Chapter Two: The Research Enterprise in Psychology

Chapter Outline

LEARNING OBJECTIVES

After completing this chapter, students should be able to

- Have a clear understanding of the goals, steps, and advantages of the scientific approach to understanding human behaviour.
- Have a clear understanding of the similarities and differences between experimental research and descriptive/correlational research.
- Describe all aspects of experimental design including independent variables, dependent variables, control groups, extraneous variables, variations in experimental design, and the advantages/disadvantages of experimental research.
- Describe all aspects of descriptive/correlational research including naturalistic observation, case studies, surveys, and the advantages/disadvantages of descriptive/correlational research
- Develop a basic understanding of descriptive and inferential statistics.
- Critically evaluate both experimental research and descriptive/correlational research in terms of research design and ethical issues related to research.

KEY CONCEPTS: WHY IS THIS CHAPTER IMPORTANT TO PSYCHOLOGISTS?

- We must develop an understanding of all aspects of research to be able to critically evaluate the theories related to human behaviour. This is an important skill to develop and will provide a deeper understanding of the evolution of psychological theories and of human behaviour. Also, this is an important life skill that can be applied when consuming information from other sources.
- Understanding the strength and weaknesses of experimental and descriptive/correlational research will allow us to evaluate research from outside our "normal" research focus which may provide insight and lead to new developments in our theories.
- Understanding ethical issues related to human and animal research will ensure that no undue harm is caused.

STUDENT MOVITATION: WHY SHOULD STUDENTS CARE?

- Students should be motivated to think critically about the psychological theories that are being presented to them. They should learn to second guess new information regardless of the source of this information.
- Students who are interested in becoming researchers will need to have an understanding of research design and evaluation. Also, students who are not interested in research and would like to become clinical psychologists or counsellors should have an understanding of how research leads to the methods used to treat patients.
- Students should have an understanding of cause and effect relationships and how this is different from from correlational relationships between variables.

BARRIERS TO LEARNING: WHAT ARE COMMON STUDENT MISCONCEPTIONS AND STUMBLING BLOCKS?

- Students who are interested in becoming clinical psychologists or counsellors often do not see the value in developing an understanding of research design and methods.
- It is sometimes difficult for students to understand the difference between a theory and a hypothesis.
- It is sometimes difficult for students to know which research method is appropriate for a specific research question (i.e. experimentation, naturalistic observation, case studies, or surveys).
- Students will sometimes struggle with the notion of a cost/benefits analysis for animal research and they believe that animal research should be allowed.

REFLECTIONS ON TEACHING: HOW CAN I ASSESS MY OWN "PERFORMANCE"?

Checklist for Instructor Self-Assessment

1. What worked? What didn't?
2. Were students engaged? Were they focused or did they go off on tangents?
3. Did my assessments suggest that they understood the key concepts?
4. What should I do differently next time?
5. How can I gather student feedback?

LECTURE/DISCUSSION TOPIC: KEY THEMES IN CHAPTER 2

Chapter 2 is probably the most important chapter for getting Theme 1 (Psychology is empirical) across to students. If they understand this point, the remainder of the course will make sense to them. They should know that psychology is not common sense (see "Lecture/Discussion Topic: Psychology and Common Sense") and is not based on the experiences of one individual. (Most psychology teachers can remember hearing one of those dreaded statements from the class: "Well, I know someone who doesn't act that way," or "I've never had that experience," or similar comments indicating an exception to the norm.) Your class should appreciate the fact that psychology is a research-based discipline, just as their natural science classes are. Psychology may deal with subject matter and subjects that make laws more difficult to generate, but the approach to the subject matter is identical. A good introduction to the empirical nature of psychology allows you to sidestep students' comments about individual experience. Point out that, of necessity, psychology deals with probabilities, generalities and averages. Exceptions to the rules do exist, and they are interesting, but they are also not typical of the population as a whole. We must attempt to study the larger population empirically before we attempt to enumerate every possible deviation from the norm. The deviations are often easier to understand once we understand the norms.

Chapter 2 is also important for emphasizing Theme 7 (Our experience of the world is highly subjective). It is this subjectivity that psychology (or any science) attempts to avoid through its use of objective research. Control and precision in the experimental approach are necessary to remove, or at least lessen, the effects of subjectivity in our data-gathering enterprise. Here you can discuss the points in the research process that still allow subjectivity to creep in. For example, we do not choose independent and dependent variables on a strictly objective basis; we choose to study variables that interest us, and we use operational definitions that are easy for us to manipulate or measure. This type of subjectivity does not threaten experimental procedures, but some areas of subjectivity do threaten any science. Many of these pitfalls (such as sampling bias, confounding of variables, and experimenter bias) appear in the section of the chapter titled "Looking for Flaws: Evaluating Research." It would be good to let students know that most of these subjective flaws do occur unintentionally and that psychologists are not out to deceive or defraud. However, you should also point out that cases of intentional research fraud are detected more frequently than in the past. For example, older cases of deception involved Sir Isaac Newton, Gregor Mendel, and Sir Cyril Burt (Roman, 1988); more recent cases concerned the supposed severe effects of a tranquilizer on IQ and dietary recommendations for children at risk for developing heart disease (Anderson, 1988; Roman, 1988). Although these recent cases have not received as much attention as Burt's case did, they both involve potentially dangerous treatments for patients. This topic fits within the larger topic of ethics, which you can emphasize in this chapter (and throughout the book whenever possible). Today's society tends to be somewhat lenient in dealing with ethical problems, so students should learn that there is no room for unethical scientists or practitioners within psychology.

Anderson, A. (1988, September 29). First scientific fraud conviction. *Nature,* p. 389.
Roman, M. B. (1988, April). When good scientists turn bad. *Discover,* pp. 50, 52–55, 57–58.

DEMONSTRATION/ACTIVITY: Canada Research Chairs and Your Department

If you had students research some of the department's lineage in Chapter 1, they could check to see if any of the department members are linked to any Canada Research Chairs. They could also chose an area of interest from the list, and find a research article done by one of the chairs. The article could then be presented to the class by the student.

PSYK.TREK MODULES AND SIMULATION

(See Chapter 1 of this manual for a summary of the Psyk.Trek CD.) The Psyk.Trek CD has several modules in Unit 1 and one simulation (Experimenting with the Stroop Test) that students can use to help them with the material in Chapter 2. The topics are spread nicely throughout the chapter.

Module 1b (The Experimental Method) explains independent and dependent variables as well as experimental and control groups. It also gives examples of experiments and presents variations in experiments. Students will probably benefit most from the Concept Checks and Quiz, which drill them extensively on finding independent and dependent variables and experimental and control groups in hypothetical experiments. This will be good practice—even students in experimental classes often continue to have problems with these concepts.

Module 1c (Statistics: Central Tendency and Variability) show students information about graphing data, measuring

central tendency, and measuring variability. Again, the Concept Checks help in drilling the student. There is a nice interactive graphic of how the shape of a distribution (of golf scores) changes as the variability increases or decreases.

Module 1d (Statistics: Correlation) leads students through positive and negative correlations, strength of the correlation, correlation and prediction, and correlation and causation. If students understand this module, it will probably help you throughout the course as you explain correlational relationships (e.g., correlations of IQs as a function of relatedness). There is a very nice interactive scatterplot that tests students' ability to plot test scores on a graph.

Module 1e (Searching for Research Articles in Psychology) introduces students to *Psychological Abstracts* and teaches them how to search both the paper and computerized versions. If you plan to have students do library work in psychology journals, this module will be an essential element for you.

Simulation 1 (Experimenting with the Stroop Test) allows students to review the experimental concepts while participating in a Stroop experiment. Students complete the color grid naming task and the color naming/word incongruent groups of the Stroop test. They must identify the independent and dependent variables, make a hypothesis, and collect their data. The program analyzes the data and couches the data in terms of the student's hypothesis. This simulation will serve as a good (and entertaining) review of the chapter's experimental concepts.

LECTURE/DISCUSSION TOPIC: PSYCHOLOGY AND COMMON SENSE

Many students confuse psychology with common sense. They are certain that they know something about psychology when they enter the classroom because of their past experiences. Ask students to discuss the problem of relying on common sense to develop a knowledge base for psychology. Try to guide the discussion to the two key themes for Chapter 2. Students should begin to realize that basing their "knowledge" of psychology on previous experiences allows subjectivity to color their understanding of behaviour. Once they bring up the subjective nature of their experiences, it should be an easy step for them to realize that this subjectivity can be avoided by relying on empirical studies.

A particular problem with commonsense explanations of behaviour is that they are made after the fact, when anything is much easier to explain. Remind students of the "I-knew-it-all-along phenomenon" (Myers, 2002, p. 14). Remind them also that one of psychology's goals (from Chapter 2) is prediction, which must take place beforehand. After-the-fact explanations are seductive, however, because they make sense and seem accurate. It is the job of research psychologists to determine whether or not such explanations are valid. Then, if they are valid, under what conditions are they useful explanatory tools?

Another problem with commonsense explanations is that multiple explanations may exist, and they are often contradictory. For example, consider "Birds of a feather flock together" and "Opposites attract." Both of these commonsense sayings purport to explain why certain people are attracted to each other. The obvious problem is that one or the other can be used to explain any possible situation. One explains why similar people form friendships, and one explains why different people form friendships. Turn the tables on your students and ask them to use these commonsense notions to predict beforehand whether or not two people would be attracted to each other. They will be unable to do so. You can point out that the text will illuminate the issue of attraction in Chapter 16, but that the commonsense saying, "Opposites attract," is largely unsupported by research studies. Buss (1985) wrote that the tendency of opposites to marry or mate "has never been reliably demonstrated, with the single exception of sex" (p. 47).

Other sets of commonsense sayings also seek to explain interpersonal relationships: "Absence makes the heart grow fonder" and "Out of sight, out of mind"; "You can't judge a book by its cover" and "Clothes make the man"; "First impressions are lasting" and "Beauty is only skin deep." Ask students to discuss these sayings in class and cite instances in which one or the other seemed true. Your goal is to generate enough contradictory experiences to make students unsure about which saying is actually correct. Point out to them that they need to avoid "black-and-white," either/or thinking, because the truth often tends to fall somewhere in the middle.

