Unit 2: The Science of Psychology

NOTE on course organization. Remember, units generally start with an outline to guide your reading and study. Additional notes, lectures, activities, and/or videos come after the outline. Be sure to navigate through the course pages in order so that you get the material in the proper sequence.

If introspection and casual observation were enough to answer the questions of interest to psychologists, there would be no need for a science of psychology. However, casual observation is subject to a variety of limitations, biases and errors of judgment that may sometimes lead us to hold beliefs that are untrue. (See “Thinking and Problem Solving” for further discussion of some of these limitations and biases.) Modern Psychology does not depend upon casual observation for its evidence and theories. Instead, the science of psychology utilizes a set of research methods, all based upon a common set of principles—the principles of the scientific method.

READING: Chapter 2

During this unit, we will explore the questions of:

1. What Makes Research Scientific?
2. Research Methods in Psychology: Data Collection
3. Research Methods in Psychology: Research Designs

1. Reliance on empirical evidence

2. Skepticism
   Why skeptics are open-minded (notes and video)

3. Precision
   Use of operational definitions

4. Principle of falsifiability
   Sheep-Goat Theory of ESP (Chapter 6, pp. 220–222) (lecture)

5. Openness: The importance of replication

6. Parsimony (activity and lecture demonstration)
Skepticism

The Amazing Randi is a magician and a skeptic who has offered a million dollars to anyone who can prove that he or she possesses true psychic powers. So far, no one has come close to collecting the million, and none of the well-known psychics who appear on TV have been willing to even put themselves to the test.

Some years ago, Randi helped the *Tonight Show* set up a set of tests of the famous Israeli psychic Uri Geller. As you watch this video clip of Geller’s performance on the show, pay careful attention to Geller’s own “theory” of the nature of his psychic powers, a theory that he presents on the show in order to explain why he can’t perform the tasks that Randi has set up for him. Notice that, like sheep-goat theory, Geller’s theory that his powers are weakened when he is pressured to perform makes the hypothesis that he truly possesses psychic powers unfalsifiable.

**VIDEO:** Click here to see the Geller Video (from *Secrets of the Psychics*).
Principle of Falsifiability

Sheep-Goat Theory of ESP (Chapter 6, pp. 220–222)

VIDEO LECTURE: Click here for the lecture on the “Sheep-Goat Theory of ESP.”
Parsimony

ACTIVITY: Learning and Using a Simple Card Force

This activity illustrates the principle of parsimony.

One of the simplest of “card force” techniques is called the Criss-Cross Force.

1. Shuffle a deck of cards in full view of the volunteer.

2. As you square the deck, notice the bottom card.

3. Put the deck of cards on the desk or table and tell the volunteer to cut the cards once by picking up some amount of cards from the top of the deck and then placing those cards in a pile next to the remaining pile of cards from the bottom of the deck.

4. Now, the secret move! Pick of the pile of cards that was from the bottom of the deck, and place it ACROSS the pile cut by the volunteer. The card the volunteer ACTUALLY selected from the deck is now at the top of the top pile. The card from the bottom of the deck is now at the bottom of the top pile.

5. Talk to the volunteer for a moment, then pick up the top pile so that only the volunteer can see the card at the bottom of that pile. Say “OK – now memorize the card you selected.” Of course, the card you are showing to the volunteer is actually the card that was on the bottom of the full deck of cards—a card whose identity you already know! Don’t worry that the volunteer will notice what you have done—it never happens.

6. Now demonstrate your psychic powers. Ask the volunteer to think of the card, do some grimacing and muttering, and then identify the card. A good technique here is to make a minor mistake at first (identify the 6 of spades when the card is actually the seven of spades, or identify the 7 of clubs when the card is actually the 7 of spades), then quickly correct yourself.

7. Tell the volunteer that you have psychic powers. Then ask the volunteer the generate hypotheses about how you performed the effect. It is always interesting to hear the creative hypotheses people come up with. According to the principle of parsimony, however, not all of these hypotheses are created equal. In particular, hypotheses referring to paranormal phenomena (psychic abilities for example) should not be seriously considered at the outset, because these ideas conflict with well supported principles of physics and biology. Of course, your friends are probably not going to think that you really have psychic powers based upon a single card effect, but many people do get fooled by professional “psychics” who produce somewhat more dramatic effects. Note, however, that the principle of parsimony applies to the consideration of those more dramatic effects as well.

