

Psychology: From Inquiry to Understanding 2/e

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Chapter Two

Research Methods: Safeguards against Error

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Lecture Preview

- **What is good research design?**
- The scientific method's tools
- Ethics of experimentation
- Statistics
- Evaluating research

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The Need for Good Research Design

- In the early 1990s, an autism treatment was developed called "facilitated communication"
- The developers thought that autism was a motor disorder
- The facilitator sat next to child with autism and guided the child's hand over a keyboard, allowing the children to type out words

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Facilitated communication in action. The rationale is that, because of a severe motor impairment, some children with autism are unable to speak or type on their own. Therefore, with the help of a facilitator, they can supposedly type out complete sentences on a keyboard or letter pad. Is it too good to be true?



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The Need for Good Research Design

- Students seemed to make stunning progress in communication, telling parents "I love you" and writing poetry
- However, some students began making allegations of sexual abuse against parents
- There was no physical evidence, just the communicators via the facilitators

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The Need for Good Research Design

- Dozens of controlled studies examined the phenomenon and found that the words came solely from the minds of the facilitators
- Still, some people continue to practice facilitated communication

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Facilitated Communication Tested



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Research Design Matters

- Even well-educated, intelligent people can be fooled
- Well-planned designs can help to eliminate biases when examining phenomena
- Prefrontal lobotomy is example of what happens when we rely on subjective impressions

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- Developer won the Nobel Prize
- In it, the neural fibers connecting frontal lobes to the thalamus were severed
- Control studies showed it didn't work



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Lecture Preview

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So, how do we prevent ourselves from being fooled by our own (and other people's) biases?

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Video

- Episode 2 Research Methods
- How to Answer Psychological Questions
- http://visual.pearsoncmg.com/mypsychlab/episode02/web_index.html?clip=1&tab=tab0

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The Scientific Method Toolbox

- Allows us to test specific *hypotheses* derived from broader *theories* of how things work
- Theories are never “proven,” but hypotheses can be confirmed or disconfirmed
- We can use a number of different types of SM tools to gain information and test hypotheses

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Naturalistic Observation

- Watching behavior in real-world settings
- High degree of **external validity** - extent to which we can generalize our findings to the real world
- Low degree of **internal validity** - extent to which we can draw cause-and-effect inferences

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Case Study Designs

- Studying one person or a small number of people for an extended period of time
- Common with rare types of brain damage or mental illness
- Helpful in providing **existence proofs**, but can be misleading and anecdotal

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Self Report Measures and Surveys

- Psychologists often need to ask people about themselves or others
 - **Self-report measures** or questionnaires assess characteristics such as personality or mental illness
 - Surveys ask about a person’s opinions or abilities

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Random Selection

- The key to generalizability in surveys and questionnaire studies
 - Ensures every person in a population has an equal chance of being chosen to participate
- Non-random selection can skew results and make them inaccurate when applied to the population as a whole

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Evaluating Measures

- To trust results, the measures must have:
 - Reliability—consistency of measurement
 - Validity—extent to which a measure assesses what it claims to measure
- A test must be reliable to be valid, but a reliable test can still be completely invalid

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Self-Report Measures

- **Pros**
 - Easy to administer
 - Direct (self) assessment of person's state
- **Cons**
 - Respondents must report themselves accurately
 - Accuracy is skewed for certain groups
 - Potential for dishonesty
 - **Response sets** - tendencies of research subjects to distort their responses

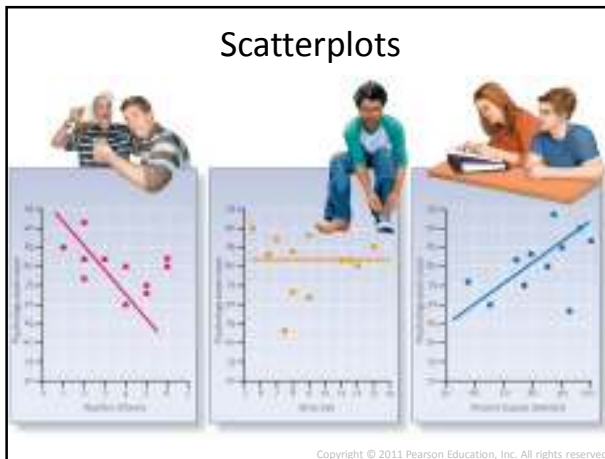
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Correlational Designs

- Examine how two variables are related
- Positive (as one increases, so does the other)
- Negative (as one increases, the other decreases)
- Zero (no relationship between variables)
- Correlations vary from -1 to +1 (correlation coefficient)

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Scatterplots



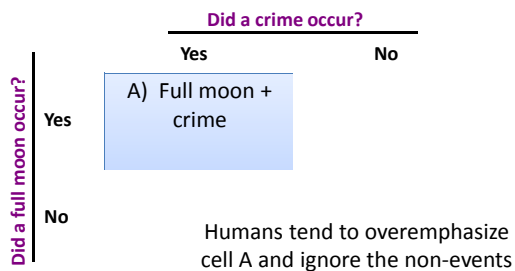
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Correlational Designs

- Illusory Correlation—perception of a statistical association where none exists
 - Crime rates and the full moon
 - Arthritis and weather

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The Great Fourfold Table of Life



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Correlation vs. Causation

- Just because two things are related, does *not* mean that one causes another
- There are three possible explanations:
 - A causes B
 - B causes A
 - C causes both A and B

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PhD and Mule

- Negative correlation between number of university students in a city and number of mules



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There's a positive correlation between the amount of ice cream consumed and the number of violent crimes committed on that same day, but that doesn't mean that eating ice cream causes crime. Can you think of a third variable that might explain this correlation?