You can come back to this topic later in the chapter and allow students to design experiments to test the contradictory statements. Discuss how they can determine which of these commonsense explanations is true. It is important for students to try thinking as scientists so they can appreciate and more easily understand the research presented throughout the semester.

Buss, D. M. (1985). Human mate selection. *American Scientist, 73,* 47–51.
Myers, D. G. (2000). *Exploring social psychology* (2nd ed.). Boston: McGraw-Hill.

LECTURE/DISCUSSION TOPIC: CULTURE AND RESEARCH

Although Theme 5 (Our behaviour is shaped by our cultural heritage) is not featured in Chapter 2, you may wish to address the topic in class. Matsumoto (2000) devoted an entire chapter to "Evaluating Cross-Cultural Research" (pp. 105–136). Some of the critical issues that should be taken into account when dealing with cross-cultural research methodology follow.

The nature of the theory and hypotheses being tested. Cross-cultural researchers must be ever mindful of their "cultural blinders." In other words, researchers must realize that they see things through their culture's eyes. In terms of formulating research questions, researchers should consider whether their research question is relevant or important in all cultures being tested. For example, research participants in industrialized cultures would fare better on tests dealing with technology, such as computers, whereas subjects in more primitive cultures would perform better on less technological tasks, such as tracking or nature-oriented behaviours. In similar fashion, researchers must take care when interpreting their data through their cultural blinders. A person who performs poorly on a task not suited to his or her culture should not be considered below average.

Definitions of culture. Different researchers may mean different things when they refer to "culture." Matsumoto (2000) pointed out that people typically refer to race or nationality differences when they conduct cross-cultural research. However, this is probably too much of a simplification. For example, a member of a minority group who is part of the middle or upper socioeconomic class may be more representative of the majority culture than a nonminority who is in the low socioeconomic class. You might get an interesting discussion going with the question, "Are women members of a different culture?"

Participants: Sampling adequacy. Sampling is a problem in any culture, as researchers seek to choose research participants who are representative of the larger population. This problem is compounded in cross-cultural research because a researcher must obtain samples that are representative of two (or more) populations. Imagine the problem you would face if you went to a foreign country and tried to get a representative sample. You would more than likely be visiting a large city in the other country—are people in that city representative of the population at large? Would you want to sample Canadians only from such cities as Toronto and Montreal? Unlikely!

Participants: Noncultural, demographic equivalence. Once you have conquered the sampling issue, you must then worry about comparing the two samples. Are they equivalent samples? If you compare samples that are from two different cultures *and* that differ in education, social experiences, or socioeconomic level, to what factor can you attribute differences between the two groups? As you can imagine, confounding of variables is a major concern here.

Language and translation issues. Typically, cross-cultural research must be conducted in more than one language. As you know from dealing with languages, a word-for-word translation often does not give equivalent meanings. Often, cross-cultural researchers use the back-translation method to ensure equivalence. In this method, for example, an English questionnaire would be translated into the second language by translator #1, and then from the second language back to English by translator #2. If the "new" English questionnaire matches the original, the translation into the second language should be equivalent. Even this type of equivalence, though, still leaves open the question of nuances in languages.

The research environment, setting, and procedures. Students in American colleges and many Canadian universities, are fairly familiar with the notion of serving as research participants, which may not be the case in another culture or country. Thus, simply being a research participant may have a different meaning in a different culture, as may the significance of the actual research setting itself.

Cultural response sets. The cross-cultural researcher should beware of any particular manner in which people in a particular culture might respond. For example, suppose that people of a given culture do not like to stand out or seem different from others. If these people served as research participants and responded on a 7-point scale, they might tend to respond in the middle of the scale. In a more individualistic culture, participants might tend to respond at the high or low ends of the scale. Thus, the two cultures would appear to be different on the scale, but the differences would reflect response sets rather than true differences on the scale.

Matsumoto (1997) also included most of these points in his book, which you can use as a supplement to the Weiten and McCann text. As you can see, there are important methodological considerations that must be taken into account when conducting cross-cultural research. If you wish to take a more in-depth look at this subject, you can consult Triandis and Berry (1980). For general readings about incorporating cross-cultural issues in your class, see the Hill and Reiner essay in this manual. Other good general readings are Enns (1994), Goldstein (1995), and Simoni, Sexton-Radek, Yescavage, Richard, and Lundquist (1999), as well as Matsumoto (1997, 2000).

Enns, C. Z. (1994). On teaching about the cultural relativism of psychological constructs. *Teaching of Psychology, 21,* 205–211.
Goldstein, S. B. (1995). Cross-cultural psychology as a curriculum transformation resource. *Teaching of Psychology, 22,* 228–232.
Matsumoto, D. (1997). *Culture and modern life*. Pacific Grove, CA: Brooks/Cole.
Matsumoto, D. (2000). *Culture and psychology: People around the world* (2nd ed.). Belmont, CA: Wadsworth.
Simoni, J. M., Sexton-Radek, K., Yescavage, K., Richard, H., & Lundquist, A. (1999). Teaching diversity: Experiences and recommendations of American Psychological Association Division 2 members. *Teaching of Psychology, 26,* 89–95.
Triandis, H. C., & Berry, J. W. (Eds.). (1980). *Handbook of cross-cultural psychology: Vol. 2. Methodology*. Boston: Allyn & Bacon.

LECTURE/DISCUSSION TOPIC: CONTROL IN PSYCHOLOGICAL RESEARCH

Students have grown up experiencing control through science and technology in many areas of their lives. For example, their physical well-being is controlled through the use of such chemicals as vitamins, drugs prescribed by their physicians, and food additives. Likewise, their existence is made easier through control of the natural elements: temperature control, scientific approaches to growing crops, flood control, and so on. Thus, students are largely comfortable with the idea that "hard" sciences exert control in a wide variety of areas.

Students will probably be more sensitive to the issue of control as a goal of psychology because it involves the control of human behaviour (perhaps their own). You should point out that control in psychology is not necessarily a bad or negative goal. All of us engage in behaviours designed to control the behaviour of others. For example, when you compliment someone on the clothes that he or she is wearing, aren't you sending a subtle message to that person to wear those clothes more often? Teachers are certainly in the business of attempting to control people's behaviour as we expose them to new ideas and information. The advertisements that bombard us daily are also attempts to control our behaviour.

To fully develop as a science, psychology must gain the ability to control its domain, just as other sciences have. Perhaps the ultimate example for students (because of their preconceived notions about psychology, discussed in Chapter 1 of this manual) is clinical and counselling psychology. Should psychologists not attempt to exert control in these areas? Clinicians may exert control without the person's permission when the person is too disordered to communicate. Counsellors might engage in control techniques at the person's request. Both cases involve people who are experiencing difficulty with life and their responsibilities. Is it ethical *not* to help such a person? If you have personal knowledge or experiences that you could share with students in a confidential manner, those would help illustrate the point to your class. If you have no such personal experiences to cite, refer to Miller (1985). He cited two cases in which behaviour therapy was used. One case involved the treatment of anorexia nervosa in a young woman (Bachrach, Erwin, & Mohr, 1965), and the other dealt with treating life-threatening ruminative vomiting in a 9-month-old child (Lang & Melamed, 1969). The accompanying before-and-after photographs make the cases particularly vivid. Thus, you can convince students that some degree of control in psychology is both necessary and good. An interesting class discussion can ensue regarding the limits of control in psychology: How much is too much, and how much is still good? Playing the devil's advocate for total control may stimulate students' critical thinking.

Be sure to point out that other disciplines have problems in this same area. As a science gains more control over its area of study, it seems that problems with that control arise. For example, as biologists gain more knowledge about genes, chromosomes, and other hereditary mechanisms, the "problem" of genetic engineering arises. Certainly genetic engineering has the potential for good, as in the correction of prenatal abnormalities, eradication of genetically linked problems, and so on. Genetic engineering is already widely applied in the cattle industry, for example, for producing better beef and dairy stock. However, genetic engineering also raises the ghost of trying to create a "super race," an experiment attempted during World War II, which produced a violently negative reaction.

Another example concerns chemistry. We have benefited greatly from imposing control over the environment and our bodies through chemistry. However, many criticisms have been levelled about the vast amount of chemicals dumped into our environment, food, and bodies every day. Certainly, many of the chemicals have beneficial purposes, but one wonders about their cumulative effect. Thus, chemistry also has potential problems with the issue of control.

Physics, of course, has been "under the microscope" since World War II and the creation of the atomic bomb. The issue of the safety of nuclear energy and nuclear reactors has raised a furor. Accidents like Three Mile Island and Chernobyl have emphasized the critical nature of this issue. Control in physics is certainly a controversial topic.

These examples of control issues in biology, chemistry, and physics are only the most obvious. If you wish to use different examples, you could talk to faculty at your school from each of those departments. Ask them what the critical issues are in their discipline. You might even invite them to your class for a panel discussion or a question-and-answer session concerning the issue of control in science.

Bachrach, A. J., Erwin, W. J., & Mohr, J. P. (1965). The control of eating behaviour in an anorexic by operant conditioning techniques. In L. P. Ullmann & L. Krasner (Eds.), *Case studies in behavior modification* (pp. 153–163). New York: Holt, Rinehart & Winston.

Lang, P. J., & Melamed, B. G. (1969). Case report: Avoidance conditioning therapy of an infant with chronic ruminative vomiting. *Journal of Abnormal Psychology, 74*, 1–8.

Miller, N. E. (1985). The value of behavioral research on animals. *American Psychologist, 40,* 423–440.

