the argument’s or conclusion’s validity
Participant Bias

• Tendency of research subjects to behave in a certain way because they know they are being observed or they believe they know what the researcher wants

• Can be reduced by naturalistic observation
Naturalistic Observation

- Observing and recording behavior in naturally occurring situations without manipulating or controlling the situation
- Method of observation where subjects are observed in their “natural” environment
- Subjects are not aware they are being watched
- Could use hidden cameras or two way mirrors
Module 4: Research Strategies

Case Studies
Case Study

• A research technique in which one person is studied in depth in the hope of revealing universal principles

• This technique is very open to bias

• Difficulty of applying data from one person to everyone
Module 4: Research Strategies

Correlation
Correlational Study

• A research project strategy the investigates the degree to which two variables are related to one another
How to Read a Correlation

Correlation coefficient $r = +.37$
How to Read a Correlation

Correlation coefficient

Indicates direction of relationship (positive or negative)

$r = +.37$
How to Read a Correlation

Correlation coefficient

Indicates direction of relationship (positive or negative)

$r = +.37$

Indicates strength of relationship (0.00 to 1.00)
Positive Correlation

• As the value of one variable increases (or decreases) so does the value of the other variable.
• A perfect positive correlation is +1.0.
• The closer the correlation is to +1.0, the stronger the relationship.
Perfect positive correlation

Effectiveness of studying

Less

More

Frequency of wearing headphones

Less

More
Moderate positive correlation

Effectiveness of studying

Frequency of wearing headphones

More

Less

More

Less
Negative Correlation

• As the value of one variable increases, the value of the other variable decreases.
• A perfect negative correlation is -1.0.
• The closer the correlation is to -1.0, the stronger the relationship.
Perfect negative correlation

Effectiveness of studying

More

Less

Frequency of wearing headphones

More

Less
Moderate negative correlation

Effectiveness of studying

Frequency of wearing headphones

More

Less

More

Less
Zero Correlation

• There is no relationship whatsoever between the two variables.
Correlational Study

• Important NOT to imply a cause and effect relationship between the variables
• Correlational study does not determine why the two variables are related--just that they are related.
• Correlational studies are helpful in making predictions.
(1) TV watching could cause Lower GPA

OR
(1) TV watching could cause Lower GPA

OR

(2) Low GPA could cause TV watching

OR
(1) TV watching could cause Lower GPA

OR

(2) Low GPA could cause TV watching

OR

(3) Low intelligence could cause AND Lower GPA
Module 4: Research Strategies

Surveys
Survey Method

- A research technique that questions a sample of people to collect information about their attitudes or behaviors.
- Research method that relies on self-reports; uses surveys, questionnaires, interviews.
- Usually a very efficient and inexpensive method.
Population

- The entire group of people about whom you would like to know something
- Total large group being studied from which a sample is drawn for a study
Random Sample

• A sample that fairly represents a population because each member of the population has an equal chance of being included

• If a sample is not random it is said to be biased.
Module 4: Research Strategies

Longitudinal and Cross-Sectional Studies
Longitudinal Study

• A research technique that follows the same group of individuals over a long period
• Can be very expensive and difficult to conduct
Cross-Sectional Study

- A research technique that compares individuals from different age groups at one time
- Study a number of subjects from different age groups and then compare the results
- Cheaper, easier than longitudinal studies, but group differences may be due to factors other than development.
Longitudinal/Cross Sectional Study
Module 4: Research Strategies

Experiments: Hypotheses and Operational Definitions
Experiment

• A research method in which the researcher manipulates and controls certain variable to observe the effects on other variables
Experimental Method

Hypothesis

• A testable prediction of the outcome of the experiment or research
Operational Definitions

• An explanation of the exact procedures used to make a variable specific and measurable for research purposes
• A specification of the exact procedures used to make a variable measurable
• In evaluating others’ research, first determine if you agree with the researchers’ operational definitions.
Experiments:
Independent and Dependent Variables
Independent Variable

• The variable that the researcher will actively manipulate and, if the hypothesis is correct, that will cause a change in the dependent variable
• The experimental variable which causes something to happen
• The “cause variable”
• The variable manipulated by the experimenter
Dependent Variable

• The variable that should show the effect of the independent variable
• The “effect variable”
• The outcome of the experiment
• The variable being measured
Experiments: Groups, Random Assignment, and Confounding Variables
Experimental Group

• The participants in an experiment who are exposed to the independent variable
• Also called the experimental condition
• The group being studied and compared to the control group
Control Group

• The participants in an experiment who are not exposed to the independent variable
• Results are compared to those of the experimental group
• Also called the control condition
Experimental Design

All study hall students
Experimental Design

All study hall students → 40 students randomly selected
Experimental Design

All study hall students → 40 students randomly selected
Experimental Design

All study hall students

40 students randomly selected

20 students randomly assigned to experimental group
Experimental Design

1. All study hall students
2. 40 students randomly selected
3. 20 students randomly assigned to experimental group
4. Wear headphones daily in study hall
Experimental Design

- All study hall students
- 40 students randomly selected
- 20 students randomly assigned to experimental group
- Wear headphones daily in study hall
- Average grades at the end of the quarter
Experimental Design

All study hall students

40 students randomly selected

20 students randomly assigned to experimental group

Wear headphones daily in study hall

20 students randomly assigned to control group

Average grades at the end of the quarter
Experimental Design

All study hall students → 40 students randomly selected → 20 students randomly assigned to experimental group → Wear headphones daily in study hall → Average grades at the end of the quarter

→ 20 students randomly assigned to control group → Not allowed to wear headphones in study hall
Experimental Design

All study hall students

40 students randomly selected

20 students randomly assigned to experimental group

Wear headphones daily in study hall

Average grades at the end of the quarter

20 students randomly assigned to control group

Not allowed to wear headphones in study hall

Average grades at the end of the quarter
Confounding Variables

• Variables, other than the independent variable, which could inadvertently influence the dependent variable
• These variables should be controlled for in order to draw a true, cause-effect relationship in the experiment.
• Many confounding variables can be eliminated through random assignment.
Random Assignment

• A procedure for creating groups that allows the researcher to control for individual differences among research participants.