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Answer: On hotter days, people both commit more crimes (in part because they go outside more often, and in part because they're more irritable) and eat more ice cream.



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Newspaper HeadLines



- **Correlation is not Causation**
- <http://www.msnbc.msn.com/id/19918336/>

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Determining Causation

- The only way to determine if one thing is casually related to another is via an experimental design.
- This is because in an experiment, you purposefully manipulate variables, rather than just measure already existing differences.

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What Makes a Study an Experiment?

- **Random assignment** of participants to the
 - **Experimental Group** - receives the manipulation
 - **Control Group** - does not receive the manipulation
- Manipulation of an **independent variable**
 - The **dependent variable** is what the experimenter measures to see whether manipulation had an effect
- Operational definition

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Does yoga help people to lower their blood pressure and relieve stress? Only an experiment, with random assignment to conditions and manipulation of an independent variable, gives us permission to infer a cause-and-effect relationship.



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What Makes a Study an Experiment?

- **Confounds** - any difference between the experimental and control groups aside from IV
 - Makes IV effects uninterpretable
- **Cause and effect** - possible to infer, with random assignment and manipulation of independent variable

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Video

- Episode 2 Research Methods
- Scientific Research Methods
- http://visual.pearsoncmg.com/mypsychlab/episode02/web_index.html?clip=1&tab=tab0

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Lecture Preview

- What is good research design?
- The scientific method's tools
- **Ethics of experimentation**
- Statistics
- Evaluating research

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Why Ethics?

- A subject of a chemist is mineral
- Physicists study neurons, electrons
- Psychologists study people
 - There are ethical and unethical ways to carry a research
 - Give examples for an unethical research?
- Our research should not alter feelings, well-being, health of our subjects

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Ethical Issues in Research Design

- **Tuskegee Study** ran from 1932 to 1972
 - African American men living in rural Alabama diagnosed with syphilis
 - U.S. Public Health Service never informed, or treated, the men, merely studied the course of the disease

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Ethical Issues in Research Design



- 28 men died of syphilis, 100 of related complications, 40 wives were infected, 19 children were born with it
- In 1997 President Bill Clinton offered a formal apology for the Tuskegee Study.
- Violating ethical principles always have tragic consequences.

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Modern Ethical Guidelines

- Today, research has to go through a careful process of review to ensure that it is conducted ethically
- The American Psychological Association guidelines on ethical research conduct.
- Institutional Review Board (IRB) (İnsan Araştırmaları Etik Kurulu)
 - Informed consent
 - Justification of deception
 - Debriefing of subjects afterwards

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Modern Ethical Guidelines

- Animal research goes through the Institutional Animal Care and Use Committee (IACUC) (Hayvan Araştırmaları Etik Kurulu)
- Only 7-8% of psychological research uses animals
- Vast majority of animals are rodents and birds

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Video

- Episode 2 Research Methods
- Ethics and Psychological Research
- http://visual.pearsoncmg.com/mypsychlab/episode02/web_index.html?clip=1&tab=tab0

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Lecture Preview

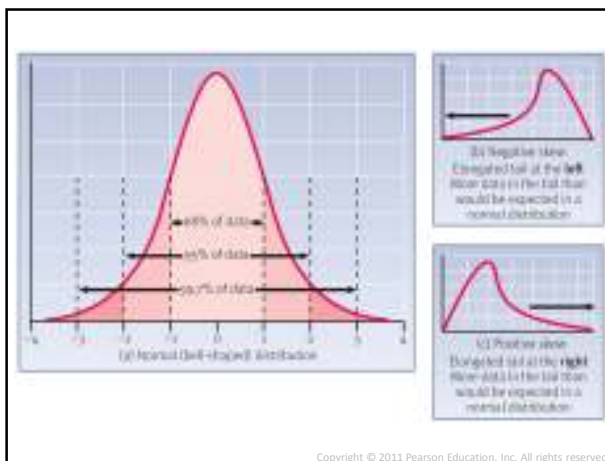
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Statistics: The Language of Research

- Descriptive statistics—numerical characteristics of the nature of the data set
- Central tendency—where the group tends to cluster
 - Mean: average of all scores
 - Median: middle scores in the data set
 - Mode: most frequent score in the data set

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Statistics: The Language of Research

- Dispersion—sense of how loosely or tightly bunched scores are
- Range—difference between the highest and lowest scores
- Standard deviation—measure of dispersion that takes into account how far each data point is from the mean

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Range vs. Standard Deviation



- Both sets of data have the same range, but very different SDs
- SDs are less susceptible to extreme scores than ranges are

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What's wrong with this (fake) newspaper headline?



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Statistics: The Language of Research

- **Inferential statistics** allow us to determine whether we can generalize findings from our sample to the population
 - Statistical significance - finding would have occurred by chance less than 1 in 20 times
 - Practical significance - real-world importance
- Statistical deceptions (e.g. truncated line graphs)

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