DEMONSTRATION/ACTIVITY: THE KITCHEN AS SCIENTIFIC LABORATORY

Vandervert (1980) described an exercise designed to demystify the scientific laboratory and scientific procedures while teaching some important concepts of the scientific approach. Ask your students to think of their kitchen at home as a scientific laboratory. What are the similarities between the two? Vandervert listed many items in a kitchen that are similar to items in a laboratory:

> *(a) Hot and cold running water—into a temperature and corrosive resistant basin; (b) An adjustable cooling chamber; (c) An adjustable heating chamber; (d) A motorized, variable-speed mixing device; (e) A high-speed blending device; (f) A long list of reasonably accurate measuring devices and containers; (g) A great collection of substances which may be combined in accordance with empirically established (often internationally) methods and rules; (h) Handling and cutting tools. (p. 58)*

Students should be able to generate the list above and even add to it (for example, a microwave or convection oven). In addition, there is usually an ample supply of "procedure manuals" that describe various "research projects" that can be conducted using the supplies and equipment of the "laboratory."

Once you have established the physical similarities of the kitchen and the laboratory, you can talk about the procedural similarities. Vandervert's objective was to make the concept of *operational definitions* come alive for students. What is the operational definition for a cake, cookies, or any "construct" of the kitchen lab? According to Weiten and McCann, an operational definition "describes the actions or operations that will be used to measure or control a variable." Thus, the operational definition for the cake is the recipe used to produce it. How do we ensure that our particular operational definition will bring about the desired product? We must exert control over the situation with our laboratory measurements, procedures, and equipment; we must follow the steps specified by the operational definition in our "Betty Crocker lab manual."

You can note that there are differing operational definitions for the same construct, both in the laboratory and in the kitchen. For example, there are many operational definitions for the construct of *anxiety*, depending on whether one is dealing with state or trait anxiety, whether one is using anxiety as an independent or a dependent variable, whether one subscribes to a physiological or psychological theory of anxiety, and so on. Similarly, there are many recipes (operational definitions) for cake, depending on whether one is making a chocolate or lemon cake, a sheet or layer cake, a wedding or birthday cake, or some other kind.

Having thoroughly discussed the notion of operational definitions, give your students a chance to create their own. Vandervert suggested generating an operational definition for *fear*, but any psychological construct should suffice. Give students several minutes to work on this definition, and then have them share their definitions with the class. Allow the other students to critique (gently) the definitions offered. Attempt to generate a class consensus on the operational definition of the construct you chose. After this activity, students will be much more sensitive to the need for operational definitions and the often difficult task of creating them.

Vandervert, L. R. (1980). Operational definitions made simple, lasting, and useful. *Teaching of Psychology, 7,* 57–59.

DEMONSTRATION/ACTIVITY: ILLUSTRATING RESEARCH WITH THE CREST® TEST

Discussing research in the absence of a concrete example is usually ineffective. Although the text provides good examples, I recommend the use of a new, different one so that students will have multiple opportunities to learn the important concepts of research. The Crest® test serves as a real-life example that can be put in the framework of an experiment.

Ask students to imagine that they have been named research director for Crest® toothpaste and have been asked to devise an experiment comparing Crest® to Brand X. What variables should they use? Students can usually see that they are interested in determining the effects of the two different toothpastes (one independent variable with two levels) on the number of cavities (dependent variable). After the students have isolated the independent and dependent variables, ask them how they would operationally define and manipulate the variables. Then ask them what variables need to be controlled so that they do not affect the outcome of the experiment (extraneous variables). Typically, students can generate a list of 10 to 15 extraneous variables in a couple of minutes. They readily realize that such variables as dental history of the parents, fluoridation, personal dental history, number of brushings daily, time spent brushing, types of food eaten, type of toothbrush used, and so on could be important extraneous variables. (This list of extraneous variables can be used to highlight Theme 4, Behaviour is determined by multiple causes, and Theme 6, Heredity and environment jointly influence behaviour.) Ask students to speculate about how they would attempt to control these extraneous variables. Also, do they believe that the Crest® researchers actually did control all of these extraneous variables when they conducted the original research? If not, what implications does the lack of control have for the findings?

The Crest® test can also be used as a demonstration to show students why statistics are necessary for decision making. Assume that the Crest® group had a mean of 1.87 cavities after two years of the study. Ask students to write down the number of cavities that the Brand X group would need to have before the students would conclude that there was a significant difference between the Crest® group and the Brand X group. In other words, how large a difference in the number of cavities must there be before the students conclude that Crest® was actually effective in preventing cavities? Ask students to share their answers, and create a rough frequency distribution of the answers on the chalkboard or on an overhead transparency. There will likely be a great deal of variability and little consistency in the answers. This exercise should demonstrate that a standard decision criterion must be adopted so that different experimenters looking at the same data will come to the same conclusions. Point out to the class that the probability of results occurring by chance decreases as the difference in the number of cavities gets larger. Small differences might reverse themselves if the experiment were run a second time.

DEMONSTRATION/ACTIVITY: CONDUCTING A "COLA CHALLENGE" IN CLASS

Conducting an in-class soft drink taste test is an easy way to illustrate basic principles of research. All you need to do is present students with two identical cups containing the same small amount of two different colas. The students consume and rate both samples. The ratings of a number of students are compared, and a winner is declared. The study sounds easy, doesn't it? Unfortunately, numerous unforeseen control and methodological problems are associated with this "easy" study. Here are some aspects that you might want to discuss with your class:

- Which cola will be sampled first? Which second? The best solution is to counterbalance the sequence of the presentation. However, make sure that these counterbalanced sequences are equally assigned to men and women. Should potential differences between men and women be evaluated?
- How can you ensure that the two colas are presented at the same temperature?

- How can you ensure that color differences (or carbonation differences) between the colas cannot be detected by the participants? Should they be blindfolded (a true "single blind" experiment)?
- Should participants rinse their mouths between the two tastes?
- How can you ensure that all participants are starting the taste test under the same conditions? Those who have just eaten breakfast or had a cup of coffee will have residual tastes that may affect their perception of the two colas.
- Are the ratings to be made immediately after each cola has been sampled or after both have been sampled?
- Will ratings be measured by checking a simple preference for one cola over the other or by filling out a Likert scale for each cola? If Likert scales are used, what type will they be (5 point, 7 point, 9 point)? Does the type matter?
- Does the age of the participants have any bearing? (Physiological evidence does tell us that taste buds become less sensitive as people grow older.)
- Is there a difference in drinking a few sips of the cola compared with drinking a whole glass? Recall the flaw in the market testing Coke did with New Coke compared to Classic Coke. In a sip test, participants preferred the sweeter taste of New Coke, leading to an expensive new product launch. It was only after New Coke proved unpopular with the public that the marketers realized too late that its taste was cloying when drunk in real-life conditions. This is described in Gladwell's book *Blink* (http://www.gladwell.com/blink/).

Obviously, this simple study is not so simple after all. Challenge your students to find additional problems with it. Despite the fact that it may be a difficult study to conduct with ample control and adequate experimental design, it raises an abundance of issues pertaining to research methodology in psychology that can be shared with your students. You might even want to use statistical procedures and significance testing to determine the reliability of the results of your cola challenge.

For variety, you can choose a different commercial claim to test in class. For example, in addition to the cola challenge, Solomon (1979) suggested testing the claims for the softest bathroom tissue and driest antiperspirant. What different variables would be involved, and how would the class choose to answer the new questions that arise?

Solomon, P. R. (1979). Science and television commercials: Adding relevance to the research methodology course. *Teaching of Psychology, 6,* 26–30.
Gladwell, M. (2005). *Blink. The Power of Thinking without Thinking.* NY: Little, Brown and Company.

LECTURE/DISCUSSION TOPIC: HYPOTHESES AND VARIABLES

Students in introductory psychology often have a difficult time thinking in an experimental frame of mind. Considering how one attempts to find an answer to a question from a research standpoint is a foreign way of thinking for most students, because they have not been previously exposed to this approach. Yet it is important for them to be able to think in such terms in order to appreciate the research discussed throughout the course. You should probably spend some time in class discussing the Chapter 2 section titled "Steps in a Scientific Investigation":

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

Select one of the questions posed at the beginning of Chapter 2, or choose another question of general interest to the class such as "Can hypnosis improve the accuracy of eyewitness testimony in court?" Ask students how they would go about finding an answer to the question. Allow students to express their ideas freely, even though they will not use the proper terms from the chapter. After a few minutes of discussion, try to pull together their ideas into a hypothesis. Point out important characteristics of hypotheses, particularly their testability. Often, students have appealing ideas that are not testable. Discussing what makes a hypothesis testable should allow you to bring in the idea of operational definitions and why they are important.

After the class has generated a testable hypothesis, you can begin talking about variables. Many students, even in experimental psychology courses, have a difficult time identifying independent and dependent variables, so it is important to begin laying the groundwork at this point. Again, allow the students some freedom as they discuss and

debate this issue. Students often do a good job of teaching other students how to identify independent and dependent variables. You can serve as a guide to gently remind them of the differences between the two types of variables, but try to allow the class to come to a democratic conclusion.

After students have isolated the independent and dependent variables, ask for a list of other variables that might potentially affect the dependent variable in the experiment. Again, this exercise gives the class some room for creativity and open discussion. After several good candidates have been generated, ask students what would happen if these variables were allowed to remain unchecked during the experiment. Students will typically figure out that the extraneous variables would "mess up" (confound) the research. You can then ask how they would make sure that these extraneous variables do not enter into the experiment and confound the results. This discussion will allow you to discuss experimental design and the need for control in research so that valid conclusions can be derived from an experiment. You can also discuss the notion that some research is probably not valid because of a lack of control.

An interesting sidelight is to ask students to present some claims made in advertisements. Ask whether the class believes that such claims are actually based on data from well-controlled and well-designed experiments. If not, what are the implications for the claims made in advertising? Discussing experimental research techniques from this point of view may help students remember to think critically about various studies mentioned later in the semester.

Throughout this discussion, take note of the hypotheses or variables suggested by students—perhaps even the names of the students who make the suggestions—that are ruled out by the class because they will not fit within the context of an experimental research project. You can use these rejected ideas in "Lecture/Discussion Topic: Nonexperimental Research Approaches" and reinforce the students whose ideas were rejected earlier.

DEMONSTRATION/ACTIVITY: DOES RANDOM ASSIGNMENT REALLY WORK?

