Chapter 2
Studying Behaviour Scientifically

Step 1: Class Presentation Ideas

Pre-Class Student Assignments

Activity Assignment

Naturalistic Observation of Gender Differences
Using the method of naturalistic observation, have students observe everyday behaviours of men and women in the university setting (e.g., waiting for an elevator or bus, standing in the lunch line, students arriving in class, students at a sporting event, crossing a busy intersection, etc.). The students should behave as though they are doing a scientific observation of the selected behaviour; as such, the behaviour should not include the observer. The students should then write a one-page report of what they observed regarding similarities and differences between men and women with respect to the designated behaviour.

Critical Thinking Responses

What Do You Think? Why Do People Believe in the Paranormal?
After reading a description of research on ESP, presented in the Frontier Box, propose the question why so many people continue to believe in the paranormal. Students should consider their response to this question by writing a brief critical thinking paragraph prior to class.

Lecture Enhancement Material

Scientific Method: Unifying the Perspectives of Psychology

Students can easily begin to believe that psychology is a very fragmented science. Contrast psychology as a science with some other sciences, like biology and physics. Most other sciences are comprised of what Thomas Kuhn (1970) called a scientific paradigm, or common belief system that all scientists share. For example, biologists share the paradigm of evolution and physicists share the paradigm associated with Einstein's theory of relativity. In contrast to other sciences, psychology appears to lack a scientific paradigm. However, the scientific method provides a common thread that ties together all perspectives of psychology. Regardless of a psychologist's perspective, all agree that the scientific method serves as the foundation for the science of psychology. Introducing the unit in this way ties the topic nicely with the introductory chapter and confirms the definition of psychology as a science.

Reference: Kuhn, T. S. (1970). *The structure of scientific revolutions*. Chicago, IL: The University of Chicago Press.

Anecdotal Evidence?

Around the world, many important decisions are made on the basis of personal stories of warmth, or courage, or anecdotes. For example, recent efforts to prevent tort reform by legislation have involved interviews with people who have suffered from medical malpractice. Likewise, many politicians state their positions by introducing the "average family of four" from somewhere in the Midwest and how it supports the politician's initiatives. There is no doubt that modern societies make many important decisions based upon these personal stories, case examples, or anecdotes. But is this the best way to make decisions? We can always find a case to support our views whether our views are supported by science or not. I am sure we have all heard of somebody who has smoked cigarettes and drank alcohol every day of his or her life and lived to be over 100 years of age. Should we be making decisions to smoke or drink based upon this one case? Likewise, we have all heard stories about a person who went on a particular diet and lost an amazing amount of weight. However, when we try the diet, we barely lose a pound.

There is a world of difference between making decisions based on anecdote and making decisions based upon scientific evidence. In fact, you could easily argue that the term 'anecdotal evidence' is an oxymoron. In order to present the scientific method adequately, it is important to contrast it with less scientific forms of reasoning. After all, these less scientific forms of reasoning are used all the time to try and persuade us to purchase certain products or adopt certain political positions. In fact, many unscrupulous advertisement executives and politicians disguise their anecdotes as "scientific research," but rarely provide enough detail for you to evaluate the quality of the information presented. For example, if 4 out of 5 dentists surveyed recommend a particular brand of toothpaste, a scientifically minded consumer would want to know how many dentists were polled, were they a representative sample of all dentists, how was the question worded, were there any incentives provided to the dentist by the toothpaste company, or were the dentists stockholders in the company? Although it may take a good bit of time and effort to develop scientifically supported positions, the end result is truly an informed decision.

Scientific Method (adapted from Malley-Morrison & Yap, 2001)

An effective way to demonstrate the scientific method is to "walk" students through an interesting study, soliciting answers to questions drawn upon the new concepts being introduced. Chapter 2 of the text begins with the dramatic case of a young paraplegic woman who helps rescue the injured driver of a truck after an accident. The author then goes on to illustrate the derivation and testing of hypotheses in the scientific method as applied in the famous Kitty Genovese murder case. The American Psychological Association advocates research with an emphasis on positive and altruistic behaviours, so using research on charity contribution as the foundation for teaching this chapter seems logical.

Your textbook author outlines six steps in the scientific process: 1) asking questions; 2) formulating hypotheses; 3) testing hypotheses; 4) analyzing data; 5) building theories; and 6) developing and testing new hypotheses derived from the theories. The premise of this lecture could be: "Suppose we are interested in who gives to charities and under what circumstances? What hypotheses would you formulate on that question? For example, what would be some common characteristics of people who give to charities? Under what conditions are people more or less likely to donate to charities?" You could then select one or two of the hypotheses that most clearly address different methodological approaches, and ask how one would go about testing those hypotheses. This discussion accomplishes two goals: 1) it introduces the four ways of defining and measuring variables as identified by the author, namely, self-report by participants, reports by others, behavioural observations, and physiological measures; and 2) it describes the three major methods of research identified in the text, namely, descriptive research, correlational research, and experiments.

Sports Fans and Charity (adapted from Malley-Morrison & Yap, 2001)
An interesting field experiment by Platow et al. (1999) may provide a useful vehicle for discussing issues in experimental design, which receives the greatest amount of attention in the chapter. The experimenters in this investigation were interested in how many dedicated sports fans would contribute to charity collectors before and after football games. Their hypotheses were derived from social identity theory, which assumes that self-concepts are composed of both personal identities (who we are as unique individuals) and social identities (who we are as group members). The authors point out that social identification with a team can influence self-evaluations and moods, and that fans of different teams make different attributions for each team's wins and losses. Putting their emphasis on pro-social behaviours, the experimenters asked whether fans would be more likely to give to a charity if the charity's solicitors belonged to the same "in-group" (i.e., were fans of the same team). They predicted that a greater number of team-identifying fans would contribute to a specific charity if fellow team fans were soliciting donations, than if supporters of a rival team were soliciting for the same charity. They were also interested in learning if the amount of charitable donations made after the game would be influenced by whether the fan's team won or lost. Ask students to formulate their own hypotheses concerning this relationship.

Platow and his associates tested their hypotheses by collecting money for the Salvation Army in Australia before and after six football games during the 1998 season. Data were collected by pairs of experimenter-collectors wearing scarves identifying them as supporters of one of the two teams playing each day, or a plain gray scarf identifying them with no team. Ask the class to identify the experimental *independent variables*: 1) team identification with three levels (scarf identifying Team 1, scarf identifying Team 2, and neutral scarf not associated with either team [a control condition]); and 2) time of data collection (before or after the game). They should also be able to identify the *dependent variable* (donating to the charity).

Next, they should apply critical thinking to identify potential *threats to the validity* of the research. Your author identifies four such threats to *internal validity* (the degree to which an experiment supports clear causal conclusions): 1) *confounding variables* (variables intertwined with independent variables in such a way that you cannot separate the effects of an independent variable from the effects of the confounding variable); 2) *demand characteristics* (cues that participants pick up about how they are expected to behave); 3) *placebo effects* (effects due to knowing one is in an experiment testing, for example, a drug or other treatment), and 4) *experimenter expectancy effects* (the subtle and unintentional ways experimenters influence participants to behave in expected ways).

To address potential threats to validity, Platow et al. took the following steps: 1) gender of collector and observer in each charity worker pair were counterbalanced so that at no time were all collectors of one gender; 2) collector and observer roles alternated between Phase 1 (before the game) and Phase 2 (after the game); 3) the three gates at which the experimenters stood were selected to facilitate sampling the widest possible cross-section of attendees; 4) collectors identified fans only by observing clothing and paraphernalia, not by direct questioning; and 5) collectors behaved passively, never directly approaching fans for contributions. Students can determine what type of threats to validity such steps helped to address.

They can also describe the differences and similarities between Platow et al.'s experiment and the experiments described in chapter 2 of the text. It is similar in that, for example, there is manipulation of an independent variable (type of scarf) and controls over extraneous variables that could affect validity, including controls for *experimenter bias* (e.g., keeping the collectors

impartial). It is different in that there is no *random assignment* of participants to experimental and control groups, even though there are experimental and control conditions.

Finally, students should speculate about the findings from this experiment. Specifically, what Platow et al. found was that 1) more fans contributed to in-group-identified than to out-group-identified charitable workers; 2) charity workers associated with each team received more donations from fans after the game than before the game; 3) charity workers not associated with a specific team received more donations before the game than after the game; and 4) fans of winning teams in particular contributed more to all charity workers (whether or not associated with a specific team) after the game than before. The authors concluded that rather than team identification and competition leading to antisocial behaviour, it actually led to prosocial behaviour (charitable donations); although team-biased, in-group favoritism occurred, it was not to the detriment of overall prosocial behaviour. In accordance with the critical thinking theme of the text, ask students if they have other interpretations of the study's findings, the extent to which the study has *external validity* (would similar findings occur in the United States?), and how they might change or add to the design if they were to try to *replicate* the experiment in a country other than Australia.

Remind students that you have just presented an experiment in which there is at least one independent variable that is manipulated by the experimenter, who creates at least one experimental condition (in this case two—the scarf for one team and the scarf for the opposing team) and one control condition (in this case, the neutral scarf). Much of the research in psychology is not experimental but *correlational—that* is, it focuses on the associations between naturally occurring events or variables. Have the class formulate some hypotheses about characteristics of people or situations that might be *positively associated* with giving to a charity, as well as some hypotheses about characteristics of people or situations that might be *negatively associated* with giving to a charity.

Reference: Platow, M. J., Durante, M., Williams, N., Garrett, M., Walshe, J., Cincotta, S., Lianos, G., & Barutchu, A. (1999). The contribution of sport fan social identity to the production of prosocial behaviour. *Group Dynamics, 3,* 161-169.

Single Subject Design

Students may equate the demonstration of cause-and-effect relations only to findings from experimental group designs. Most psychologists recognize that is not the case; in fact, many causal inferences can be made from research using a single subject (participant) as long as the investigator adheres to a set of established principles known as single subject designs. One of the most common types of single subject designs is the reversal design. The reversal design involves three phases:

- Baseline Phase: A designated behaviour is measured frequently to determine a base rate. For example, the number of physical altercations observed on the playground during recess for a young aggressive child could be measured daily for a two-week period.

- Intervention (or manipulation): The investigator manipulates a single aspect of the environment using the intervention that he or she is testing. An example of an intervention would be to prevent the aggressive child from playing violent videogames; the number of physical altercations on the playground will continue to be measured to determine whether the intervention had an effect.

- Reversal: In order to demonstrate causality, the intervention (or manipulation) is briefly removed. For example, after the rate of physical altercations decreases substantially with the intervention, the investigator permits the child to play violent videogames for three days. If the rate of physical altercations increases during the reversal phase, it can be concluded that the intervention 'caused' the intended behaviour change.

