Psychology Ch. 1 Part 2

Psychology and the Scientific Method

Scientific method - system of gathering data so that bias and error in measurement are reduced.

Steps in the Scientific Method (stated simply):

1. Perceive the question.
2. Form a Hypothesis
3. Test the hypothesis.
4. Draw conclusions.
5. Report your results

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Steps in the Scientific Method (more in-depth):

1. Perceive the question/Generate Research Idea

2. Conduct **Secondary** (background) Research
   - See what others have done on the same topic, previous studies and findings, what literature exists, using databases such as PSYLIT

3. Form a Hypothesis

4. Design method to collect data to test hypothesis
   - Make as controlled as possible

3. Test the Hypothesis/Collect Data
   - Using **Primary** Empirical Research- such as interviewing people yourself (not relying on second-hand info such as an interview someone else conducted and wrote about)

4. Draw conclusions/Analyze Data
   - Computer programs such as SPSS to assist in analyzing data/stats
5. Report your results

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In the search to understand human behavior, psychologists attempt to:

1. Establish relationships between circumstances and behaviors

2. Fit these relationships into an orderly body of knowledge

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Steps in the Scientific Method:

1. Perceive the question

Form a question for research: What is happening, wanting /needing an explanation. **The question must pass the ROT test**: Repeatable, Observable and Testable

2. Form a Hypothesis

Tentative explanation of a phenomenon based on observations.

3. Test the hypothesis

Determine if the factor you suspect has an effect and that the results were not due to luck or chance: Need to collect data and repeat research. The goal of testing the hypothesis is to get an explanation for behavior.

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4. Draw conclusions

Either your hypothesis was supported (your experiment worked or your measurements supported your initial observations or

Your hypothesis was not supported (Need to go back and think of another possible explanation for what you have observed)

Any data derived from testing will be analyzed with some kind of statistical method that will help you organize ands refine that data.

If your study does not support your hypothesis, it does not necessarily mean that your hypothesis is incorrect.

- your study could be poorly designed

- factors not under your control may have interfered with your study

5. Report your results

So others can try to replicate /repeat the study/experiment to see if the same results will be obtained in an effort to demonstrate the reliability of results.

What did you do? Why did you do it? How did you do it? What were your findings?

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Descriptive Data Collection Methods

Laboratory vs. Naturalistic Research Design

- Laboratory observation – watching animals or humans behave in a laboratory setting.

  Advantages:
  - Control over environment.
  - Allows use of specialized equipment.

  Disadvantage:
  - Artificial situation that may result in artificial behavior.

- Descriptive methods lead to the formation of testable hypotheses.

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Descriptive Data Collection Methods

Laboratory vs. Naturalistic Research Design

Naturalistic observation – watching animals or humans behave in their normal environment.

- Major Advantage:
  - Realistic picture of behavior.
- Disadvantages:
  - Observer effect - tendency of people or animals to behave differently from normal when they know they are being observed.
    - Participant observation - a naturalistic observation in which the observer becomes a participant in the group being observed (to reduce observer effect).
  - Observer bias - tendency of observers to see what they expect to see.
    - Blind observers – people who do not know what the research question is (to reduce observer bias).
  - Each naturalistic setting is unique and observations may not hold.

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Descriptive Data Collection Methods

- Surveys – researchers will ask a series of questions about the topic under study.

- Given to a representative sample - randomly selected sample of subjects from a larger population of subjects.
    - Population - the entire group of people or animals in which the researcher is interested.

- Advantages:
  - Data from large numbers of people.
  - Study covert behaviors.

- Disadvantages:
  - Have to ensure representative sample (or results not meaningful).
  - People are not always accurate (courtesy bias).

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Descriptive Data Collection Methods

- Case study - study of one individual in great detail.
  - Advantage: tremendous amount of detail.
  - Disadvantage: cannot apply to others.
  - Famous case study: Phineas Gage