Watson (1990) presented an interesting class demonstration designed to show students that random assignment does, indeed, create groups that are essentially equal on variables that might affect the outcome of an experiment. Tell your class that you want to design an experiment to test a new basketball coaching technique that you have developed. The obvious way to test this new approach is to pick two teams, train one team using your new coaching technique while the other team is trained using a traditional approach, and then have the two teams play each other. However, you are worried about a possible extraneous variable in the experiment: the height of the players. A tall, traditionally coached team could beat a short, innovatively trained team for reasons unrelated to the training method. Random assignment should eliminate such confounding elements by creating equal groups.

Watson typically used his female students in this demonstration to avoid biasing height by gender and because they are more numerous. Using female students could also allow you to make a silent statement against gender stereotypes. Pick students randomly (with the gender constraint) and assign them to Team A or Team B by flipping a coin. Have the teams stand in different places as students are assigned; stop when you have chosen ten "players" for each team. Have Team A stand in front of the class, arranged from shortest to tallest. Then have Team B stand in front of Team A, arranged in the same manner. The result should be two teams approximately equal in height, thus removing that potential extraneous variable from your experiment.

To show students that random assignment works best in the "long run," you can repeat the demonstration several times, each time selecting only one or two players for each team. Sometimes random assignment will work with such a small sample, but sometimes you will obtain teams that are much different in height.

Before you end this demonstration, ensure that students understand why flipping a coin represents random assignment. Also, be sure that they understand the difference between random *selection* and random *assignment*. You can point out that violating the principle of random selection harms the external validity of an experiment (the ability to generalize findings beyond the population studied). Obviously, researchers do not worry too much about this problem because of the vast number of studies using college students and lab rats as subjects. On the other hand, violating random assignment can destroy the internal validity of the experiment, resulting in confounding and an inability to make cause-and-effect statements. This problem is not trivial; it renders an experiment's results useless.

Watson, D. L. (1990). A neat little demonstration of the benefits of random assignment of subjects in an experiment. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities handbook for the teaching of psychology: Vol. 3* (pp. 3–4). Washington, DC: American Psychological Association.

LECTURE/DISCUSSION TOPIC: NONEXPERIMENTAL RESEARCH APPROACHES

In the course of generating ideas for experimental research projects (see "Lecture/Discussion Topic: Hypotheses and Variables"), students will often express ideas that are not amenable to an experimental approach. Take note of such ideas so that you can discuss them when you cover correlational research approaches. Assuming that you have covered the concept of control within experimentation, students should understand that the control available in the laboratory allows researchers to make cause-and-effect statements, which is the goal of any science. However, they have also probably mentioned the artificiality of the laboratory situation.

Although nonexperimental approaches to research do not allow statements of causality to be drawn, they do have benefits, particularly in terms of generating ideas and hypotheses that might later be subjected to experimental scrutiny or in terms of testing the external validity (generalizability) of experimental findings. It is vital that students understand the differences between the different approaches and exactly why the correlational approaches do not allow causality to be determined. This issue is important later in the semester, for example, when discussing Freudian theory and the fact that Freud's ideas are open to question because of his reliance on the case study method.

An example always makes concepts easier to understand, and this is particularly true when talking about correlational relationships and their lack of causality. Do not end your discussion on this note, however. Be certain that students see the value in correlational approaches and how they might lead to experimental research. Also, you may wish to convince your students that the ideal is a combination of laboratory and naturalistic research in order to establish causal relationships that would work in the real world.

DEMONSTRATION/ACTIVITY: POTENTIAL PROBLEMS WITH SURVEY RESEARCH

Scoville (1987) presented a class activity designed to show some of the pitfalls of asking hypothetical questions in a questionnaire or poll. The answers given to a survey don't always match actual behaviour. You will need to buy some exotic but unappealing food, such as chocolate-covered ants, squid, or tongue. Begin by asking the class outrageous hypothetical questions, such as "How much would you charge to let me cut off your finger or cut off your arm or shave your head?" (Scoville, 1987, p. 18). Negotiate to get the lowest possible price. Then ask students if they have ever eaten unusual or strange or exotic foods that are generally unappealing to North American tastes, using some specific examples of these foods. Pick some of the students who have not previously eaten such foods, and ask them whether they would consider eating the food that you have with you (without naming it). Some brave individuals will usually say that they would, particularly if you put a price on this behaviour. After getting several to agree, preferably for free or for a nominal sum, display your food. Usually some of your volunteers will back down, often at the last moment. Male students may be more prone to actually taste the food because of peer pressure. Scoville recommended choosing students who are likely to back down, because they illustrate the difference between saying something and actually doing it.

You can use this demonstration to launch an interesting discussion of the potential pitfalls of survey research and hypothetical questions. Highlight the results from any recent poll. Ask students to react to the published results now that they have experienced firsthand the relative ease of making a verbal commitment versus the difficulty of actually following through with the behaviour.

Scoville, W. E. (1987). What would you do if? In V. P. Makosky, L. G. Whittemore, & A. M. Rogers (Eds.), *Activities handbook for the teaching of psychology: Vol. 2* (pp. 18–19). Washington, DC: American Psychological Association.

DEMONSTRATION/ACTIVITY: AN IN-CLASS STUDY OF CORRELATION AND DESCRIPTIVE/INFERENTIAL STATISTICS

(You can cover this activity now or when you cover Appendix B: Statistical Methods.) Many aspects of research methodology can be made clearer and more meaningful through this simple in-class demonstration. Randomly assign the students in your class to two groups, and mention the importance of random sampling. Obtain the height and shoe size for each student. Calculate the correlation coefficient for these two measures for each group (a computer is highly desirable), and share the correlations with your students. There is likely to be a moderate positive correlation, but the two groups will probably show different degrees of correlation. If your computer can generate a scatterplot of the scores for each group, show the plots to the class so they can see the linear trend.

You can point out how these correlations could be used to predict one's height from shoe size or vice versa. You can also use this demonstration to make the point that correlation does not imply causality: Being tall does not cause one to have large feet, and having large feet does not cause one to be tall.

Having collected and analyzed these data, you can also discuss measures of central tendency and variability. These data also lend themselves nicely to an inferential statistical test (a *t* test) and a discussion of significant differences. There is no reason to assume that you will find significant differences between your two random groups in either height or shoe size. If significant differences do exist, you could explore the cause(s) with your class, discussing extraneous variables. Most likely, you will also find an abundance of women or men in one of the two groups, giving you the chance to discuss sampling techniques and the importance of beginning research with equivalent groups.

DEMONSTRATION/ACTIVITY: CHOOSING AMONG RESEARCH METHODS

Fernald and Fernald (1990) developed an activity to give students practice at choosing the proper research approach to different problems. Use this activity after covering the different research approaches in Chapter 2.

Divide the class into small groups. Present the groups with the 10 statements in HM 2-1 concerning human nature and behaviour and with four research approaches: naturalistic observation (N), survey (S), clinical procedure (C), and experiment (E). Give the groups 20 minutes to choose the best research approach for dealing with each statement. If they believe that a problem is not amenable to scientific study, they should mark it with a question mark. Have a group report their answer for the first statement, followed by class discussion until a reasonable conclusion is reached. Continue with the other statements in the same manner. Be sure that the discussion focuses on the appropriateness of the research approach recommended for each statement, as well as the merits and limits of that approach.

According to Fernald and Fernald, the answers are:

1. E	2. ?	3. C	4. S	5. N
6. ?	7. N	8. C	9. S	10. E

They pointed out that Statements 1 and 10 could be explored through naturalistic observation but are tested more thoroughly with the experimental approach. You can make up additional questions to suit your own interests.

This activity gives students a chance to apply the knowledge they have gained from Chapter 2 in a manner that requires both synthesis and critical thinking.

Fernald, P. S., & Fernald, L. D. (1990). Selecting appropriate research methods. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities handbook for the teaching of psychology: Vol. 3* (pp. 33–34). Washington, DC: American Psychological Association.

LECTURE/DISCUSSION TOPIC: ETHICS IN PSYCHOLOGY

Ethical concerns have become a major focus in psychology. Chapter 2 discusses ethical issues in research, particularly those dealing with deception and animal research. Certainly ethical concerns encompass more than those two topics.

Ask the class to speculate on why the American Psychological Association (APA) and the Canadian Psychological Association (CPA) have formal, written ethical principles. Can't psychologists simply be trusted to "do right"? Why are there different principles for research using humans and animals? Should there be? How are the ethical responsibilities of scientists similar to those of laypersons? How are they different? The goals of this discussion are to identify the purpose of and need for ethical guidelines in research and to generalize those notions to everyday life.

Many resources will provide background information for either you or your students. The APA Council of Representatives adopted a new Ethics Code in August, 2002 to take effect June 1, 2003. The "General Principles" (reprinted below) are less specific and much briefer than the Ethical Standards and are intended to be aspirational in nature. The full Ethics Code was printed in the December 2002 issue of *American Psychologist.* Additionally, you can access the ethical principles at *www.apa.org/ethics/.*

Principle A: Beneficence and Nonmaleficence
Psychologists strive to benefit those with whom they work and take care to do no harm. In their professional actions, psychologists seek to safeguard the welfare and rights of those with whom they interact professionally and other affected persons, and the welfare of animal subjects of research. When conflicts occur among psychologists' obligations or concerns, they attempt to resolve these conflicts in a reasonable fashion that avoids or minimizes harm. Because psychologists' scientific and professional judgments and actions may affect the lives of others, they are alert to and guard against personal, financial, social, organizational, or political factors that might lead to misuse of their influence. Psychologists strive to be aware of the possible effect of their own physical and mental health on their ability to help those with whom they work.

Principle B: Fidelity and Responsibility
Psychologists establish relationships of trust with those with whom they work. They are aware of their professional and scientific responsibilities to society and to the specific communities in which they work. Psychologists uphold professional standards of conduct, clarify their professional roles and obligations, accept appropriate responsibility for their behaviour, and seek to manage conflicts of interest that could lead to exploitation or harm. Psychologists consult with, refer to, or cooperate with other professionals and institutions to the extent needed to serve the best interests of those with whom they work. They are concerned about the ethical of their colleagues' scientific and professional conduct. Psychologists strive to contribute a portion of their professional time for little or no compensation or personal advantage.