Research Ethics and Historical Research

Presentations on research ethics often start with a brief overview of historical research studies that were conducted on both humans and animals with no regulatory oversight (e.g., experiments on humans at Nazi concentration camps, experiments involving radiation by the United States government during World War I and II). With these stories as background, there will be very little argument that regulatory oversight is necessary. Students are often interested in the type of psychological research that was conducted prior to the development of Institutional Review Boards. Some graphic illustrations include:

- Emotions. Ax's and Landis' research on emotions. Ax (1953) conducted a study to compare the experience of fear and anger. In the anger condition, the experimenter criticized the participant and roughly adjusted the electrodes used for measurement; in the fear condition, the polygraph "malfunctioned" emitting sparks, and the experimenters made comments in front of the participant regarding presence of a dangerous high voltage short circuit. Landis (1924) conducted a study to measure facial reactions of participants. To induce the emotion of surprise, he set off a firecracker under the participant's chair and to create disgust, participants were instructed to cut off the heads of live white rats with a knife.

  References: Ax, A. (1953). The physiological differentiation between fear and anger in humans. *Psychosomatic Medicine*, *15*, 433-442; Landis, C. (1924). Studies of emotional reactions: General behaviour and facial expression, *Comparative Psychology*, *4*, 447-509.

- Conditioned Fear. Watson & Raynor's (1920) demonstration of a conditioned emotional (fear) response in 11-month old Little Albert. In this study, Watson used the principles of classical conditioning described by Pavlov to demonstrate that fear can be conditioned to a previous neutral stimulus: an unsuspecting infant placed in his care while his mother was at work (see http://www.simplypsychology.org/classical-conditioning.html for more details).

  Reference: Watson, J.B., & Rayner, R. (1920). Conditioned emotional reactions. *Journal of Experimental Psychology*, *3*, 1-14.

- Obedience. Milgram's (1974) experimental research on obedience to authority. In this study, Milgram demonstrated that the majority of participants who served as teachers in an apparent study on learning administered "lethal" shocks to the learners based upon the command of the experimenter (see http://www.simplypsychology.org/milgram.html for more details)

  Reference: Milgram, S. (1974). *Obedience to authority: An experimental view*. New York: Harper & Row.

In-Class Demonstrations and Activities

The Psychic Psychologist

One of the best ways to introduce students to critical thinking involved in the scientific method is to conduct a demonstration in class that is beyond belief. Once the demonstration is completed, ask the students to generate hypotheses regarding how the demonstrated phenomenon occurred and to come up with effective methods for examining their hypotheses. Although there are several demonstrations that would work in serving this purpose, a proven method involves a demonstration of psychic ability. Because the chapter also includes a segment on paranormal psychology, this is an excellent way to introduce your students to the scientific method. Doug Bernstein has conducted this demonstration at both national and regional teaching conferences and deserves credit for bringing this 'magic' act into the classroom setting.

In order to conduct this activity, you will need to do some preparation prior to class. Review the daily local or campus paper and select a story that has a large headline and one lengthy column of text. Carefully cut out the article. Then very carefully cut between two lines of text right below the headline, separating the headline from the text. Write the first few words of the text portion of the article on an index card and seal it in an envelope. Then, very carefully, tape the text portion to the headline upside down. From the distance between you and your students in class, the "doctored" article will look like the real thing. Students will focus on the headline and be too far away from you to notice the text is upside down.

To conduct the activity in class, describe how you have been examining paranormal psychology, and through your investigations have begun to realize that you have psychic abilities. Explain to them that although it does not work for you in every setting, you would like to demonstrate your abilities for them. Hold up the news article and explain to the students that although it is a rather lengthy article, you are going to try and focus your paranormal abilities on only a few distinct words in the article that you predicted a student would select prior to class. Ask for a volunteer and inform him or her that you are going to move a pair of scissors slowly up and down the article until he or she says "Stop" where a cut should be made. When the volunteer says, "Stop," cut the article, and let the bottom segment of text fall to the floor. Fold up the upper portion of the article (including the headline) and put it away. Then, ask a second volunteer to retrieve the segment of the newspaper article from the floor. Inform the class that your psychic abilities have led you to predict the first words that appear on that segment of the article that fell to the floor and that you wrote them down and sealed them in an envelope before class. Hand the envelope to a third volunteer and ask him or her to check to make sure that it is sealed and then open it. Then, on the count of three, have the second volunteer read the first three or four words of the article and the third volunteer read the words on the card. They will, of course, be identical. After your students express their disbelief in your psychic abilities, you can lead a discussion regarding several hypotheses students might have about your demonstration. They will frequently point to the volunteers as your accomplices or try to examine the news article to determine whether the entire article is made up of the same three or four words. As the students arrive at these hypotheses, they will automatically generate ways to test them out, providing an excellent introduction to the scientific method and critical thinking.

Psychological Research (adapted from Jarvis, Nordstrom, & Williams, 2001)

Students learn about the scientific method in many of their courses. While many people accept controlled studies as a good way to obtain information, we are nevertheless sometimes

susceptible to accepting untested propositions as truth. The following 20-minute activity effectively demonstrates that psychologists (and other human beings) must be careful that the things they believe to be true are, in fact, accurate. Truth can be acquired in many ways, but the scientific method is perhaps the best way for psychologists to learn about behaviour because it reduces the chances that this knowledge or truth will be based on inaccurate material.

To demonstrate the tendency that we all have to accept information uncritically from others as truth, announce to the class that you will be giving them a brief lecture on the scientific method and that it will be followed by a short quiz. Base the brief lecture on the following information. The material in bold italics is inaccurate (but don't tell them that yet!).

> A famous German structuralist philosopher by the name of Edward Horton Sanders wrote an essay entitled "In Defense of Science" over two hundred years ago, in which he argued that although humans have many different ways of gathering knowledge, the preferred way for approaching the truth is the scientific method. How else can we gather knowledge about things? Sanders said that we learn much secondhand from authorities. For example, an expert authority tells you that something is true and, although he or she can be checked, you usually don't check for reasons of time and interest. When a mechanic tells Susan her van needs new brakes, or when a dentist tells Stan he needs a cavity filled, these experts are usually believed without being checked. However, expert authorities such as these and others, like teachers, journalists, and physicians, can be wrong.
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> The scientific method, according to Sanders, by being public and self-corrective, provides a chance to detect errors and, through the requirement that any good piece of research must be replicated, also provides a chance to correct these errors. Suppose a researcher reports that depressed people blame themselves for bad outcomes even when they are not to blame. In order for this to be ultimately accepted by psychologists as being true, the researcher must report his or her procedures and findings in a public forum, such as a professional journal, where others can read and perhaps criticize them. ***If*** another independent researcher does the experiment over and finds essentially the same results, then people have more faith in it. ***If*** however, others fail to replicate the original work or do so in modified form, such as finding that the results are only true for females with depression, then the findings of the original study will likely be viewed skeptically by others.
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> The self-corrective nature of the scientific method is evident by the use of the technique itself, such as in controlled experiments, to try and test whether knowledge originally gained through the scientific method is accurate. Because this "correction factor" is not generally available for knowledge from authorities or common sense, these ways of acquiring knowledge are generally not endorsed by psychologists.

Administer the quiz on **Handout 2-C.** It also can be given orally or put on a transparency.

After students finish the quiz, tell them you will not grade it because although most of the lecture about the scientific method was accurate, the initial part (and the first three quiz questions) contained material that you just made up (expect a major class reaction at this point!). Go on to tell them that there was no German philosopher of the structuralist school named Edward Horton Sanders who lived about two hundred years ago and wrote an essay called "In Defense of Society." Rather, confess that you made it up just to show how prone people are to accepting what others tell them as the truth. Psychologists need to be careful and depend on the scientific method as a preferred way to gather knowledge.

At this point, continue the discussion with a more detailed look at how the scientific method is used in psychology (observations, facts, hypotheses, theories, etc.). You might also want to point out that it was Charles Sanders Pierce, an American pragmatist philosopher, who wrote an essay entitled "The Fixation of Belief" about a hundred years ago in which he made these points. Don't be surprised if your students do not believe this or anything else that you say at this point!

Design a Study

One method for ensuring that your students comprehend the steps of the scientific method is to work through the actual design for a study. The more outrageous the topic chosen for study, the more interested students will be. The safest approach to this exercise is to select a general topic yourself and let your students design the study in class. For example, you might select general topics like playing violent videogames and aggression, single parenting and behavioural disturbances among children, caffeine and memory enhancement, or a topic pertinent to your research area. If you are feeling bold, you might consider letting your students come up with a general topic pertaining to human behaviour based upon their observations (this could be done in conjunction with the pre-class assignment on naturalistic observation). Once the general topic is chosen, work though the remaining five steps in the scientific process. Ask students to write their responses on **Handout 2-D**.

- Formulating Hypotheses Once students understand the basic question, ask them to formulate a written hypothesis. In writing the hypothesis, students will need to consider whether they want to describe relations between variables (correlational approach) or whether they want to make causal statements about relations between variables (experimental approach). The study hypothesis will be written slightly differently based upon their choice. For purposes of simplicity, it is best to limit the number of variables to two.

- Testing Hypotheses One of the first steps in testing the hypothesis is to state operational definitions for the variables in the study. Students will need to consider whether their measures represent self-report measures, psychological tests, behavioural observations, or physiological when stating their operational definitions. Once the variables have been defined, students will need to consider the basic elements of the method chosen, including a description of the participants and procedures used for data collection.

- Analyzing Data For this step, you are going to have to pretend you have spent months collecting the data and are now presenting the findings. This will involve a discussion of correlation coefficients and tests of statistical significance. Review with students how these data analytic strategies assist them in drawing conclusions.

- Building Theories –Once you have reported your results and conclusions, you can return to the six perspectives of psychology and interpret your findings with regard to a particular perspective (or several perspectives).

- Developing and Testing New Hypotheses Finally, once your data is tied to a theoretical framework, it permits additional questions for future research, starting the whole process over again.

Opinions Versus Facts (adapted from Malley-Morrison & Yap, 2001)
Although some students can come in to an introductory psychology course believing they will learn the answers to many of life's problems, others believe that their personal opinions are just as good as the opinions of psychologists—thus indicating that they have little understanding of the difference between facts and opinions. Thus, in teaching the scientific method, it can be very important to help students understand the difference between opinions and facts—and to suggest that the language of facts should not be used when presenting opinions. The following in-class activity may help clarify the difference, an understanding of which is essential to critical thinking.