The principle of parsimony does not imply that one should never even consider seemingly unlikely explanations for phenomena (including the possibility that an
individual is producing some kind of effect through the use of psychic or other paranormal powers). However, one should first consider hypotheses consistent with established evidence-supported theories. In addition, in science the burden of proof is always on the claimant. In other words, it is not up to you to prove that an effect was not accomplished through psychic powers. The burden of proof is on the psychic to prove that he or she did produce the effect in the manner claimed, and the more extraordinary the claim, the better the evidence should be.

**VIDEO LECTURE:** Click here for the lecture video on parsimony, “The Criss-Cross Force Demonstration.”
Part 2: Research Methods in Psychology: Data Collection

Based upon the general principles of the scientific method, research psychologists collect data in a variety of ways.

Naturalistic and Laboratory-Based Observation (pp. 41–43)
Observing systematically
Weaknesses of observational methods
a. Observers may influence behavior
b. Observational methods are better suited to description than explanation

Standardized Tests (pp. 43–45)
What makes a test a “good” test? Issues of reliability and validity

Surveys and Questionnaires (pp. 45–46)
Issues:
a. Biased questions can produce biased results
b. Are respondents honest?
c. How well do we really know ourselves?
d. Does the sample represent the population? (lecture)
Surveys and Questionnaires

VIDEO LECTURE: Click here to listen to the lecture on sampling, “Does the sample represent the population?”
Part 3: Research Methods: Research Design

Searching for Evidence of Relationships Between Variables

When collecting data using the above and other methods, psychologists are usually searching for evidence of a relationship between variables. A variable is any characteristic of an individual that can vary and can be measured. Height is a variable. School performance is a variable. The way someone responds on a test of problem solving persistence is a variable. The amount that someone studies for a test is a variable. The type of TV show that someone likes is a variable.

The kind of relationship between variables that is often of most interest to psychologists is a causal relationship. It is only by testing for causal relationship that psychologists can move beyond mere description to begin to answer the questions “why.”

There are three basic research designs that psychologists use when asking the questions “why?”

Case Studies (pp. 40–41)
Strengths and Weaknesses:
See Genie: A Case Study. . . (notes and video)

Correlational Studies (pp. 48–50)
Do children who view a lot of violence on TV tend to be aggressive?
Correlations do not imply causation! (lecture)

Experimental Studies: Establishing causality (pp. 50–54)
Independent and dependent variables
Experimental and control conditions
The importance of random assignment
Experimental studies of TV violence effects
See A Lab-Based Study: Liebert and Brown (1972) (notes)
See Field-Based Research: Friedrich and Stein (1973) (notes)
The power of experimental research: Goldberger’s discovery of the cause of pellagra (lecture)
Case Studies

Genie: A Case Study in the Effects of Early Isolation on the Ability to Acquire Language

Case studies are intensive investigations of specific people or situations. Usually, the specific person or situation being studied was selected because it presented a set of interesting, and perhaps unique, characteristics. For example, in the Brain and Nervous System section of the course, you will learn about the case of H.M., an individual who had a small part of his brain (the hippocampus) removed as a treatment for his severe epilepsy. Prior to the operation, the exact function of the hippocampus was not known. Contrary to all expectations at the time, H.M.’s memory was affected by the operation. In fact, since that time he has never been able to form a new long-term conscious memory, and based in large part upon the study of H.M., we now know that the hippocampus play a critical and necessary role in the formation of new memories.

Another famous case study was the case of a most unfortunate girl called Genie. You can read about Genie in your textbook (p. 40), and see a video clip of Genie here.

VIDEO: Click here to see video segments from the Genie video.

Case studies provide an important source of hypotheses for research psychologists. However, they usually are not sufficient by themselves to address questions regarding relationships between variables. For that purpose, a larger number of people have to be studied, using the correlational and experimental designs.
Correlational Studies

VIDEO LECTURE: Click here for “Correlations Do Not Imply Causation!”
What Is an Experiment?