Principle C: Integrity
Psychologists seek to promote accuracy, honesty, and truthfulness in the science, teaching, and practice of psychology. In these activities, psychologists do not steal, cheat, or engage in fraud, subterfuge, or intentional misrepresentation of fact. Psychologists strive to keep their promises and to avoid unwise or unclear commitments. In situations in which deception may be ethically justifiable to maximize benefits and minimize harm, psychologists have a serious obligation to consider the need for, the possible consequences of, and their responsibility to correct any resulting mistrust or other harmful effects that arise from the use of such techniques.

Principle D: Justice
Psychologists recognize that fairness and justice entitle all persons to access to and benefit from the contributions of psychology and to equal quality in the processes, procedures, and services being conducted by psychologists. Psychologists exercise reasonable judgment and take precautions to ensure that their potential biases, the boundaries of their competence, and the limitations of their expertise do not lead to or condone unjust practices.

Principle E: Respect for People's Rights and Dignity
Psychologists respect the dignity and worth of all people, and the rights of individuals to privacy, confidentiality, and self-determination. Psychologists are aware that special safeguards may be necessary to protect the rights and welfare of persons or communities whose vulnerabilities impair autonomous decision making. Psychologists are aware of and respect cultural, individual, and role differences, including those based on age, gender, gender identity, race, ethnicity, culture, national origin, religion, sexual orientation, disability, language, and socioeconomic status and consider these factors when working with members of these groups. Psychologists try to eliminate the effect on their work of biases based on those factors, and they do not knowingly participate in or condone activities of others based upon such prejudices. (American Psychological Association, 2002, pp. 1060–1073)

In addition, the ethical standards are subdivided into 10 categories:

1. Resolving Ethical Issues
2. Competence
3. Human Relations
4. Privacy and Confidentiality
5. Advertising and Other Public Statements
6. Record Keeping and Fees
7. Education and Training
8. Research and Publication
9. Assessment
10. Therapy

You will note that the emphasis in these principles is on providing psychological services rather than conducting

research, but this is also valuable information for students. It is interesting that the discussion of ethics in introductory psychology almost always occurs exclusively in the area of research. This oversight can be remedied by talking about ethics as a topic that applies to all psychologists. Providing case studies and asking for class discussion of the ethical issues can be used to promote critical thinking. If you wish to discuss ethics in research, refer to "Lecture/Discussion Topic: Ethics in Psychological Research with Humans."

One way to show the similarities and differences between APA and CPA is to have students look at both sets of ethics guidelines.

American Psychological Association. (2002). Ethical principles of psychologists and code of conduct. *American Psychologist, 57,* 1060–1073.

Adair, J.G. (2001). Ethics of psychological research: New policies; continuing issues; new concerns. *Canadian Psychology, 42,* 25-35.

Hadjistavropoulous, T., Malloy, D.C., Sharpe, D., Green, S.M. & Fuchs-Lacelle, S. (2002). The relative importance of the ethical principles adopted by the American Psychological Association. *Canadian Psychology, 43,* 254-260.

LECTURE/DISCUSSION TOPIC:

ETHICS IN PSYCHOLOGICAL RESEARCH WITH HUMANS

A portion of Principle 8 of the APA's "Ethical Principles of Psychologists" (see "Lecture/Discussion Topic: Ethics in Psychology") has been expanded to create a booklet, *Ethical Principles in the Conduct of Research with Human Participants,* which is available from the American Psychological Association. Salkind (2003) provided the following synopsis of the guidelines for research with human participants:

1. *When a study is planned, the researcher must be the first and most important judge of its ethical acceptability.*
2. *Participants must be judged to be "at no risk" or "at minimal risk."*
3. *The researcher is responsible for ensuring ethical practices, including the behavior of assistants, students, employees, collaborators, and anyone else involved in the process.*
4. *A fair and reasonable agreement must be reached between the researcher and the subjects prior to the beginning of research.*
5. *If deception is necessary, the researcher must be sure it is justified and a mechanism must be built in to ensure that subjects are debriefed when the research is concluded.*
6. *Researchers must respect the subject's choice to withdraw and must not coerce the subject to return to the study.*
7. *Every possible effort should be made to protect participants from physical and psychological harm.*
8. *Once the research is complete, should the participant so indicate, the results should be shared and the participant should be given a chance to clarify any discrepancies she or he might be aware of.*
9. *If the research should result in harm of any kind, the researcher has the responsibility to correct the harm.*
10. *All the information obtained in a research study is confidential.* (pp. 66-67)

It is particularly important that you discuss the ethics of human research with your introductory psychology students because there is a good possibility that they may end up serving as participants in a research project in your department. This knowledge will allow them to understand and appreciate their rights as research participants. As an exercise, you could have them analyze their research participation both in terms of what they learned about research techniques and what they learned about research ethics. The fact that your introductory students have this information can also serve a valuable function for experimental psychology/research faculty members. If they can inform their students that the introductory psychology students (potential subjects) are aware of the ethical guidelines governing research, then the research students will probably take their ethical responsibilities much more seriously.

You can order a copy of *Ethical Principles in the Conduct of Research with Human Participants* from:

American Psychological Association
Order Department
P.O. Box 2710
Hyattsville, MD 20784-0710

or access Principle 8 at *www.apa.org/ethics/*.

Salkind, N. J. (2003). *Exploring research* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

DEMONSTRATION/ACTIVITY: IS DECEPTION IN RESEARCH JUSTIFIED?

This activity is a variation of Rosnow's (1990) technique for teaching research ethics in a research methods class. You should first familiarize students with the ethical guidelines for research with human subjects (see "Lecture/Discussion Topic: Ethics in Psychological Research with Humans").

Divide students into small groups and have them play the role of members of an institutional review board (IRB) at their school. Give each group a copy of the "proposal" in HM 2-2. The groups should debate the merits of this study in light of its use of deception and the ethical principles. Because students see this as a hypothetical experiment, they should debate its merits solely on the proposal's merits. It is likely that students who know the results of an actual study may be prone to say that the research was justified because the information gained outweighed the cost to the participants. Unfortunately, this type of analysis cannot be made by an IRB, which must evaluate the proposal before the research is conducted.

This proposal is based on a study by Baron, Russell, and Arms (1985). They found that higher levels of negative ions increased the mood that the participants reported, regardless of whether positive or negative. One variation of this activity would be to let some students know the outcomes before debating the proposal. In this way, you can determine whether knowing the results does, indeed, bias the judgment of a study's value.

For an interesting variation of this activity, let a student play the role of the potential researcher. This student must appear before the IRB and defend the proposed study. If you can rotate students through the researcher and IRB member roles, students will get a full view of the process of research. Playing both roles will help students hone their critical thinking skills.

Baron, R. A., Russell, G. W., & Arms, R. L. (1985). Negative ions and behavior: Impact on mood, memory, and aggression among Type A and Type B persons. *Journal of Personality and Social Psychology, 48,* 746-754.
Rosnow, R. L. (1990). Teaching research ethics through role-play and discussion. *Teaching of Psychology, 17,* 179–181.

LECTURE/DISCUSSION TOPIC:

ETHICS IN PSYCHOLOGICAL RESEARCH WITH ANIMALS

Principle 8.09 of the "Ethical Principles of Psychologists" (see "Lecture/Discussion Topic: Ethics in Psychology") has been expanded to specifically deal with ethical issues in research with animals in the booklet *Guidelines for Ethical Conduct in the Care and Use of Animals*, available from the American Psychological Association or via the Web *(www.apa.org/ science/anguide.html)*. Researchers who publish in APA journals must attest to the fact that they followed the guidelines below during their animal research:

- When conducting research with animals, all federal, state, local, and institutional laws should be followed. Allresearchers working with animals should be familiar with these guidelines.
- Psychologists should ensure that all those working with animals are familiar with the guidelines, that all laws concerning animals are followed, and that a veterinarian conducts twice-yearly inspections of the facility.
- An animal care and use committee, composed of representatives from the institution and the local community, should review all procedures carried out on animals.
- Animals should be bred for laboratory purposes or purchased from a legal supplier. Animals being transported should be given adequate food, water, ventilation, and space and be subjected to no unnecessary stress.
- Animals should be provided with humane housing and care in the facility. It is the responsibility of the

psychologist and other individuals within the institution to ensure that they do.

- Research with animals should have a clear scientific purpose, which should outweigh any stress or harm to the animals. Alternatives to animal research should always be considered. Research should not begin before being reviewed by the institution's animal care and use committee. The psychologist should be diligent throughout the research to ensure the animals' welfare.
- The species used in research should be appropriate to answer the questions posed. The minimum number of animals necessary to answer the research question should be used.
- The minimum level of distress necessary to the research should be used. The higher the level of distress, the greater the burden of responsibility and justification is for the researcher. This guideline is quite broad and covers such topics as aversive versus appetitive procedures, food or water deprivation, physical restraint, extreme environmental conditions, prey killing, aggressive interactions, deliberate infliction of trauma, paralytic agents, and surgical procedures.
- Field research should disrupt the populations as little as possible. Research with endangered species requires particular justification.
- The educational use of animals is subject to the same type of guidelines as is research with animals.
- Alternatives to euthanasia should be considered when animals are no longer required for research. If euthanasias necessary, it should be accomplished as humanely as possible.