Explain that "opinions" are to be considered to be beliefs or assumptions that individuals have that are not based on scientific evidence. They do not belong in a scholarly, scientific research paper. In scientific language, they should consider "facts" to be statements concerning scientifically gathered and validated *data* or *evidence* of the sort that are obtained in an empirical study and typically found in the results section of a psychology research report. Explain that when scientists present conclusions or inferences or interpretations about facts that are not firmly established through scientific procedures, they are expected to present qualifications concerning the firmness of the conclusions that can be drawn from the collected data. Then ask the class to evaluate each of the pairs of statements on Part I of **Handout 2-E** and decide which is best considered a statement of fact and which is an opinion. Next, they should evaluate the unpaired statements in Part II to determine if they are better examples of a fact or an opinion.

Evaluating Hypotheses (adapted from Malley-Morrison & Yap, 2001)
Students need to understand that good hypotheses are empirically verifiable and not, for example, statements of moral values. The exercise presented on **Handout 2-F** will help students recognize a sound scientific hypothesis.

Research Design (adapted from Malley-Morrison & Yap, 2001)
Explain that researchers often prefer to use experimental, rather than correlational designs, to test hypotheses because experiments can be used to demonstrate cause-effect relationships. However, some hypotheses do not lend themselves to experimental study for ethical, practical, or logical reasons (i.e., some important variables, such as age of respondents, cannot be *manipulated*, even though researchers can study participants already differing in age). Moreover, at early stages of the research, purely descriptive or correlational studies may be most appropriate. Present the class with the hypotheses on **Handout 2-G** and ask them to decide whether an experimental, a descriptive, or a correlational study would be the best (or the only) way to test the hypothesis.

Confounding Variables (Malley-Morrison & Yap, 2001)
To help students understand what a confounding variable is, present the exercise on **Handout 2-H**. Instruct students to read each study finding and identify a potential confounding variable.

Class Discussion Activities

Correlation Vs. Experimental Research (adapted from Jarvis, Nordstrom, & Williams, 2001)
This 10-15 minute activity is an old standby that has been described in various forms in numerous teaching manuals. It can be adapted to large class sizes and works quite well to illustrate the difference between correlation and causation. In addition, the activity can be used to introduce the need for experimental research in psychology. Alternative explanations for data and confounds of studies can be considered, as well. Finally, information on hypothesis testing and independent and dependent variables can be presented.

1. Prepare a handout containing five or six observations and subsequent conclusions (see example **Handout 2-1** for ideas). Try to choose observations that reflect different content areas of psychology (e.g., developmental, social, physiological).

2. Begin the exercise by passing out the handout. Tell students that you would like them to discuss the observations and conclusions given on the handout with a student or two sitting next to them. Ask the groups to decide if the conclusion is sound based on the information given in the observation. If the conclusion is not sound, the students should provide reasons why the statement is not warranted. Give the class several minutes to discuss the handout in their small groups.

3. Stop the groups after a designated time so that the class can discuss the observations and conclusions as a whole. Start with the first observation and, by a show of hands, ask how many of the groups agreed with the conclusion. Then ask those students who do not think the conclusion was warranted to explain their rationale. Do this for all the observations and conclusions. Use these responses to illustrate that these observations imply only correlation, not causation. Discuss the alternative explanations the class gave for each of the observations. Discuss what is necessary to make causal conclusions leading the class to information on the experimental method.

4. Have the students return to each of the examples and generate an experimental hypothesis to test the conclusion. Identify independent and dependent variables for each hypothesis.

Diffusion of Responsibility (adapted from Malley-Morrison & Yap, 2001)
The textbook describes one of the classic experiments of Darley and Latane who simulated an "emergency" in a university psychological laboratory in order to investigate, experimentally, hypotheses about the role of group size in producing "diffusion of responsibility." They found that student volunteers who thought they were overhearing another student having a seizure were much more likely to seek help, and to seek it more quickly, when they believed they were the only ones aware of the "emergency" than when they thought other students also heard the calls for help. What are the major limitations of this important experiment? How could these limitations be addressed in other experiments? Within both the group of participants who believed they were alone and the group who believed others were witnesses to the apparent emergency, there were individual differences in how quickly participants sought help. What personal characteristics might be associated with the tendency to seek help faster? How might hypotheses about such characteristics be tested empirically?

Children as Research Subjects (adapted from Malley-Morrison & Yap, 2001)
Chapter 2 of the textbook presents several of the ethical guidelines promulgated by the American Psychological Association, including the principle of informed consent. The chapter also points out that in the case of children and others who are unable to give true informed consent, consent must be obtained from their parents or guardians. In addition, it may be noted, assent (agreement) must be obtained from individuals incapable of giving true informed consent.

As is true of animal research, there has been a great deal of controversy over "using" (think of the implications of that term!) children in research. Levine (1995) provides a thoughtful discussion of the controversies concerning the involvement of children as research participants. He focuses particularly on the issues raised by the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research (the National Commission). The recommendations of this committee, published in 1977, form the basis of federal regulations promulgated in 1983. The National Commission identified three basic ethical principles that should be adhered to in all research using human participants— I) respect for persons, 2) beneficence (do no harm; maximize possible benefits and minimize possible harm), and 3) justice (assure an equitable access to the benefits of research).

Students might find it interesting to have a debate on involving children in research. They could consider such questions as: Which of the following statements demonstrates more respect for children?

- Assuming that since they cannot give true informed consent, they should not be involved in research at all, even with parental consent and even when the research could have benefits for many children.

- Assuming that the only obligation to children is to protect them from harm, and therefore, if their parents provide consent, and the children assent to the procedures, it is acceptable to involve them in research when there is no foreseeable risk.

At what point are children mature enough to be capable of assenting to research procedures? Is it possible to maximize the benefit of drugs needed to treat children's medical problems, and minimize the risk of those drugs, if children cannot participate in clinical trials to test those drugs?

Animal Research

Using animals for psychological research is controversial. On the one hand, scientists learn a lot about behaviour from conducting experiments on animals like rats and pigeons. Much of what is learned can be applied directly to human learning situations to facilitate strategies for learning new behaviours or extinguishing maladaptive behaviours. On the other hand, animal rights advocates are generally opposed to conducting research on animals, even the benign sorts of studies conducted on rats and pigeons. You might consider engaging your class in a discussion of this topic to determine their thoughts and opinions regarding this issue. The discussion could lead to presenting information regarding the strict regulations required for conducting animal research which includes directives pertaining to clean housing conditions for animals, regular veterinary services to maintain healthy animals, and regular feeding. It could be argued that laboratory animals live a higher quality of life than many humans!

Guest Presentation

Research Faculty Member

Many faculty members at research universities have active research laboratories, often funded through external grants. Students might find it interesting to hear how the six steps of the scientific method direct the line of scientific inquiry in one of these psychologist's laboratories. You could invite a faculty member with an active research laboratory to give a brief 10-minute overview of how the six steps of scientific method are currently operating in his or her laboratory. In order for this type of presentation to be a success, it is important to meet with the faculty guest beforehand to inform him or her about the nature of the talk you would like and to orient them to the six steps of the scientific method outlined in the Passer, Smith, Atkinson, Mitchell, Muir textbook. It would be helpful for your students if the speaker used the same language in his or her presentation that is used in the book. Finally, because most researchers are so interested in their own research and could talk for hours on it, it is important to limit their presentation to only about 10-minutes. Even the most enthusiastic introductory psychology students will lose interest if the presentation goes on too long. To maintain your student's interest, make sure you ask them to write down something they learned from the guest presentation and tum it in at the end of class or create several exam items based upon the guest presentation.

Step 2: Student Evaluation

Essay Question Papers (adapted from Malley-Morrison & Yap, 2001)
Students may be assigned to answer the following essay question:

"Suppose you were asked to conduct a content analysis of daytime soap operas to determine whether the soaps on CBS were more sexist than the soaps on NBC (or vice versa). Write an essay in which you identify the independent and dependent variables and describe how you would operationalize them. Also indicate what the sample and the population would be in this investigation, and whether the investigation is descriptive, correlational, or experimental. What confounding variables might you need to consider?"

Study Questions
In this chapter, there are 36 focus questions located in the margins on each page of the textbook. Ask students to review these questions to help them preparing for a chapter quiz or exam.

For Further Reading (adapted from Malley-Morrison & Yap, 2001)

- American Psychological Association (2003). Ethical principles of psychologists and code of conduct. *American Psychologist, 47,* 1597-1611.
- Chastain, G., & Landrum, R. E. (1999). *Protecting human subjects: Departmental subject pools and Institutional Review Boards.* Washington, DC: American Psychological Association.
- Martin, D. W. (2000). *Doing Psychology Experiments (5" ed.).* Belmont, CA: Wadsworth/Thomson Leaming.
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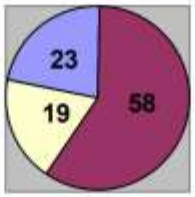
Handout 2-A

Self Report Bias In Surveys

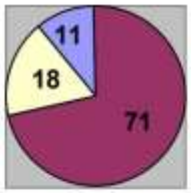
My Causes for Concern

Environment



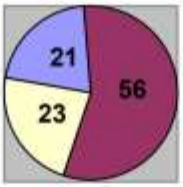
My response _____

AIDS



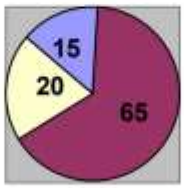
My response _____

Animal Protection



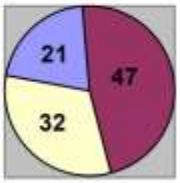
My response _____

Drug Abuse



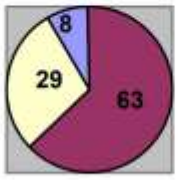
My response _____

World Hunger



My response _____

Homelessness



My response _____

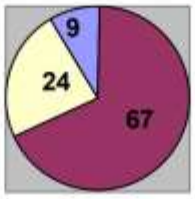
Legend:

White = same as others Light
Shading = less than others Dark
Shading = more than others

Handout 2-A (Concluded)

My Ratings of Concerns of Others

Environment

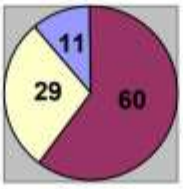


My response _____

AIDS

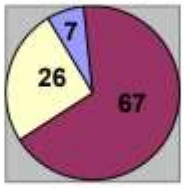
My response _____

Animal Protection



My response _____

Drug Abuse

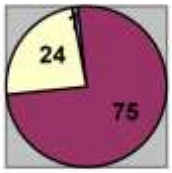


My response _____

World Hunger

My response _____

Homelessness



My response _____

Legend

White = right amount of worry
Light Shading= worried too much
Dark Shading = not worried enough