Read in your textbook (pp. 50–54) to learn about the basic characteristics of experiments and the ways in which experimental and correlational studies differ. Then read here about the two important experiments (on this page and the next page) concerned with the effects of TV violence viewing on children’s behavior.

Experimental Studies 1

Liebert and Baron (1972): A laboratory study of the effects of TV violence viewing on children’s aggressive behavior.

The participants in the study were children ages 5 to 9 years of age. Each child was tested individually. Children were randomly assigned to either the control group or the experimental group. When children arrived for the study, they waited in a room that contained a TV set. During the waiting period, the children in the experimental group watched a violent 3½-minute clip from the TV show *The Untouchables*. The clip contained two fistfights, two shootings, and a stabbing. The children in the control group watched a 3½ minute film of a nonviolent but exciting track meet. Thus, the independent variable was the type of program watched.

Each child was then taken into another room and seated before a panel that had wires leading into an adjoining room. On the panel was a green button labeled HELP, a red button labeled HURT, and a white light between the buttons. An experimenter told the child that another child in an adjoining room would soon be playing a handle-turning game that would illuminate the white light. The participant was told that by pushing the buttons when the light was lit, he or she could either (1) help the other child by making the handle easy to turn or (2) hurt the child by making the handle become very hot. When it was clear that the participant understood the instructions, the experimenter left the room and the light came on 20 times over the next several minutes. Thus, each participant had 20 opportunities to help or hurt another child. The total amount of time each participant spent pushing the hurt button served as the dependent variable in this study.

The results were clear: Despite the availability of an alternative helping response, both boys and girls were much more likely to press the HURT button if they had watched the violent television program. This finding demonstrates that a mere 3½-minute exposure to televised violence can cause children to behave more aggressively toward a peer even though the aggressive acts they witnessed on television bore no resemblance to those they committed themselves.

BUT—do these findings mean that the same effects occur in the real world. Whether or not one thinks that it is appropriate to generalize these findings to the real world, depends upon how much one feels that the design of this study captures the essential features of aggressive behavior and TV violence viewing in the real world.
Experimental Studies 2

Friedrich and Stein (1973): A field-based study of the influence of TV viewing on children’s aggressive behavior

One way to make the elements of a study more similar to what occurs in real world settings is to conduct a field study—an experiment conducted in a real-world setting. An excellent example is the study by Friedrich and Stein (1973). In this study, the investigators set up a real nursery school on a university campus and controlled the types of TV programs that the children watched. The observations of the impact of TV viewing were made during the daily play sessions at the nursery school; adult observers recorded the frequency of aggressive.

The study was conducted during a nine-week summer nursery school session. For the first three weeks, the investigators observed the children in order to achieve a baseline measure of their interaction patterns. Based upon these initial measures, children were classified as being either high or low in aggression. A random half of the high aggression children were then assigned to the experimental group and half to the control group. Similarly, a random half the low aggression children were assigned to the experimental group and half to the control group. For the next four weeks, the children in both groups watched a half-hour TV program each day. The children in the experimental group always saw aggressive programs, such as “Batman” and “Superman” cartoons. The children in one control group watched a very non-violent program, Mister Rogers’ Neighborhood. Children in a second control group watch non-violent nature shows.

The impact of the programs was determined by comparing the children’s behavior during the first three weeks, or the baseline period, with their behavior during the period of TV viewing. It was found that exposure to aggressive cartoons did affect the children’s behavior, but the amount of aggression exhibited in the pre-TV sessions was an important factor. Children who were initially high in aggression were more aggressive following exposure to the aggressive cartoons in comparison to children exposed to Mr. Rogers or nature shows. However, the type of TV show that the children watched did not affect the behavior of children who had been less aggressive during the initial baseline period. These findings suggest that TV violence does affect children’s behavior, but perhaps only for children who tend to be aggressive already.
Experimental Studies 3

VIDEO LECTURE: Click here to see “The Power of Experimental Research: Goldberger’s Discovery of the Cause of Pellagra.”