Research with animals is a particularly controversial issue at this time, as animal activists have become vocal and even violent. If you check newspapers and news magazines for a month or so, you are likely to find stories relevant to this issue that you can bring to class for additional information. The December 26, 1988 issue of *Newsweek* contained a cover story on "The Battle over Animal Rights: A Question of Suffering and Science." This article raised several issues that could lead to fruitful class discussion (but remember that the numbers provided were from 1988). For example:

- Although the estimated number of animals used in research per year is at least 17 million, 80% to 90% are thought to be rats and mice. Does this fact change students' views about the ethical nature of animal research? Does the external validity of animal research (that is, its generalizability to humans) make a difference?
- What are students' feelings about wearing fur? This practice has drawn especially sharp attention from animal activists. For example, Bob Barker has criticized the Miss America Pageant for its use of fur. How do students feel about cosmetics companies testing their products on animals, injecting chemicals into their eyes and the like? Neither of these issues actually deal with psychology, but they do raise the ire of animal activists and may explain some of the vehemence directed at behavioral research involving animal subjects.
- Why are animal activists so alarmed about animal research but not about pet care? The *Newsweek* article quotes the American Humane Association as stating that more than 2,000 dogs and 3,500 cats are born every hour, compared with 415 babies per hour. Also, in 1987 more than 22 million cats and dogs were taken in by animal shelters, and at least 12 million were destroyed.
- What about the relative value of human life compared to that of animals? The *Newsweek* article contains a poignant essay by a mother whose daughter has cystic fibrosis: "If you had to choose between saving a very cute dog or my equally cute, blond, brown-eyed daughter, whose life would you choose? It's not a difficult choice, is it? My daughter has cystic fibrosis. Her only hope for a normal life is that researchers, some of them using animals, will find a cure. Don't misunderstand. It's not that I don't love animals, it's just that I love Claire more" (Cowley, 1988, p. 55).
- What about the radical animal activists who have resorted to breaking into laboratories and releasing animals involved in research? Or to vandalizing such laboratories? Or to planting booby traps or bombs that will injure, maim, or even kill the researchers? Where do the rights of animals and researchers begin and end?

You can expect this to be an emotionally charged issue in class. It is likely that students will end up on opposite sides of the issue, perhaps with very strong feelings. Be careful to moderate the discussion in such a way that you don't end up alienating a portion of the class.

Herzog (1991) reviewed two books that deal with the issue of animal consciousness (Radner & Radner, 1989; Rollin, 1989). Herzog believed that "both of these books have a sound message that the research community needs to hear" (p. 8) and pointed out that "similarity in biology and psychology implies similarity of mental experience" (p. 8).

If you are interested in more information concerning the ethical treatment of animals in research, contact Psychologists for the Ethical Treatment of Animals (PSYETA). PSYETA is concerned with promoting animal welfare within psychology and the community at large. PSYETA has produced a video "Beyond Violence: The Human-Animal Connection" and has published a book *Animal Models of Human Psychology: Critique of Science, Ethics and Policy*. In addition, PSYETA publishes three journals (*Humane Innovations and Alternatives, Journal of Applied Animal Welfare Science,* and *Society and Animals*) and publishes a newsletter three times a year (free to members; also on the Web site).

For further information, contact:

PSYETA
P.O. Box 1297
Washington Grove, MD 20880-1297
e-mail: fran@psyeta.org

or access PSYETA at *www.psyeta.org*.

You may order a copy of *Guidelines for Ethical Conduct in the Care and Use of Animals* from:

American Psychological Association, Order Department
P.O. Box 2710
Hyattsville, MD 20784-0710

Cowley, G. (1988, December 26). Of pain and progress. *Newsweek,* pp. 50–55, 57, 59.
Herzog, H. (1991). Animal consciousness and human conscience. *Contemporary Psychology, 36,* 7–8.
Radner, D., & Radner, M. (1989). *Animal consciousness.* Buffalo, NY: Prometheus Books.
Rollin, B. E. (1989). *The unheeded cry: Animal consciousness, animal pain, and science.* Oxford, UK: Oxford University Press.

DEMONSTRATION/ACTIVITY: MAKING ANIMAL RIGHTS ISSUES COME ALIVE

Herzog (1990) developed an exercise that makes the issue of animal research vivid to students. He divides students into small groups and asks them to play the role of members of an animal care and use committee at their school. Each group gets a research proposal and must decide whether or not to permit the research. He tells groups to decide by consensus rather than majority vote. Furthermore, it is not their job to suggest improvements to the studies but to decide only on the proposal's merits based on the information provided. Forcing students to take a stand on actual cases, instead of merely mouthing general platitudes, often helps them clarify their values.

Herzog provided four cases that address different critical issues in the debate over animal research; you can find these cases in his *Teaching of Psychology* article. Two cases given by Myers and Hansen (1993) appear in HM 2-3 and HM 2-4. (Both predated the current ethical guidelines for research with animals.) The case in HM 2-3 is based on Brady's (1958) research with "executive monkeys." It deals with shock to a species that is closely related to humans, with the results potentially applicable to humans. The case in HM 2-4 is based on Solomon and Wynne's (1953) experiment on avoidance learning and dogs that contributed to the concept of learned helplessness. Again, research animals received electric shock, but the results had important implications for humans. Herzog pointed out that you could slightly alter the specific details of each case to make for more interesting discussion. For example, what happens if some students consider the case in HM 2-3 with rats instead of monkeys?

Brady, J. V. (1958). Ulcers in executive monkeys. *Scientific American, 199*(4), 95–100.
Herzog, H. A. (1990). Discussing animal rights and animal research in the classroom. *Teaching of Psychology, 17,* 90–94.
Myers, A., & Hansen, C. H. (1993). *Experimental psychology* (3rd ed.). Pacific Grove, CA: Brooks/Cole.
Solomon, R. L., & Wynne, L. C. (1953). Traumatic avoidance learning: Acquisition in normal dogs. *Psychological Monographs, 67*(4, Whole No. 354).

LECTURE/DISCUSSION TOPIC: BENEFITS OF ANIMAL RESEARCH

Students may wonder whether the ends justify the means in terms of animal research. A discussion of some of the advances that have been made through animal research should at least make your students consider the benefits, if not convince them. Miller's (1985) article has one of the better collections of examples of how animal research has eventually benefited either animals or humans.

The article covers these topics:

- Research benefiting animals (avoiding predation of crops or livestock, imprinting, environmental behaviours)
- Research protecting people and crops (insect repellents, pheromones, insect control)
- Principles of learning and behaviour derived from research on animals (historical review, including classical and operant conditioning)
- Treatment of enuresis, or incontinence (feedback, reinforcement)
- Automated training devices (maintenance of performance, learning, scoliosis)
- Psychotherapy as learning
- Behaviour therapy (systematic desensitization, anorexia, ruminative vomiting)
- Behavioural medicine (rewarded sickness behaviour)
- Compensation for deafferentation (rehabilitation of patients with neuromuscular disorders)
- Visceral learning and biofeedback (wide range of problems treatable through biofeedback)
- Prevention (avoiding unhealthy behaviour and promoting healthy behaviour)
- Effects of stress (fight-or-flight response, reduced immune response, depression)
- Effects of noise on hearing loss (development of standards for safe exposure to noise)
- Pain (chronic pain, addictive painkillers)
- Behaviourally active drugs (addiction, anxiety, tolerance, antipsychotics, Parkinson's disease)
- Animal companions to help the handicapped (seeing-eye dogs, Capuchin monkeys to aid quadriplegics)
- Effects of early experience (early deprivation of visual stimulation, impoverished environments, psychosocial deprivation, prematurity, fetal alcohol syndrome, early exposure to other drugs)
- Deficits in learning and memory that occur with age (cholinergic neurotransmitter system, cerebral energy metabolism)

As you can see, it would be possible to discuss the benefits of animal research within almost any chapter in introductory psychology.

Domjan and Purdy (1995) found that many of the leading introductory psychology texts do not explicitly acknowledge the contributions of animal research, sometimes leading students to the conclusion that important research used human rather than animal subjects. They presented a review of their findings relative to the importance of animal research, ethical issues in animal research, and justification of animal research. In addition, they highlighted findings from the following typical chapter content areas: biological bases of behaviour, sensation and perception, motivation and emotion, conditioning and learning, memory and forgetting, developmental psychology, psychoactive drugs and drug abuse, psychopathology, treatment, and health, stress, and coping. By reading this article, you should be able to weave the topic of animal research throughout your course.

Try to impress upon your students the importance of animal research, but also remind them of the American Psychological Association's *Guidelines for Ethical Conduct in the Care and Use of Animals* (see "Lecture/Discussion Topic: Ethics in Psychological Research with Animals"). The fact that many psychologists are convinced that animal research is necessary does not give them license to abuse or mistreat the animals. In particular, the APA specifically states that "the psychologist should always consider the possibility of using other species, nonanimal alternatives, or procedures that minimize the number of animals in research, and should be familiar with the appropriate literature" (American Psychological Association, 2000, I.C.). Don't let your students leave this class believing that psychologists conduct research with animals simply because they can "do things to animals that they couldn't do to humans." This belief is partly to blame for the negative press that psychological research with animals receives.

If you would like to receive current updates concerning progress in animal research, information about animal activist activities, and other information related to the issue of animal research, you can contact PSYETA (see "Lecture/Discussion Topic: Ethics in Psychological Research with Animals").

American Psychological Association. (2000). *Guidelines for ethical conduct in the care and use of animals.* Washington, DC: Author. Retrieved February 17, 2000 from the World Wide Web: *http://www.apa.org/science/anguide.html.*

Domjan, M., & Purdy, J. E. (1995). Animal research in psychology: More than meets the eye of the general psychology student. *American Psychologist, 50,* 496–503.

Miller, N. E. (1985). The value of behavioural research on animals. *American Psychologist, 40,* 423–440.

LECTURE/DISCUSSION TOPIC: POPULAR TREATMENT OF RESEARCH

The findings of scientific research may be covered inaccurately in the popular media. If you have a good example from your own area of expertise, share it with your class. Show them what was written in the newspaper or magazine. As simply as possible, summarize the actual findings as originally published. Allow the students a chance to talk about the differences in the two accounts. Why do they think such inaccuracies occur in the popular media?