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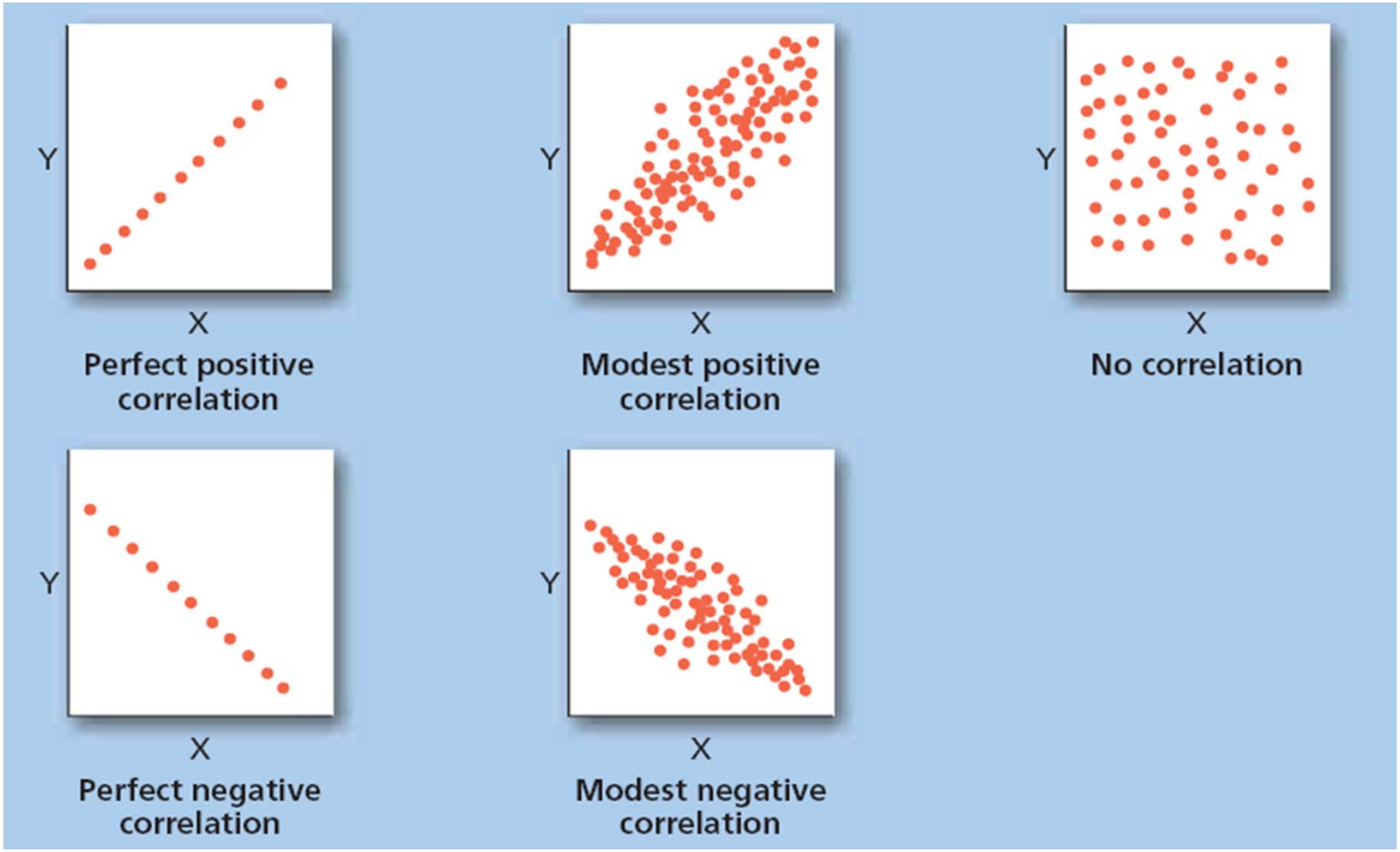
Figure 1.3

Five scatterplots showing direction and strength of correlation. It should be noted that perfect correlations, whether positive or negative, rarely occur in the real world.



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Two kinds of research studies:

1. Correlational

2. Experimental

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Research Design

1. **Correlational Research Study**: Determine whether *2 variables are related* without attempting to manipulate either one

A Correlational Study on Media Violence

427 people studied: At age 8-9, researchers measured how much television violence the children watched. Childhood exposure to violent television programming *is the first variable*.

When participants were 18-19 researchers measured their level of aggressiveness. Adult aggressiveness is the *second variable.*

The Researchers examined the correlation between childhood exposure to television violence and adult aggressiveness

The conclusion the researchers made was that a preference for watching violent television at age 8-9, contribute to the development of aggressive habits as adults

- When knowing one variable allows you to make good predictions about the other variable

- all variables are measured

-surveys/questionnaires, archival research, behavioral observation

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Finding Relationships

- Correlation - a measure of the relationship between two variables.
  - Variable - anything that can change or vary.
  - Measures of two variables go into a mathematical formula and produce a *correlation coefficient (r)*, which represents two things:
    - direction of the relationship.
    - strength of the relationship.
  - Knowing the value of one variable allows researchers to predict the value of the other variable.