• Assigning participants to the control and experimental groups by chance

• Each participant should have an equal chance of being assigned into either group.
Experiments

• Play “Experimental Design” (7:24) Segment #3 from Psychology: The Human Experience
Confounding Variable

• In an experiment, a variable other than the independent variable that could produce a change in the dependent variable

• The variable “confounds” the results
Module 4: Research Strategies

Experiments: Control for Other Confounding Variables
Confounding Variables: Environmental Differences

• Any differences in the experiment’s conditions--between the experimental and control groups

• Differences include temperature, lighting, noise levels, distractions, etc.

• Ideally, there should be a minimum of environmental differences between the two groups.
Confounding Variables: Expectation Effects

- Any changes in an experiment’s results due to the subject anticipating certain outcomes to the experiment
Experimental group: Studies with headphones → Average end-of-quarter grades

Control group: Studies without headphones → Average end-of-quarter grades
Confounding variables: Any variable other than the IV that might account for the group differences on the DV.
Experimental group
Studies with headphones
Average end-of-quarter grades

Control group
Studies without headphones
Average end-of-quarter grades

Confounding variables: Any variable other than the IV that might account for the group differences on the DV.

Individual differences among participants?
- Was the experimental group healthier?
- Did the control group experience more personal problems?
Individual differences among participants?
- Was the experimental group healthier?
- Did the control group experience more personal problems?

Environmental differences?
- Did both groups study at the same time of day?
- Were room temperature and lighting conditions the same for both groups?

Confounding variables: Any variable other than the IV that might account for the group differences on the DV.
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- Individual differences among participants?
  - Was the experimental group healthier?
  - Did the control group experience more personal problems?

- Environmental differences?
  - Did both groups study at the same time of day?
  - Were room temperature and lighting conditions the same for both groups?

- Expectation effects?
  - Did the experimental group expect to do better?
  - Did the researchers expect the experimental group to do better?
An experiment must demonstrate adequate control for all potential confounding variables to allow the conclusion of a cause-and-effect relationship between the IV and the DV.
Blind procedure

• An experimental procedure where the research participants are ignorant (blind) to the expected outcome of the experiment

• Sometimes called single blind procedure
Double Blind Procedure

• A research procedure in which both the data collectors and the research participants do not know the expected outcome of the experiment.

• Both groups are ignorant (blind) to the experiment’s purpose or expected results
Placebo

• A non-active substance or condition administered instead of a drug or active agent

• Many times an inactive pill that has no known effect

• Given to the control group
Placebo Effect

• Play “The Placebo Effect: Mind-Body Relationship” (9:14) Segment #3 from The Mind: Psychology Teaching Modules (2nd edition)
Module 4: Research Strategies

Experiments: Data Analysis
Statistically Significant

- Possibility that the differences in results between the experimental and control groups could have occurred by chance is no more than 5 percent
- Must be at least 95% certain the differences between the groups is due to the independent variable
Experiments:
Replication
Replication

• To repeat the essence of a research study to see whether the results can be reliably reproduced
• Repeating the experiment to determine if similar results are found
• If so, the research is considered reliable.
The Experiment Step by Step

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## The Experiment Step by Step

**Table 4.2**

The Experiments Step By Step

1. Develop the *hypothesis*.
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1. Develop the *hypothesis*.
2. Create *operational definitions* for the *independent variable (IV)* and *dependent variable (DV)*.
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The Experiment Step by Step

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6. Control for other *confounding variables* by using a *double-blind procedure* and treating both groups the same except for exposure to the IV.
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7. Learn the effect of the IV by measuring the DV for both groups.
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<td>8.</td>
<td>Use statistical analysis to discover whether the difference in the DV between the two groups is likely to have been caused by the manipulation of the IV.</td>
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Experimental Method

• Play “Tackling a Killer Disease” (10:07) Segment #1 from Scientific American Frontiers: Video Collection for Introductory Psychology (2nd edition)
Module 4: Research Strategies

Research Ethics
Module 4: Research Strategies

Ethics: Human Research
(Four Basic Principles)
1. Informed Consent

• Participants must be informed, in advance, about:
  – the general nature of the research, and
  – any potential risk.
  – Participants must have the right to refuse participation or withdraw at any time.
2. Right to be Protected from Harm and Discomfort

- Studies involving harm or discomfort may be conducted only under certain circumstances, and only with the informed consent of the participants.
3. Right of Confidentiality

- Individual data about research participants should never be discussed or released.
4. Right to Debriefing

- Participants have a right to receive a complete explanation of the research at the end of the study.
- This is extremely important if the research involves deception.
Module 4: Research Strategies

Ethics:
Animal Research
Reasons for Animal Research

• Interest in animal behavior as a topic of study
• Data from animal studies may apply to humans.
• Easier to do some type of studies (genetics) due to the shorter life span of animals
Reasons for Animal Research

• Easier to exercise more control over experiments with animals as compared to humans

• Procedures that are not ethical to perform on humans may be considered acceptable when performed on animals
Care of Animals used in Research

• Animals used in research must:
  – Have clean housing with adequate ventilation
  – Have appropriate food
  – Be well cared for
The End
Name of Concept

- Use this slide to add a concept to the presentation
Name of Concept

Use this slide to add a table, chart, clip art, picture, diagram, or video clip. Delete this box when finished