Often, distortions and inaccuracies arise because the media oversimplify the original findings so that the general public can better understand them. However, some inaccuracies appear to be deliberate. For example, Canadian reseacher Catherine S. Fichten and her co-author (1983) had subjects read horoscopes for all zodiac signs (blind as to which horoscope represented each sign) and rate how accurate each would have been on a daily and monthly basis. They found that the subjects' actual horoscopes were no more accurate than the others. Not surprisingly, Fichten and Sunerton found that subjects felt their forecasts were accurate when they knew which forecast belonged with each sign. Thus, they concluded that "daily and monthly forecasts were shown to be unreliable and invalid" (p. 123). However, when the tabloid *The Star* dealt with Fichten and Sunerton's research, the headline read "Horoscopes really true, says psychologist" (1983, p. 32). According to the tabloid, "Daily and monthly forecasts must have some validity or the subjects would not have rated their own forecasts as more useful than the others, Dr. Fichten said." The contrast between the quotes from the article and the tabloid is striking. To make matters even worse, an article appeared in *American Astrology* the following year that was apparently based only on the article in *The Star:* "According to an article in the October 11th edition of the tabloid, *The Star,* a psychologist at Dawson College in Montreal has concluded that there is some truth and usefulness to astrology!" ("Science and Horoscopes," 1984, p. 21).

This example provides an excellent case study of media distortion of scientific research. It also gives you a chance to point up the problem inherent in attempting to make everything "black and white" or simple when it really is not. Perhaps you can convince your class of the value of theoretical diversity (Theme 2) and of complexity (when complex answers are required). To get your class actively involved, you could ask them to peruse some supermarket tabloids to try to find similar articles.

Fichten, C. S., & Sunerton, B. (1983). Popular horoscopes and the "Barnum effect." *Journal of Psychology, 114,* 123–134.
Horoscopes really true, says psychologist. (1983, October 11). *The Star,* p. 32.
Science and horoscopes. (1984). *American Astrology, 51,* p. 21.

DEMONSTRATION/ACTIVITY: DISSECTING A JOURNAL ARTICLE

Because the Personal Application in Chapter 2 of Weiten and McCann's text gives your students an excellent introduction to journal articles and American Psychological Association format, a class activity dealing with this topic should prove interesting and beneficial. Students will get more out of reading journal articles at the library if you discuss journals and articles with them.

This activity seems to produce optimum results if it is conducted in two steps. First, pass out several journals for class members to examine, and discuss journals in general. Second, provide each student with his or her own copy of a research article you have selected for closer scrutiny. (Less specialized or less "exotic" topics will suit your purpose best. Also, the article should be relatively short.) Your discussion of the article can be as detailed or superficial as you feel the situation warrants. Students appear to benefit even more if they are encouraged to highlight items in the article as they are being discussed. This is an excellent opportunity to introduce your students to the accepted APA format for journal articles if not already done, and all of the aspects of research methodology practiced by contemporary psychologists. You can also emphasize the fifth step in a scientific investigation (report the findings), as discussed in the text.

Jordon, C.H., & Zanna, M.P. (1999). How to read a journal article in social psychology. In R.F. Baumeister (Ed.), *The self in social psychology* (pp. 461-470). Philadelphia: Psychology Press.

References for Additional Demonstrations/Activities

From *Teaching of Psychology:*

Tables to help students grasp size differences in simple correlations, by J. D. Duke (1978), *5,* 219–221

Science, psychology and self: A demonstration experiment for introductory psychology, by J. C. Larkin, H. A. Pines, & J. W. Julian (1979), *6,* 237–238

Sherlock Holmes and the educational process, by R. L. Kellogg (1980), *7,* 41–44

Rewards, costs, and helping: A demonstration of the complementary nature of experimental and correlational research, by K. W. Kerber (1980), *7,* 50–52

The psychology of Agatha Christie, by R. L. Kellogg (1983), *10,* 46–47

Basketball game as psychology experiment, by J. A. Polyson & K. A. Blick (1985), *12,* 52–53

Regression toward the mean effect: No statistical background required, by J. Karylowski (1985), *12,* 229–230

Naturalistic observation of behavior: A model system using mice in a colony, by H. A. Herzog (1988), *15,* 200–202

Teaching research ethics through role-play and discussion, by R. L. Rosnow (1990), *17,* 179–181

Excerpts from journal articles as teaching devices, by H. Pennington (1992), *19,* 175–177

Defying intuition: Demonstrating the importance of the empirical technique, by A. Kohn (1992), *19,* 217–219

Using the Barnum effect to teach about ethics and deception in research, by B. C. Beins (1993), *20,* 33–35

From the laboratory to the headlines: Teaching critical evaluation of press reports of research, by P. A. Connor-Greene (1993), *20,* 167–169

Predicting introductory psychology test scores: An engaging and useful topic, by T. A. Cavell & D. J. Woehr (1994), *21,* 108–110

Motivating students to read journal articles, by D. M. Carkenord (1994), *21,* 162–164

Using an everyday memory task to introduce the method and results sections of a scientific paper, by W. R. Marmie (1994), *21,* 164

Taking the fear out of research: A gentle approach to teaching an appreciation for research, by C. Brems (1994), *21,* 241–243

A model for thinking critically about ethical issues, by C. L. Allegretti & J. N. Frederick (1995), *22,* 46–48

Teaching basic statistical concepts through continuous data collection and feedback, by J. M. Low (1995), *22,* 196–197

Understanding correlations: Two computer exercises, by M. D. Goldstein & M. J. Strube (1995), *22,* 205–206

Assessing students' perceptions of psychology as a science: Validation of a self-report measure, by J. Friedrich (1996), *23,* 6–13

A "handy" way to introduce research methods, by D. E. Johnson (1996), *23,* 168–170

Fighting shyness with shyness: An exercise in survey methodology and self-awareness, by B. J. Carducci (1996), *23,* 241–243

Introducing research ethics into the introductory psychology curriculum, by C. B. Fisher & T. L. Kuther (1997), *24,* 171–175

A classroom demonstration of single-subject research designs, by J. E. Carr & J. Austin (1997), *24,* 188–190

Essential topics in introductory statistics and methodology courses, by N. Giesbrecht, Y. Sell, C. Scialfa, L. Sandals, & P. Ehlers (1997), *24,* 242–246

Learning ethics the hard way: Facing the ethics committee, by W. B. Johnson & R. Corser (1998), *25,* 26–28

Demonstrating scientific reasoning, by M. A. Stadler (1998), *25,* 205–206

Teaching a course on psychology ethics to undergraduates: An experiential model, by T. G. Plante (1998), *25,* 286–287

Teaching observational research in introductory psychology: Computerized and lecture-based methods, by V. A. Kazmerski & D. G. Blasko (1999), *26,* 295–298

The two captains: A research exercise using *Star Trek,* by L. G. Herringer (2000), *27,* 50–51

Teaching experimental methods while bringing smiles to your students' faces, by J. E. Grahe, K. D. Williams, & V. B. Hinsz (2000), *27,* 108–111

Research methods with a smile: A gender difference exercise that teaches methodology, by A. Lipsitz (2000), *27,* 111–113

Using daily horoscopes to demonstrate expectancy confirmation, by G. D. Munro & J. E. Munro (2000), *27,* 114–116

Engaging students in qualitative research through experiential class activities, by L. A. Fontes & F. P. Piercy (2000), *27,* 174–179

The mind as black box: A simulation of theory building in psychology, by C. Hildebrandt & J. Oliver (2000), *27,* 195–197

Using a dining facility as an introductory psychology research laboratory, by N. Koschman & R. Wesp (2001), *28,* 105–108

A sweet tasting demonstration of random occurrences, by A. N. Christopher & P. Marek (2002), *29,* 122-125

Helping students read reports of empirical research, by C. K. Varnhagen & N. Digdon (2002), *29,* 160-164

Active and passive touch: A research methodology project, by C. D. O'Dell & M. S. Hoyert (2002), *29,* 292-294

Using the Barnum Effect to teach psychological research methods, by T. E. Boyce & E. S. Geller (2002), *29,* 316-318

Science or snake oil? Teaching critical evaluation of "research" reports on the Internet, by P. A. Connor-Greene & D. J. Greene (2002), *29,* 321-324

• From *Activities Handbook for the Teaching of Psychology*, by L. T. Benjamin, Jr., & K. D. Lowman (Eds.), 1981, Washington, DC: American Psychological Association:

Observation: A standardized experience, by N. F. Russo, pp. 3–4

Accuracy of observation, by P. J. Woods, pp. 5–6

Demonstrating experimental design logic, Anonymous, pp. 7–9

Experimental design: Varying heart rate, by S. Cameron, J. Christiano, & B. Mausner, pp. 10–11

Sampling and probability, by L. Snellgrove, pp. 12–13

Hypothesis testing, Anonymous, pp. 14–15
Hypothesis testing—To "coin" a term, by W. J. Hunter, pp. 16–17
Randomization, by D. J. Stang, pp. 18–19
Experimenter expectancy, by C. Stierhem, pp. 20–21
To err is human, especially in measurement, by W. J. Hunter, pp. 22–23
Finding meaning in the method, by P. G. Zimbardo, pp. 24–26

• From *Activities Handbook for the Teaching of Psychology: Vol. 2*, by V. P. Makosky, L. G. Whittemore, & A. M. Rogers (Eds.), 1987, Washington, DC: American Psychological Association:

Inferences and observable behavior, by P. S. Fernald & L. D. Fernald, pp. 3–6
The observational study of children, by J. R. Wallace, pp. 7–8
Workshop in content analysis, by B. Mausner & D. Kennedy, pp. 9–11
Simulating and stimulating scientific thinking, by B. F. Peden & A. H. Keniston, pp. 12–15
Experimental versus correlational research, by L. Leal, pp. 16–17
A consumer approach to teaching research methods in introductory psychology, by J. D. Arnold, pp. 20–22

• From *Activities Handbook for the Teaching of Psychology: Vol. 3*, by V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), 1990, Washington, DC: American Psychological Association:

