

The Scientific Approach

Goals

- Measurement and description
- Understanding and prediction
- Application and control

Steps in an investigation

1. Formulate a testable hypothesis.
2. Select the method and design the study.
3. Collect the data.
4. Analyze the data and draw conclusions.
5. Report the findings.

Advantages

Clarity and precision yields better communication.
Intolerance of error yields more reliable data.

Experimental Research

Elements

Independent variable (IV): Condition or event manipulated by experimenter
Dependent variable (DV): Aspect of behavior thought to be affected by independent variable
Experimental group: Participants who receive special treatment
Control group: Similar subjects who do not receive treatment given to experimental group
Extraneous variables: Factors besides IV that might affect DV, hence they need to be controlled

Variations

- Can have one group of subjects serve as their own control group
- Can manipulate more than one independent variable in a study
- Can use multiple dependent variables in a study

Advantages and disadvantages

- + Permits conclusions about cause and effect relationships
- Manipulations and control often make experiments artificial
- Practical realities and ethical concerns make it impossible to conduct experiments on many issues

Descriptive/Correlational Research

Examples of specific methods

Naturalistic observation: Careful, systematic observation, but no intervention with subjects
Case study: In-depth investigation of single participant, typically involving data from many sources
Survey: Questionnaires and interviews are used to gather information about specific aspects of participants' behavior

Advantages and disadvantages

- + Broadens the scope of phenomena that psychologists can study (can explore issues that could not be examined with experimental methods)
- Cannot demonstrate that two variables are causally related

Key Themes

- Psychology is empirical.
- Our experience of the world is highly subjective.

Statistics

Basic descriptive statistics

- Three measures of central tendency are the *median* (center score), the *mean* (arithmetic average), and the *mode* (most frequent score).
- The mean tends to be the most useful index of central tendency, but the median may be better if the mean is inflated by a few extreme scores.
- *Variability* refers to how much scores vary from each other and the mean.
- The *standard deviation* is an index of the amount of variability in a data set.

Correlation

Correlation exists when two variables are related to each other.
Types: Positive (variables covary in the same direction) or negative (variables covary in the opposite direction).
Correlation coefficient: Numerical index of degree of relationship between two variables.
Strength: The closer the correlation to either -1.00 or +1.00, the stronger the relationship.
Prediction: The stronger the correlation, the better one can predict.
Causation: Correlation is *not* equivalent to causation.

Inferential statistics

- *Inferential statistics* are used to interpret data and draw conclusions.
- *Hypothesis testing* involves making calculations to determine whether research results are statistically significant.
- *Statistical significance* exists when the probability that observed findings are due to chance is very low.

Common Flaws in Research

Sampling bias

Exists when a sample is not representative of the population

Placebo effects

Occur when participants' expectations lead them to experience some change even though they receive empty or fake treatment

Distortions in self-report data

Result from problems, such as social desirability bias and response sets, that happen when participants give verbal accounts of their behavior

Experimenter bias

Occurs when a researcher's expectations or preferences about the outcome of a study influence the results obtained

Internet-Mediated Research

- Internet-mediated research has grown in recent years because it offers access to larger and more diverse samples and to specialized samples while reducing costs and saving time.
- However, Internet-mediated research raises its own concerns about sampling bias and uncontrolled conditions during data collection.

Ethical Issues

The question of deception

Should researchers be permitted to mislead participants?

YES

- Otherwise, important issues could not be investigated.
- Empirical evidence suggests that deception is not harmful to subjects.

NO

- Deception is inherently immoral and may undermine participants' trust in others.
- Deceptive studies often create stress for subjects.

The question of animal research

Should researchers be permitted to subject animals to harmful or painful procedures?

YES

- Otherwise, important issues could not be investigated.
- Relatively little animal research involves pain or harm.

NO

- Animals are entitled to the same rights as humans.
- Animal studies are often trivial or may not apply to humans.