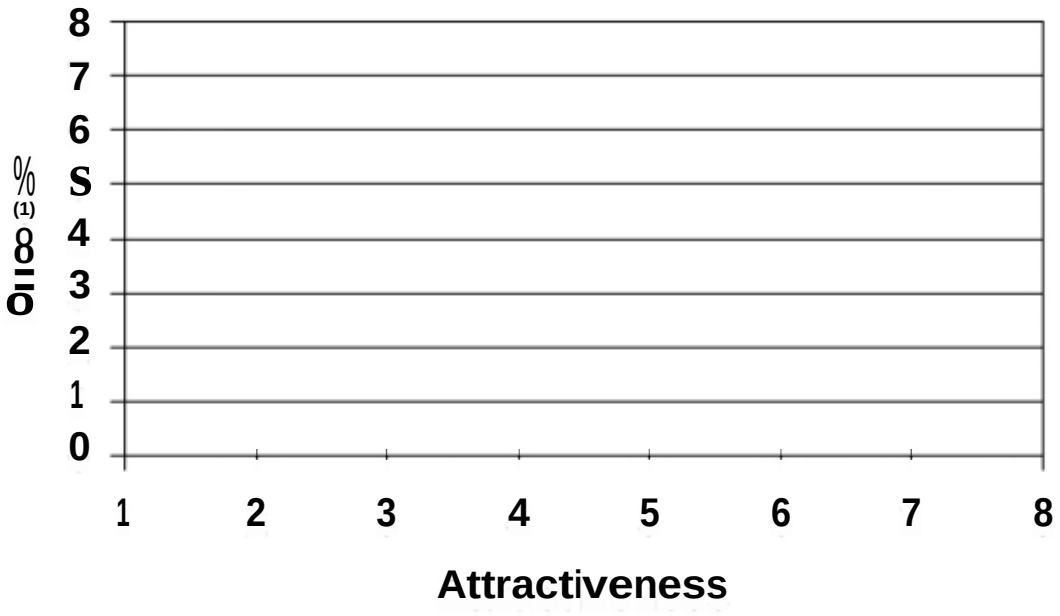
Handout 2-B

Correlational Research

A. My Ratings of Attractiveness and Success:

Celebrity	Attractiveness	Success	Celebrity	Attractiveness	Success
A			F		
B			G		
C			H		
D			I		
E			J		

Scatterplot Between Attractiveness and Success



The correlation coefficient between my Attractiveness and Success ratings was _____.

Handout 2-C

Scientific Method Quiz

1. Who wrote "In Defense of Science"? _____

2. When was this influential essay written? _____

3. What school of philosophy did the author of the essay subscribe to?

   _____

4. When we learn things from others, what is this way of gathering knowledge called?

   _____

5. What two features of the scientific method make it preferable as a way of gathering knowledge for psychologists?

   A. _____

   B. _____

6. If an experiment is successfully repeated by another researcher, we say that it has been

   _____.

Source: Adapted from Jarvis, Nordstrom, & Williams, 2001.

Handout 2-D

Design a Study

Step 1: Ask a Question

General Topic is:

Step 2: Formulate Your Hypothesis:

Step 3: Test Your Hypothesis

Operational Definitions

Variable A:

Variable B:

Handout 2-E

Opinions Versus Facts

Part I

Read each of the following pairs of statements and decide whether it is an opinion or a fact (a statement of evidence, of an empirical finding).

- Females scored significantly higher than males on every measure administered in the study of gender and affiliation.
- Women are naturally more empathic than men—it's just part of their nature.

- Husbands who physically batter their wives are depraved and should be locked up for the rest of their lives.
- The extent of observed violence between parents was positively correlated with later expression of outward anger in a college student sample.

- Jealousy causes more problems in human relations than just about anything else you can think of.
- Jealousy and overall anger were significantly positively correlated in males but unrelated in females.

- The amount of time that elapsed between the presentation of the emergency stimulus and the participant's effort to get help varied significantly as a function of the size of the group being exposed to the emergency stimulus.
- It's a lot better to have men around in a time of emergency than just to have a bunch of women, because men are much better at keeping a cool head in the face of an emergency.

Handout 2-E (Concluded)

Part II. Continue by examining each of the following statements and determine whether it is a statement of opinion or a statement of fact.

A. In this society, females are always the ones who push the guys to make a commitment.

B. Women who put up with battering from men can't have a very high opinion of themselves.

C. The difference between the mean optimism scores of the women in the college sample and the women in the community sample was not statistically significant.

D. Scores on dismissive attachment were negatively correlated with commitment in males but not females.

E. Women just can't seem to be happy unless they are in a relationship with a man.

F. The statistical analyses revealed that seniors scored higher than freshmen regarding concerns about the future.

G. Even though there is no evidence of a statistically significant gender difference of appreciation for psychology, I still believe that females appreciate the field more than males do.

Source: Malley-Morrison & Yap, 2001.

Handout 2-F

Evaluating Hypotheses

Circle the Good Hypotheses.

A. It is better to be honest about people's faults than to kill them with kindness.

B. People from ghettos are just never going to be able to learn as well as people who have more advantages.

C. If you reinforce an animal every time it performs a desired behaviour, then when you stop reinforcing it, the behaviour will extinguish (die out) faster than if you reinforced the behaviour intermittently.

D. L-DOPA can relieve the symptoms of Parkinson's Disease.

E. Hitting kids is the best way to teach them manners.

Source: Malley-Morrison & Yap, 2001.

Handout 2-G

Experimental, Descriptive, or Correlational Design?

	Experimental	Descriptive	Correlational
Students will learn better in a cool room than in a hot one.			
Students do better on exams with spaced reviews than with last minute cramming.			
The greater the street noise level in an urban area, the more learning disabilities the children growing up in that area will have.			
Individuals who were abused as children are more likely to become abusive in dating relationships.			
Teenage guys are more likely to accompany girls who are shorter than girls who are taller.			
Drinking a cup of coffee before an exam will improve performance.			
Children mature faster in cities than in the suburbs.			
It is easier to remember words that rhyme than words that are completely unrelated.			
Girls read better than boys during elementary school.			

Source: Malley-Morrison & Yap, 2001.

Handout 2-H

Identifying the Confounding Variable

1. To determine if students retain more information with spaced reviews, Dr. X compares exam scores in students from a parochial school who used spaced review with students from a public school who crammed.

Confounding Variable:

2. To see if blondes have more fun, Dr. Y compared fun surveys of blondes from a modeling agency with those of brunettes from a temp agency.

Confounding Variable:

3. To determine if jogging increases lung capacity in members of the track team, Dr. Z compared their lung capacity with that of members of the wrestling team.

Confounding Variable:

4. To determine if brains process information faster as children mature, 2-year olds in a university day care centre were compared with 4-year olds in a head start program.

Confounding Variable:

Source: Malley-Morrison & Yap, 2001.

Handout 2-1

Observations and Conclusions

Read each of the following observations. Assume that the observations were accurately observed. Next read the conclusion made based on the observation. Is this conclusion warranted? If not, explain why not.

1. OBSERVATION: A physiological psychologist observes that people with higher levels of the neurotransmitter, dopamine, exhibit more behaviours associated with schizophrenia than those with lower levels of dopamine.

   CONCLUSION: High dopamine levels cause schizophrenia.

2. OBSERVATION: A psychologist studying sensation and perception observes that blue eyed subjects make more mistakes when interpreting visual stimuli than do subjects with brown eyes.

   CONCLUSION: The color of the iris determines how well we perceive visual stimuli.

3. OBSERVATION: A developmental psychologist notices that male and female children prefer different toys during their preschool years. In particular, girls enjoy playing with dolls and stuffed animals while boys like action figures and guns.

   CONCLUSION: Males and females have innate biological differences. Females are more nurturing and males are more aggressive.

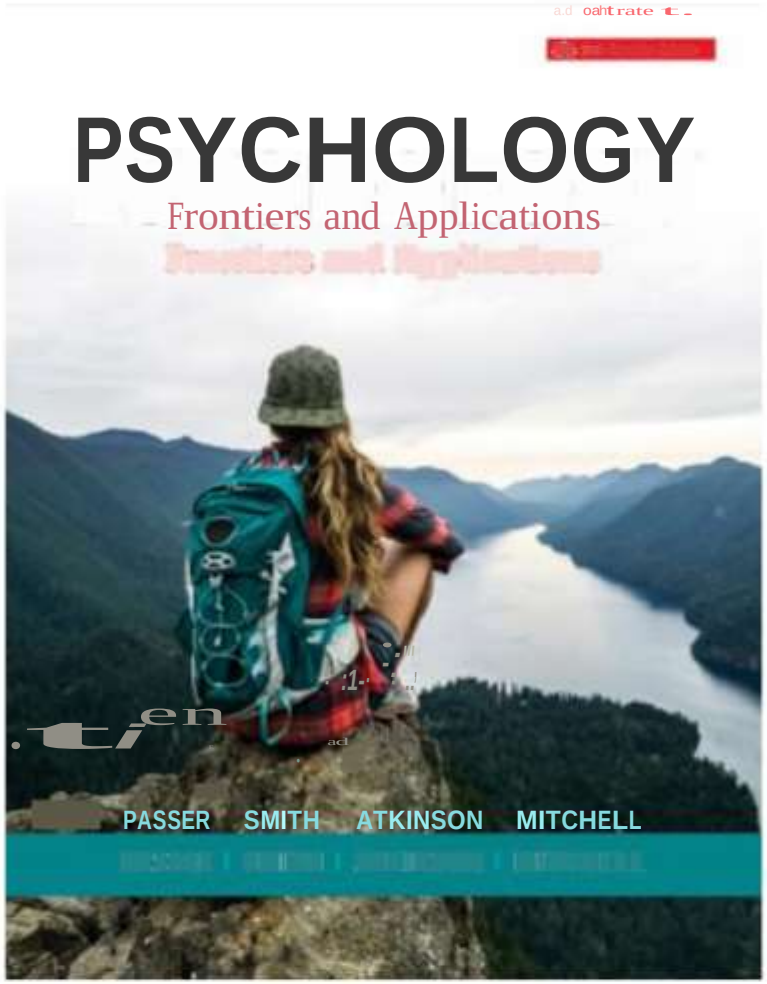
4. OBSERVATION: A social psychologist observes that older people with pets live longer than older people without pets.

   CONCLUSION: If people want to live longer, they should have a pet.

5. OBSERVATION: An industrial/organizational psychologist observes that people who are most satisfied with their jobs perform at higher levels than people who are dissatisfied.

   CONCLUSION: Job satisfaction causes performance.

Source: Adapted from Jarvis, Nordstrom, & Williams, 2001.