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Finding Relationships

- Correlation coefficient ranges from –1.00 to +1.00.
- Closer to 1.00 or -1.00, the stronger the relationship between the variables.
  - No correlation = 0.0.
  - Perfect correlation = -1.00 OR +1.00.
- Positive correlation – variables are related in the same direction.
  - As one increases, the other increases; as one decreases, the other decreases.
- Negative correlation – variables are related in opposite direction.
  - As one increases, the other decreases.
- **CORRELATION DOES NOT PROVE CAUSATION!!!**

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Limitations of Correlational Studies

1. *Can only show that two variables are related to one another- it cannot show that one variable causes the other (causation)*

There is a positive correlation between childhood exposure to television violence and adult aggressiveness but childhood exposure to television violence DOES NOT CAUSE adult aggressiveness- Just because there is a statistical correlation between X and Y it does not mean that X causes Y and Y causes X (Correlation does not imply causation)

2. *Third Variable Problem*

When there is a third variable that can have an effect or cause changes in both variables (called a **spurious correlation**)

Is there a third variable that causes childhood exposure to TV violence **AND** adult aggressiveness- if so it can be a third variable problem: **Poor parenting** – Poor parenting can cause children to watch violent TV **AND** Poor parenting can cause adult aggression

But Genetic defects could NOT be a third variable problem as genetic defects CAN cause adult aggressiveness but CANNOT cause childhood exposure to violent TV

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Reasons why Correlational Research is useful

1. A fine approach for demonstrating statistical relationships. A correlational study that shows that childhood exposure to TV violence contributes to adult aggressiveness shows that such a relationship exists, even if it does not show that childhood exposure to TV violence causes adult aggressiveness. Sometimes, just knowing that two variables are related is interesting … regardless of whether either one has a causal influence on the other. In many situations, after establishing that there is a relationship, researchers will conduct more studies to determine why.

2. Correlational research often shows that there is *no* relationship between two variables, in which case the third-variable problem is not much of an issue. The two variables are simply unrelated and the researcher can move on to another question.

3. There are situations in which the major alternative to correlational research (i.e., Experimental Research) cannot be conducted for practical or ethical reasons. In such cases, correlational research might be the best approach available.

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Experimental Research Study

Like correlational research, **experimental research** concerns relationships between variables. Unlike correlational research, however, experimental research *provides strong evidence for causal interpretations and is the only research method that will allow researchers to determine the cause of a behavior*.

There are 2 types of Variables:

1. ***Independent Variable***: This is the variable that is manipulated. It should have at least two levels. It is *independent* of anything the participants do-they have no effect or choice in this variable. The Independent Variable in the example would be the presence or absence of violent TV programming.

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Experimental Research Study

2. ***Dependent Variable***:

This is always the ***measured*** response of the participant(s),which if your hypothesis is correct, should ***depend*** on their response to the Independent Variable. This would be the *measure of aggressive behavior* in the participants from the example.

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Experimental Research Study

There is also the ***Confounding Variable*** which are variables that interfere with each other that may have possible effects: In our example, if most children in the study were from a family that was aggressive then any effects that violent cartoons might have had on the children's behavior could be ***confused or confounded*** with the effects of their family's aggressive behavior and researchers would not know if the children were being aggressive because of the violent TV or because of their aggressive family background.

So how do we control the Confounding Variable in our experiment?

1. Experimental Groups
2. Control Groups
3. Randomization

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Experimental Research Study

We expose one group to the Independent Variable (The Violent TV Programs): 1. The Experimental Group

The other group gets no treatment/treatment with no effect- not exposed to the Independent Variable (They watch *non-violent* TV Programs): 2. The Control Group

If researchers found that both the group that watched violent TV (Experimental Group) and the group that did not watch violent TV (Control Group) were equally aggressive, then what would they have to assume about violent TV?

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Experimental Research Study

3. ***Randomization***

This is the best way to choose participants for study: assign them *randomly* to be in either the Experimental or Control Group: *each person should have an equal chance of being place in either group*

You can flip a coin, use a randomizer online, or a random-number table (among other methods) to complete random assignment

Randomization will help ensure control over interfering or *Confounding* variables and avoid biasing research.

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Experimental Study

1. Perceive the Question:

Does Style of Dress Affect Donation Rates?