Chapter 2

Studying Behaviour Scientifically

Slides Prepared by Anastasia Bake
St. Clair College

Chapter 2 Outline

- **Scientific Principles in Psychology**
  - Scientific Attitudes
    - Research Foundations: Bystander Intervention
  - Gathering Evidence: Steps in the Scientific Process
  - Two Approaches to Understanding Behaviour
  - Defining and Measuring Variables
    - Focus on Neuroscience: The Neuroscience of the Human Brain at Work

Chapter 2 Outline

- **Methods of Research**
  - Descriptive Research: Recording Events
  - Correlational Research: Measuring Associations between Events
  - Experiments: Examining Cause and Effect

- **Threats to the Validity of Research**
  - Confounding of Variables
  - Placebo Effects
  - Experimenter Expectancy Effects
  - Replicating and Generalizing the Findings
    - Frontiers: Does ESP Exist?

Chapter 2 Outline

- **Ethical Principles in Human and Animal Research**
  - Ethical Standards in Human Research
  - Ethical Standards in Animal Research

- **Critical Thinking in Science and Everyday Life**
  - Applications: Evaluating Claims in Research and Everyday Life

Welcome to Chapter 2

"I have no special talents.

I am only passionately curious."

Albert Einstein

Scientific Attitudes

Are Scientists Different? *Yes!*

Curiosity– *Why?*

Skepticism- What is the Evidence?

Open-minded – Other Explanations?

Gathering Evidence: Steps in the Scientific Process

Identify Question of Interest

↓

Gather information – form hypothesis (specific prediction)

↓

Test Hypothesis - Conduct research

↓

Analyze data – draw tentative conclusions

↓

Build a body of knowledge – build theory (formal statements)

Two Approaches to Understanding Behaviour

- **Hindsight Understanding**
  - Relies on explanations 'after-the-fact'
- ***Drawback***:
  - Past events can be explained in many ways

- **Understanding through Prediction, Control, Theory building**
  - Uses scientific method
- ***Advantages***:
- Satisfies curiosity, builds knowledge, generates principles that can be applied to new situations

Understanding Behaviour

Good Theories

1. Organize information in meaningful way
2. Are testable
3. Have prediction supported by research
4. Conform to law of parsimony
5. simpler theory is preferred

Non-Scientific Theories

Make No Predictions

Un-testable

Can't be Falsified

Car Won't Work? ➔ Aliens Drained The Battery.

Car won't work? ➔ Gods must be angry.

Defining & Measuring Variables

Variable

- Any characteristic that can vary
- E.g., stress, weight, reaction time

Operational Definition

- Defines a variable in terms of specific procedures used to produce or measure it

How Would We Study Stress?

- Need to operationally define it
- E.g., measure stress through measurement of muscle tension

How Are Variables Measured?

Self-report

- **Issue**: Social desirability• desire to make good Impression
- Suggestive questions?

Physiological

- **Issue**: Establishing link between physical responses & mental events

Behavioural

be 'reliable'

- Is behaviour typical? Unobtrusive measures

Methods of Research: 'Our Tools'

Descriptive Research

Describe behaviour in natural settings

Case studies; naturalistic observation; surveys

Correlational Studies

Relationship between/among variables?

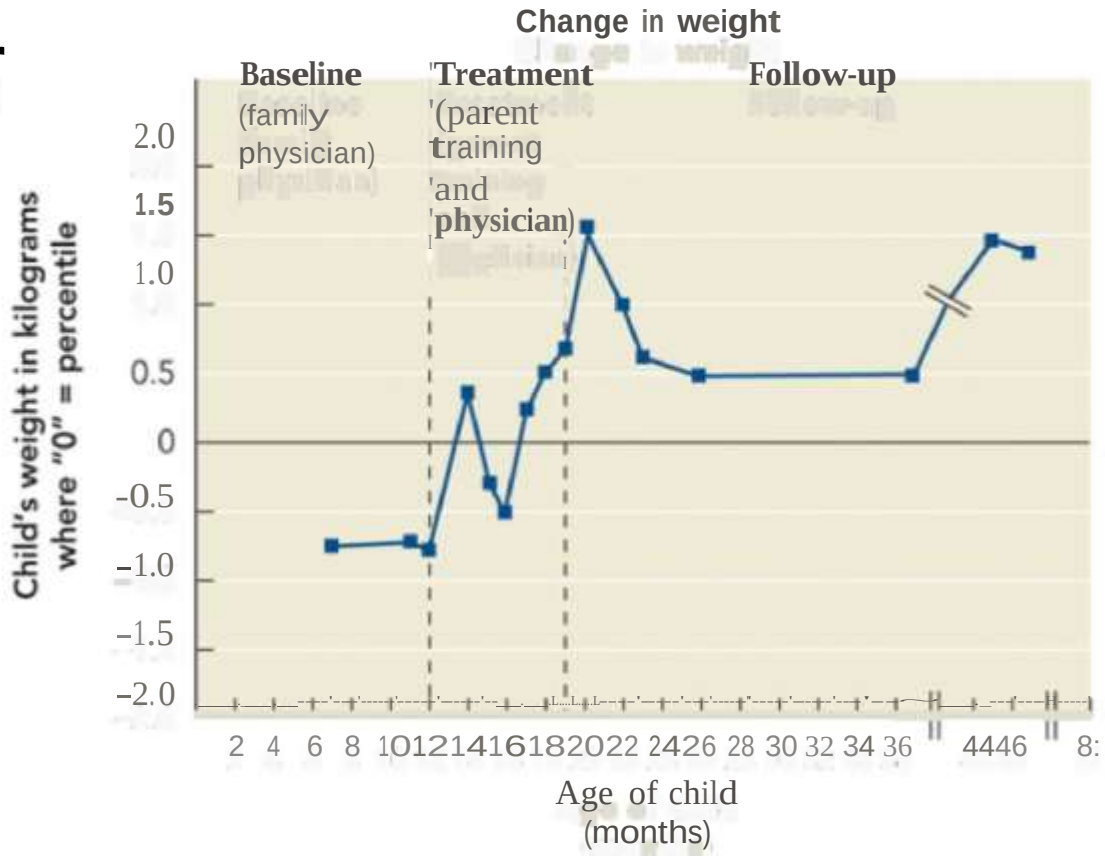
Experimental Methods

'Cause and Effect' Relationship?

Case Studies

- In-depth analysis of individual, group, or event

- What information could a case study possibly tell us about human behaviour?



Case Studies

Advantages

- Useful for rare phenomenon
- May challenge validity of theories
- Can illustrate effectiveness

Disadvantages

- Poor method of determining cause-effect relations
- Generalizability questionable
- Researcher bias

Naturalistic Observation

- Observation of behaviour in a natural setting
  - Bullying in Canadian Schools

Naturalistic Observation

- **Advantage**:
  - Provides a rich description of behaviour

- **Disadvantage**:
  - Does not permit clear causal conclusions

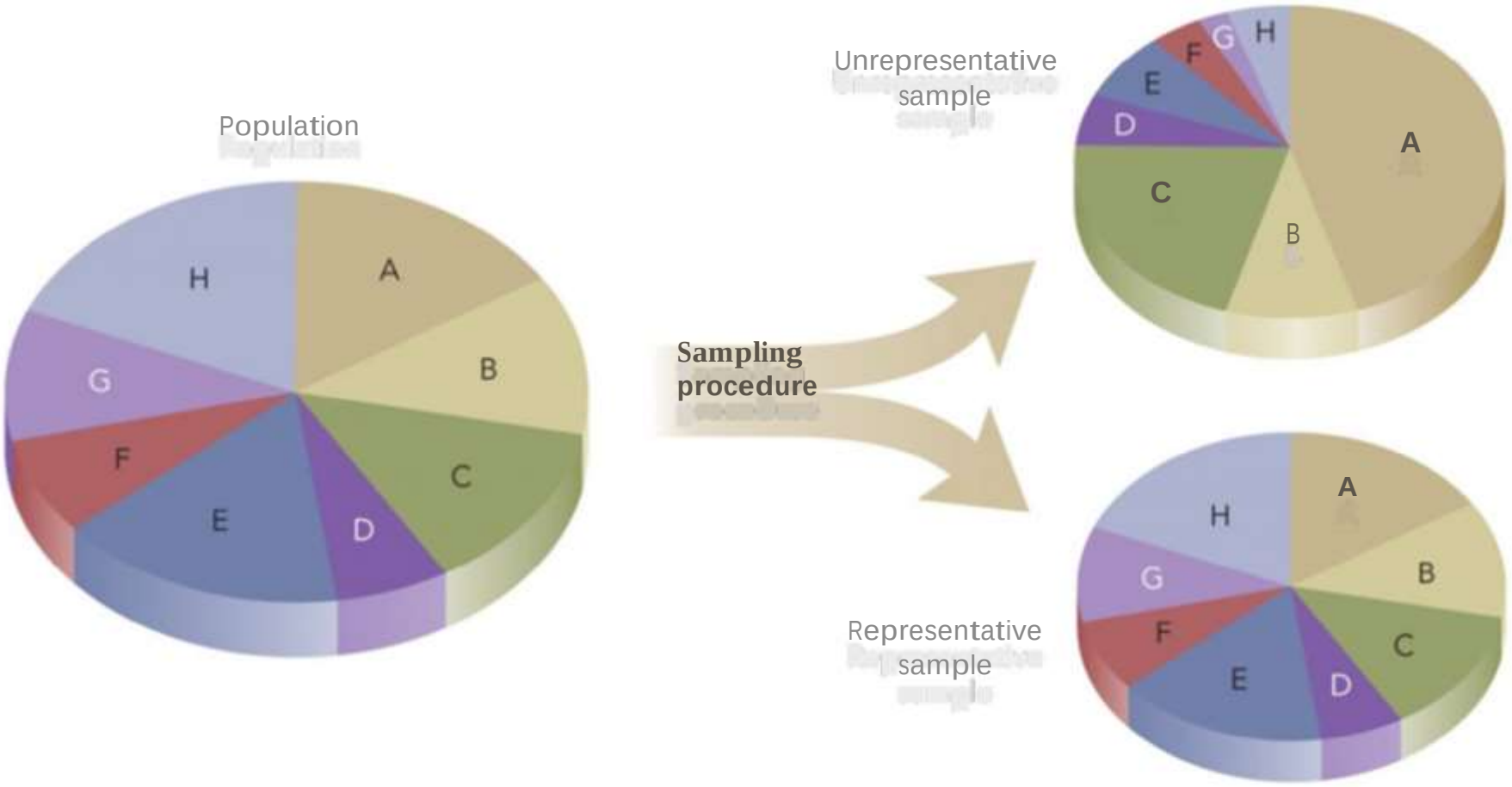
Survey Research Methods

- Need 'representative' sample
  - Cannot study entire population
  - Sample must reflect important characteristics of population
  - Use random sampling

Survey Research Methods

- **A representative sample**
  - Is one that reflects the important characteristics of the population (Figure 2.9). (slide 21; next)
  - A sample composed of 80 percent males would not represent a student body in which only 45 percent are men
- **Random sampling**
  - To obtain a representative sample
  - In which every member of the population has an equal probability of being chosen to participate in the survey.

Survey Research Methods

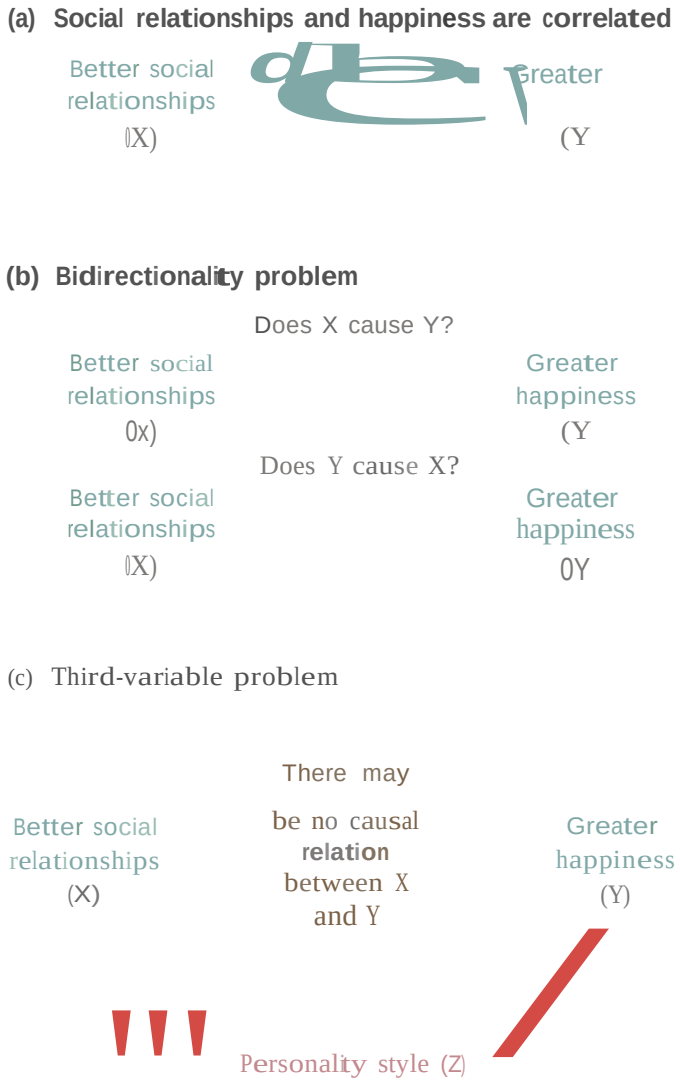


Correlational Research: Measuring Associations between Events

- Elegant in its design
- Researcher measures one variable (X)
- Researcher measures second variable (Y)
- Researcher statistically determines if X and Y are related
- **Important**
  - Variables are not manipulated just measured
  - Goal is to determine if an association exists between variables

So You've Found a Correlation

- **Bidirectionality**
  - Two-way causality
  - X causes Y
  - Y causes X
- **Spurious association**
  - Not genuine
  - 3rd variable problem

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Correlation Coefficient

- Correlations are mathematically described by a correlation coefficient
- **Coefficient**
  - Ranges from -1.0 to +1.0
  - Sign indicates direction
  - Absolute value indicates strength

Positive Correlation

- Positive relationship – Variables change in same direction
  - **As X is increasing, V is increasing**
  - **As X is decreasing, V is decreasing**

- E.g., As height increases, so does weight.

Indicated by + sign

Negative Correlation

- Negative relationship – Variables change in opposite directions
  - **As X is increasing, V is decreasing**
  - **As X is decreasing, V is increasing**

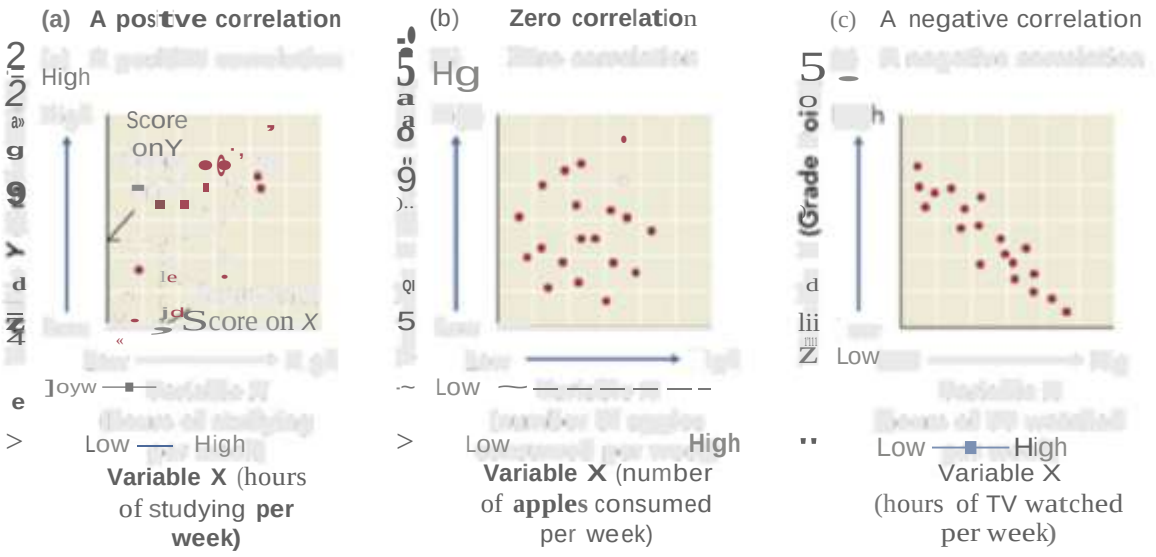
- E.g., As number of hours of daylight decreases, number of symptoms of depression increases

Indicated by – sign

Scatte rplots

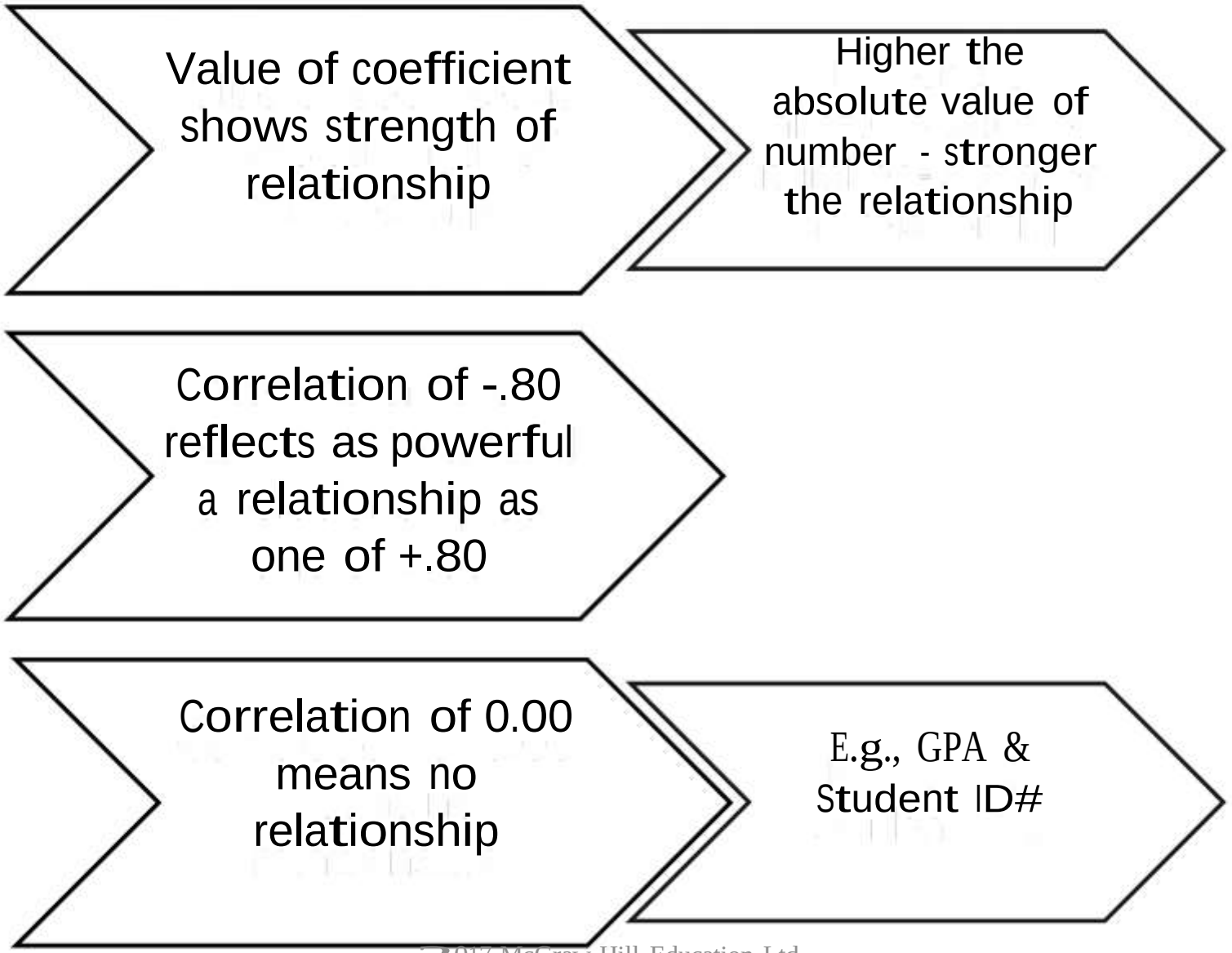
FIGURE 2.11

A scatterplot depicts the correlation between variables. The horizontal axis represents variable X, the vertical axis variable Y. Each data point represents a specific pair of X and Y scores, such as the number of hours a week a student studies (X) and that student's grade point average (Y). The three scatterplots show (a) a strong positive correlation, (b) a zero correlation (0.00), and (c) a strong negative correlation, for hypothetical sets of data.