Does this pass the ROT Test? Repeatable, Observable and Testable

2. Hypothesis:

People will donate less to a person who is dressed in an Untidy fashion.

3. Design method to collect data to test hypothesis

Collectors will stand outside of Wal-Mart in Guilford and ask 20 different entering people to donate money to _____.

Formal Dress will be khakis and shirt/tie, or an actual formal dress (not a ball gown) neat hair, dress shoes, "neat and clean appearance"

Untidy Dress will be older "worn" clothes such as jeans with rips, shorts with stains, un-tucked shirt, old baseball hat "messy and unkempt appearance"

Casual Dress will be "under" formal- no tie or dress needed but clothes that are neat, shoes and hats that are 'newer" looking

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Experimental Study

Independent Variable –Variable in an experiment that is manipulated by the experimenter (should only be 1 IV variable with 2 or more levels): **Formally dressed or Untidy "Collector"**

Dependent Variable – Variable in an experiment that represents the measurable response or behavior of the subjects in the experiment: **How much money is donated**

Experimental group – Subjects in an experiment who are subjected to the independent variable: **Participants asked to donate to a "Collector" either formally dressed or dressed in an Untidy fashion**

Control group – Subjects in an experiment who are not subjected to the independent variable and who may receive a placebo treatment (controls for confounding variables): **Participants asked to donate by "Collector" who is casually dressed (not Formally, not Untidy)**

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Experimental Study

4. Analyze Data

Statistical significance is a mathematical measure of the validity of an experiment. If an experiment is performed repeatedly and the results are within a narrow margin, the results are said to be significant when measured using statistics. If results are scattered, they are not that significant because one definite conclusion cannot be drawn from the data.

-Scales of Measurement

-Descriptive Stats

-Inferential Stats

-Assessing Group Differences

-Assessing relationships Between Variables

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Experimental Study

4. Draw conclusions

People donated less to Collector that was dressed in an Untidy fashion.
Hypothesis was supported (your experiment worked or your measurements supported your initial observations)

People donated same or more to Collector that was dressed in an Untidy fashion.
Hypothesis was not supported (Need to go back and think of another possible explanation for what you have observed)

Any data derived from testing will be analyzed with some kind of statistical method that will help you organize and refine that data.

If your study does not support your hypothesis, it does not necessarily mean that your hypothesis is incorrect.

- your study could be poorly designed

- factors not under your control may have interfered with your study

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Experimental Study

5. Report your Results

So others can try to replicate /repeat the study/experiment to see if the same results will be obtained in an effort to demonstrate the reliability of results.

People donated less to Collector that was dressed in an Untidy fashion.

Report any and all errors.

What did you do?

Why did you do it?

How did you do it?

What were your findings?

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Experimental Study

5. Report your Results

Abstract

Summary of entire study

Introduction

Review of past research

Statement of Hypothesis

Overview of method

Results

Results of statistical tests

Discussion

Evaluate findings

Discuss implications

Suggest improvements

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- Placebo effect - the phenomenon in which the expectations of the participants in a study can influence their behavior.
  - Single-blind study- subjects do not know if they are in the experimental or the control group (reduces placebo effect).
- Experimenter effect - tendency of the experimenter's expectations for a study to unintentionally influence the results of the study.
  - Double-blind study - neither the experimenter nor the subjects knows if the subjects are in the experimental or control group (reduces placebo effect and experimenter effect).
- Quasiexperimental designs - not considered true experiments because of the inability to randomly assign participants to the experimental and control groups (for example, if age is the variable of interest).

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Empirical Approach

Empirical questions are those that can be tested through direct observation or experience-supported or disproved by gathering real evidence. So a question such as: "What is the meaning of life?" is not empirical question- one that can be studied using the Empirical approach/scientific method. (You can *believe without proof*, but you *can't know with out proof*).

Hypothesis Development

1. **Variables**: categories of object, events, situations or constructs

2. **Levels**: Specific instances or values of a variable

3. **Hypotheses**: Testable statements about the relationship between two or more variables

4. **Operational Definitions**: How the variables of interest will be measured or manipulated by the researcher

5. **Reliability and Validity**: Consistency of measurement (reliability) and Adequacy of measurement (validity)

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Research Design

3. Quasi-Experimental and Field Experiments

4. Advantages and disadvantages of various designs:

- Internal Validity: ability to draw casual inferences from data

- External Validity: ability to generalize results to others populations or settings