- **Depicts the correlation**
  - **Shows direction (positive or negative) of relationship**

Strength of Correlation



Correlational Studies

- **Advantages**
  1. Show the strength of relationship present
  2. Can be used to make predictions about variables
  3. Identifies 'real-world' associations

Correlational Studies

- **Disadvantages**
  1. Can't assume cause-effect relationship exists
  2. Relationships may be due to a third unmeasured variable
  3. Shows an association NOT a cause

Experiments

- **Three Essential Characteristics:**

1. Manipulate one variable
2. Measures whether this variable produces changes in another variable
3. Control for other factors that might influence results

Methods of Research

- **Independent variables**
  - **Manipulated** by experimenter
    - e.g. noise, level of drug

- **Dependent variables**
  - **Measured** by experimenter & influenced by independent variable
    - e.g. learning,# of symptoms

Experimental / Control Groups

- 2 groups
- **Experimental group**
  - Receives a treatment
- **Control group**
  - Not exposed to treatment (basis for comparison)

Experimental / Control Groups

- Could have more than one experimental group, *for instance*
  - Varying dosages of a drug
    - E.g., 5 mg of drug, 10 mg of drug, control group
  - Different teaching methods
    - E.g., Traditional, group work, long-distance learning

Two Basic Designs

1. Different participants in each condition

Making experimental & control groups equal

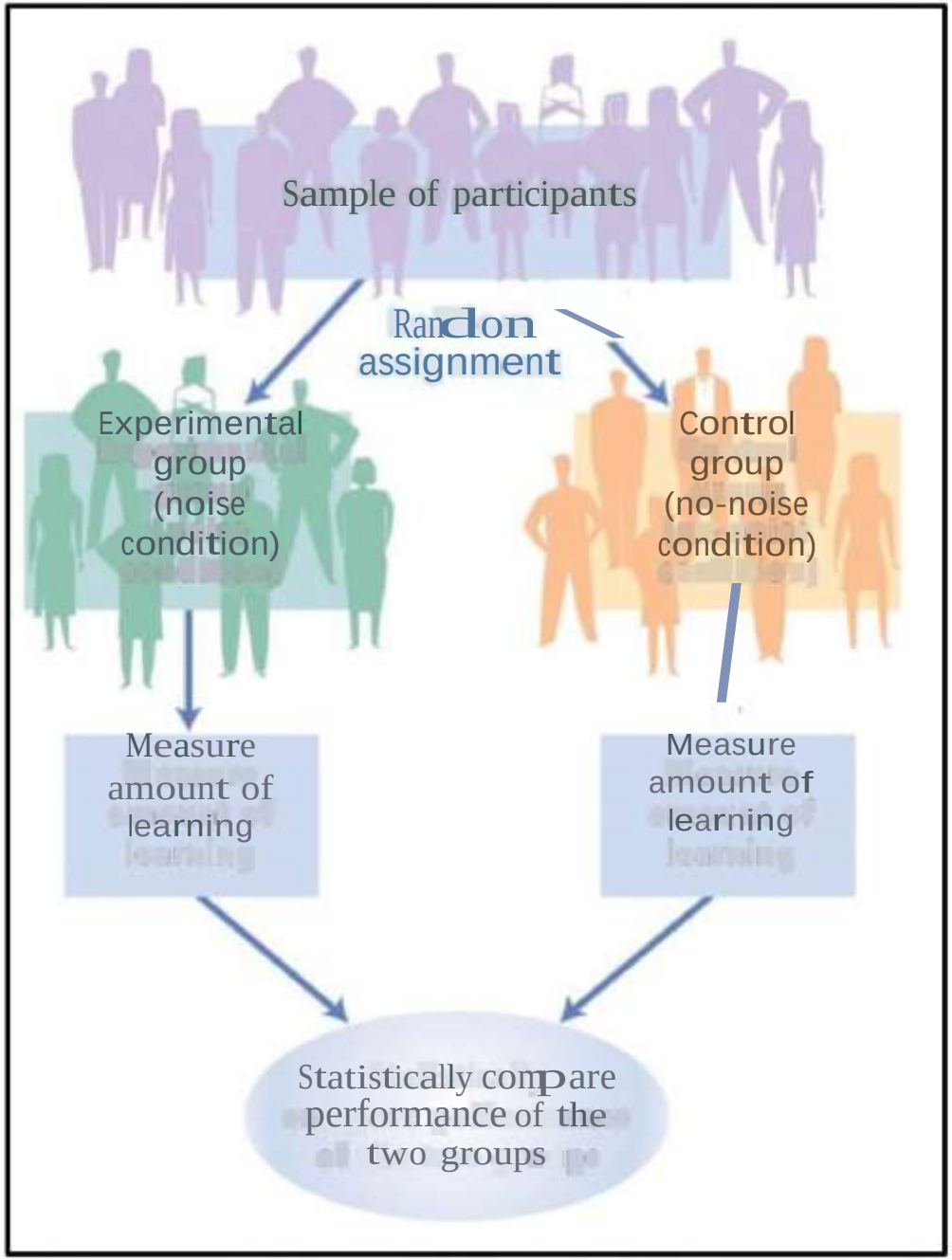
- First 20 people in experimental group; second 20 in control group? NO!

Groups must be equal in the beginning

- E.g., intelligence, motivation etc.

How to control for this?

- Randomly assign individuals to experimental or control group



Two Basic Designs

2. Same participants in all conditions

Alternative to random assignment

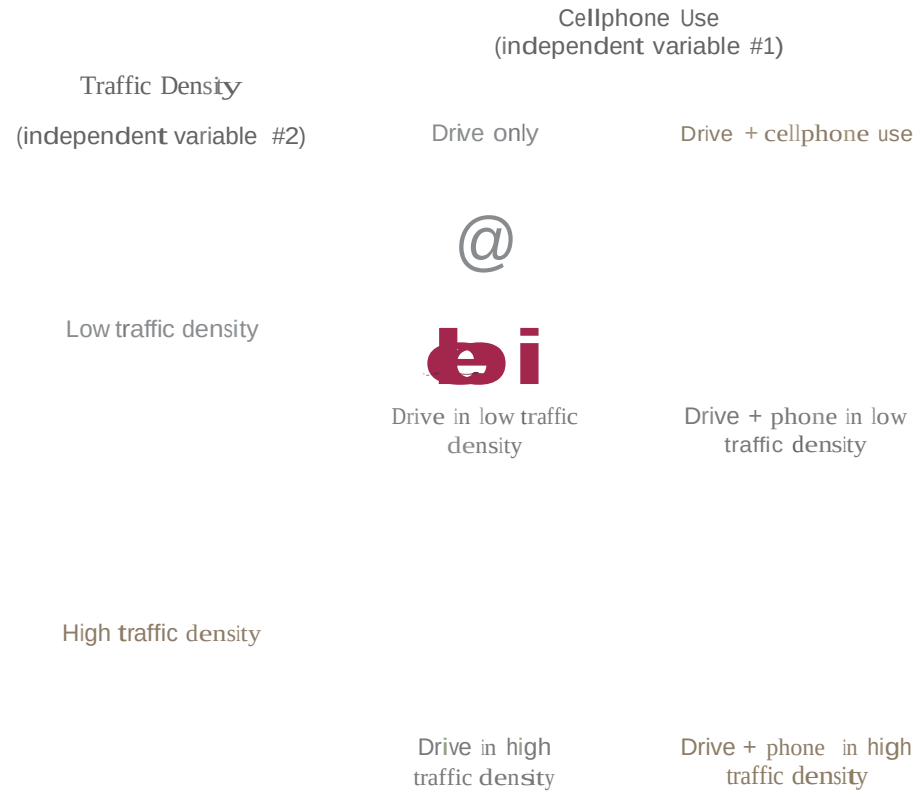
- Expose each participant to all conditions of experiment
- Individuals in each condition are now equal - they're the same people!

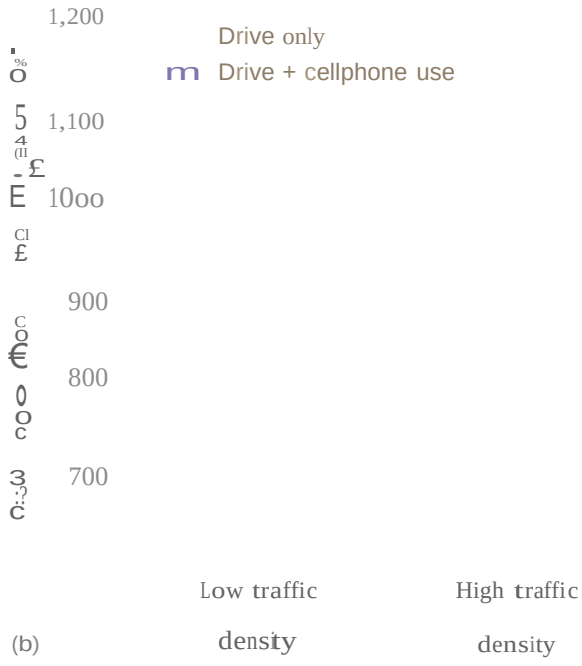
Problem

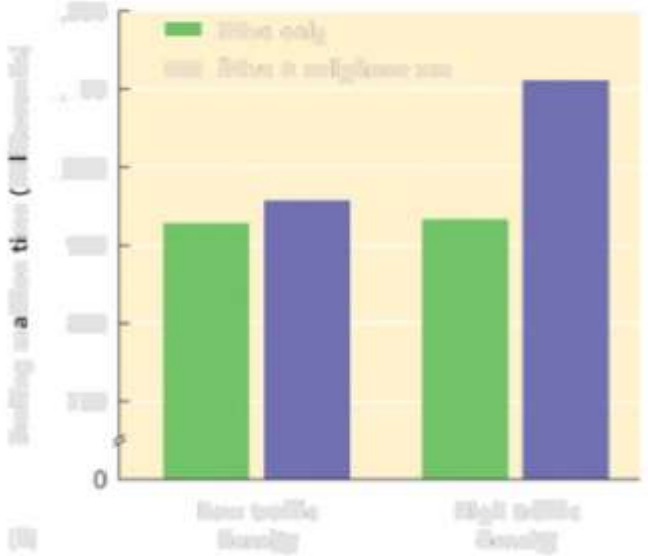
- Other factors such as learning effect, boredom, fatigue are now an issue
- Use counterbalancing to reduce this

Two Independent Variables

- **Effects of each variable and combinations can be assessed – *interaction of variables***







Experimentation & Descriptive Methods

- **Experimentation**
  - Independent variables manipulated
  - Typically done in laboratory
  - Extraneous factors controlled

Experimentation & Descriptive Methods

- **Descriptive**
  - All variables measured
  - Examine more natural contexts
  - Extraneous factors not controlled

Research Validity

Validity

- How well an experimental procedure actually tests what it is designed to test

Internal Validity

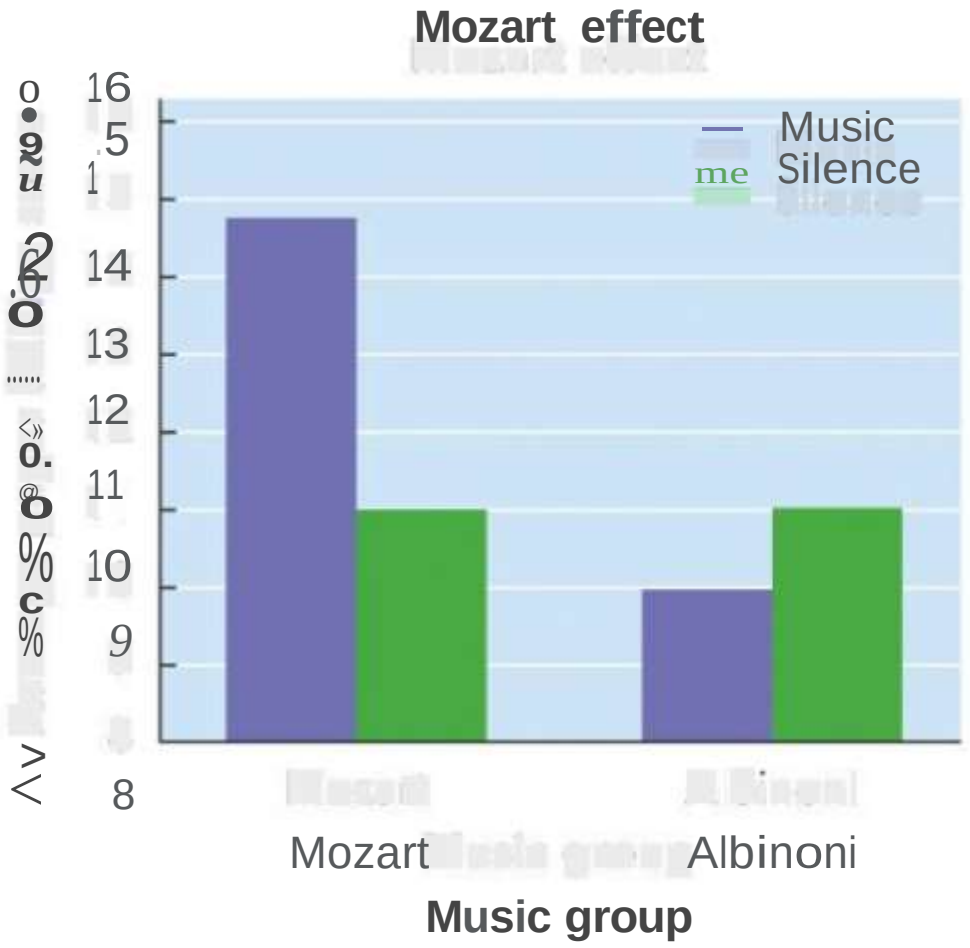
- Degree to which conclusions are supported

Threats

- Confounding variables
- Demand characteristics, Placebo effect
- Experimenter expectancy effects

Threats to Research Validity

- Confounding variables
- Rival explanations
- Both groups listened to music - one happy; one sad
- Did the music from Mozart make the difference or the mood created by it?



Threats to Research Validity

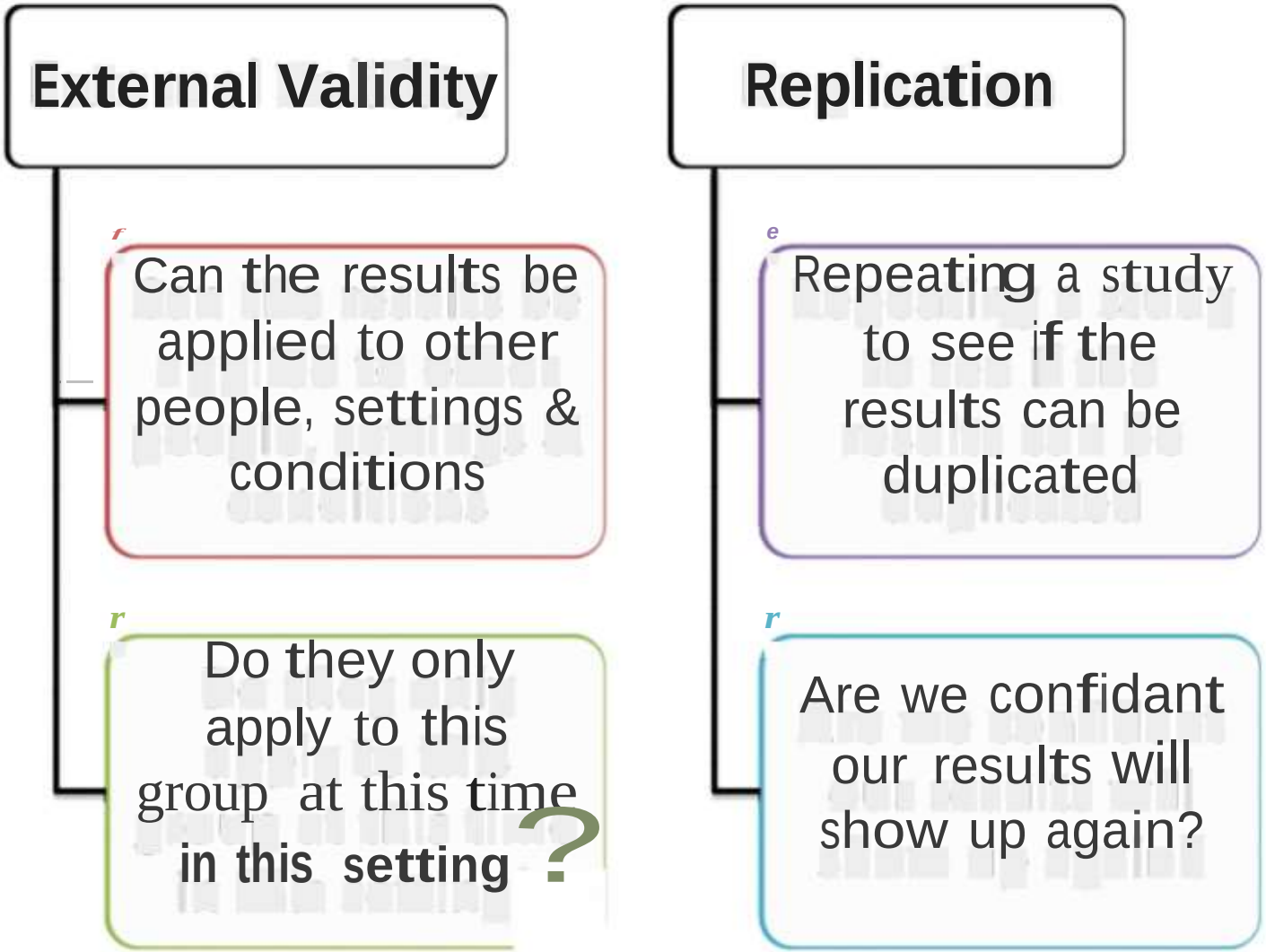
- **Placebo Effects**
- Change in behaviour because of expectations

Threats to Research Validity

- **Experimenter Expectancy Effects**
  - Unintentional ways experimenters influence participants

- ***How to minimize?*** **-** Double-blind procedure
  - Neither participant nor researcher knows which experimental condition the person is in

Threats to Research Validity



Ethical Principles in Human & Animal Research

- **Ethical standards**
  - Designed to protect the welfare of both human and animal subjects in psychological research

Psychologists Must do the Following:

1. Protect and promote the welfare of participants.
2. Avoid doing harm to participants.
3. Not carry out any studies unless the probable benefit is proportionately greater than the risk.
4. Provide informed consent—
   - Oral or written consent is usually required & without penalty
   - Reasonable steps made to ensure consent is not coerced
5. Ensure privacy and confidentiality.

Psychologists Must do the Following:

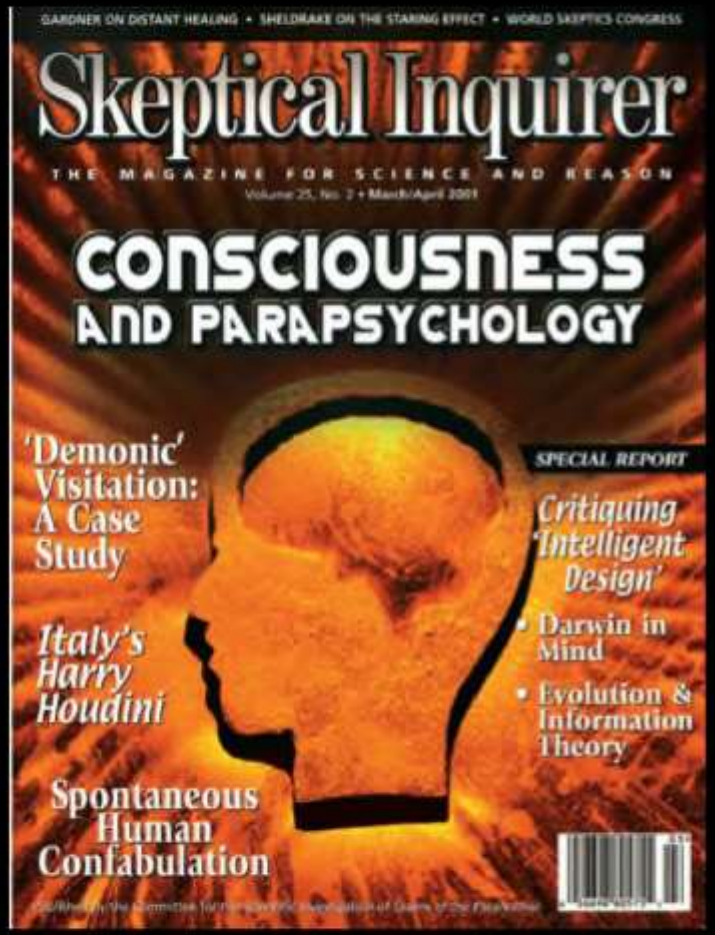
- **Deception**
  - Participants are misled about nature of research
  - Controversial - violates informed consent
  - Permitted only if no alternative is available
  - Must be debriefed by competent person about true nature of research

Ethical Standards in Animal Research

- Used in 7-8% of studies
- CCAC
  - Rodents and birds 90% of animal studies
  - Nonhuman primates 5 %
  - Humane treatment

Science, Psychics, & Paranormal

- Critical thinking requires reasoned skepticism
- Evaluations should be based on scientific evidence
- But! must be careful not to reject unknown as impossible



Chapter 2 Recap

- Scientific Principles in Psychology
- Methods of Research
- Threats to the Validity of Research
- Ethical Principles in Human and Animal Research
- Critical Thinking in Science and Everyday Life