Observational recording of rodent behavior: Behavior profile or ethogram, by E. P. Reese, pp. 5–8
A field experiment in helping, by D. L. Watson, pp. 9–11
A computer-based exercise in experimental methodology, by T. Brothen, pp. 12–17 (requires use of computer program)
Self-experimentation as a tool for teaching about psychology, by B. F. Peden & A. H. Keniston, pp. 18–24
A demonstration of the illusory correlation effect, by T. Rocklin, pp. 25–26
Teaching rival hypotheses in experimental psychology, by G. S. Howard & J. L. Englehardt, pp. 35–37

• From *Activities Handbook for the Teaching of Psychology: Vol. 4*, by L. T. Benjamin, Jr., B. F. Nodine, R. M. Ernst, & C. Blair-Broeker (Eds.), 1999, Washington, DC: American Psychological Association:

Parsimonious explanations of apparent mind reading, by J. W. Kalat, pp. 18–21
Counting fidgets: Teaching the complexity of naturalistic observation, by B. C. Beins, pp. 53–56
Discovering the relationship between operational definitions and interobserver reliability, by A. H. Becker, pp. 57–63
A classroom demonstration of Galileo's distinction between objective and subjective reality, by A. N. Elliott, pp. 64–65
A tasty sample(r): Teaching about sampling using M&M's, by R. A. Smith, pp. 66–68
Using jelly beans to teach some concepts in research methodology, by H. Rothgerber & E. A. Day, pp. 69–73
The effects of gender on the number of shoes owned: Gathering data for statistical and methodological demonstrations, by S. E. Stern, pp. 74–76
Probability distributions with real social judgment data, by J. A. Jegerski, pp. 77–79
Making research come alive: Exploring the effects of culture and confounds, by R. Ely & C. Yeager, pp. 271–275
Gender stereotypes and methodology: What's the connection?, by E. M. Valentine, pp. 289–294

Suggested Readings for Chapter 2

Elmes, D. G., Kantowitz, B. H., & Roediger, H. L. (1992). *Research methods in psychology*. St. Paul, MN: West. One of the leading books on the research enterprise. It emphasizes the intricacies of experimental methods.

Keith-Spiegel, P., & Koocher, G. P. (1985). *Ethics in psychology: Professional standards and cases*. New York: Random House. A well-written, thoughtful discussion of a variety of complex ethical issues in psychology.

Kiess, H. O., & Bloomquist, D. W. (1985). *Psychological research methods*. Boston: Allyn & Bacon. A sophisticated, upper-level text on research design and statistics.

Kimble, G. A. (1978). *How to use (and misuse) statistics.* Englewood Cliffs, NJ: Prentice-Hall. An intriguing look at how statistics can be manipulated to create inaccurate impressions.

Martin, D. W. (2000). *Doing psychology experiments* (5th ed.). Belmont, CA: Wadsworth. An easy-to-use, "how to" discussion of the experimental method. The chapters address practical questions, such as how to decide which variables to manipulate, how to select a design, how to interpret experimental results, and so forth.

McCain, G., & Segal, E. M. (1988). *The game of science*. Pacific Grove, CA: Brooks/Cole. A lively look at the assumptions and logic underlying the scientific approach. The book includes unique discussions of scientists as people and the relationship between science and society at large.

Nye, R. D. (1992). *The legacy of B. F. Skinner: Concepts and perspectives, controversies and misunderstandings*. Pacific Grove, CA: Brooks/Cole. A brief summary of Skinner's work in a clear, easy-to-understand style.

Reed, J. G., & Baxter, P. M. (1992). *Library use: A handbook for psychology*. Washington, DC: American Psychological Association. A terrific little book on how to do library research in psychology, with an abundance of concrete examples.

Smith, R. A., & Davis, S. F. (2004). *The psychologist as detective: An introduction to conducting research in psychology* (3rd ed.). Upper: Saddle River, NJ: Prentice Hall. An introduction to experimental psychology with an emphasis on research conducted by undergraduate students.

Spatz, C. (2000). *Basic statistics: Tales of distributions* (7th ed.). Belmont, CA: Wadsworth. A user-friendly text on statistics that explores the history of statistics and profiles some important pioneers in the field.

Stanovich, K. E. (1992). *How to think straight about psychology*. Glenview, IL: Scott, Foresman. A brief, readable book that models critical thinking as it applies to the research process in psychology.

Wood, G. (1986). *Fundamentals of psychological research.* Glenview, IL: Scott, Foresman. Another excellent, accessible undergraduate text on research methods.

HANDOUT MASTER 2–1: SELECTING APPROPRIATE RESEARCH METHODS

Choose what you believe to be the single preferred method of study for each statement below. If a problem can be studied with more than one approach, choose the method with greater precision. Label each with one of the following letters:

N Naturalistic observation
C Clinical approach
S Survey method
E Experimental approach
? Impossible to study the problem scientifically

1. Jogging increases lung capacity.
2. The soul remains after death.
3. When administered the Rorschach Inkblot Test, young children and regressed psychotics perceive more animals than they do humans.
4. Individuals having one or more significant hobbies report more job satisfaction than individuals having no hobbies.
5. Unmarried cab drivers talk more with their customers than do married cab drivers.
6. Newborn infants have an innate conception of sin.
7. The purchase of tranquilizers increases during monetary crises.
8. Alcoholics with a history of poor nutrition show more signs of brain damage than alcoholics with a history of good nutrition.
9. More men than women report fantasies of making large sums of money.
10. Work productivity increases when workers are allowed flexible hours.

Adapted from "Selecting Appropriate Research Methods," by P. S. Fernald and L. D. Fernald. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities Handbook for the Teaching of Psychology: Vol 3*, pp. 33–34, American Psychological Association, 1990.

HANDOUT MASTER 2–2: HUMAN RESEARCH ON IONIZATION'S EFFECTS

Warm, dry, seasonal winds, like the sirocco in the southern Mediterranean or the Santa Ana winds in California, or an Alberta Chinook, have been blamed for everything from insomnia to homicide, and there is some research evidence that seems to support this. These winds increase air temperature, reduce humidity, and alter the atmosphere's electron balance, splitting electrons into positively and negatively charged particles called ions. During these seasonal winds, there is a slightly higher concentration of positive ions in the air, and a small amount of research evidence suggests that positive ions can produce negative mood shifts. Could negative ions have the opposite effect, making people feel better? Professor Y wanted to test this hypothesis in a laboratory experiment.

The researcher plans to use a machine that generates negative ions (as some electronic air cleaners do) to change the air in a laboratory room so that the concentration of negative ions will be low (normal ambient), moderate, or high. In each session, a male student will be led to believe he is involved in an experiment about learning. His task during the session will involve training another student to reduce his heart rate with biofeedback. The "learner" will actually be a trained confederate of the researcher, and his performance will be completely scripted in advance. Every time the learner makes a mistake the trainer will administer a heat stimulus on the learner's wrist. No real heat will ever be delivered in the experiment, but trainers will believe that they are punishing the learners. Sessions will be set up so that half of the volunteers will be intentionally angered by nasty comments from the learner during the session; the other half will not be angered. Each volunteer's mood will be measured at the end of the session.

Adapted from *Experimental Psychology* (pp. 14–15, 34), by A. Myers & C. H. Hansen, 1997, Pacific Grove, CA: Brooks/Cole.

HANDOUT MASTER 2–3: ANIMAL RESEARCH ON EXECUTIVE MONKEYS

Professor X has studied the emotional behaviour of rhesus monkeys for several years. The monkeys were kept in restraining chairs; these allowed them to move their heads and limbs but not their bodies. They were placed in the chairs so that they could be trained through various conditioning procedures involving electric shock. The experimental setup, according to Professor X, seemed to be quite stressful for the animals. Many of them died during the preliminary study. Autopsies showed that many of the dead animals developed ulcers, which are unusual in laboratory animals. Restraint alone was not the explanation; some animals had been kept in the restraining chairs for 6 months, received no shock, and did not develop ulcers.

Therefore, in subsequent work, Professor X wants to explore the effect of the conditioning procedures. She will train two monkeys, designating one an executive and one a control. Both monkeys will be given brief shocks on the feet. However, the executive monkey will be able to prevent shock by pressing a lever. Unless the executive acts appropriately, it (and its partner, the control monkey) will be shocked on the feet once every 20 seconds. The monkeys will be exposed to alternating 6-hour periods of shock avoidance and rest (no shock).

Professor X hypothesizes that the executive monkey will develop ulcers whereas the control monkey will not. She believes that this difference will occur because the executive monkey will have the stress of the responsibility of avoiding the shock. Although the control monkey will be shocked exactly the same number of times and length as the executive monkey, Professor X believes that it will <u>not</u> develop ulcers because it has no responsibility (whatever happens to the executive monkey happens to it also). Thus, Professor X believes that the stress of responsibility will be the causative factor in developing ulcers and not merely being shocked. Professor X argues that this research will have important implications for humans and their health.

Adapted from *Experimental Psychology* (pp. 131–133), by A. Myers & C. H. Hansen, 1993, Pacific Grove, CA: Brooks/Cole.

HANDOUT MASTER 2-4: ANIMAL RESEARCH ON LEARNED HELPLESSNESS

Professor Z wants to train dogs to avoid electric shocks. He will use a box divided into two compartments, placing a dog in one side of the box, the floor of which is an electrified grid that can be used to shock the dogs' feet. The dogs' task is to learn to escape the shock and, later, to avoid it. Some animals will be confronted with a hurdle between the two compartments; they will have to jump over the hurdle to escape or avoid the shocks. However, some dogs will be prevented from escaping the shocks because a barrier will block off the second compartment. After 50 shocks with the escape blocked off, the barrier will be removed and the dogs in the second group will be free to escape. The shocks used by Professor Z will be fairly intense (dogs receiving this level of shock typically yelp, shriek, defecate, and urinate) and last up to 2 minutes. Each dog will have five training sessions with 10 trials per session.

Based on some preliminary findings, Professor Z believes that the dogs that face the hurdle will easily learn to escape and then to avoid the shocks. However, he thinks that the dogs that initially cannot escape the shocks will not learn to escape or avoid them even after the barrier is removed, even though they merely have to walk from one side of the box to the other. If he is correct, he will have demonstrated "learned helplessness," a state in which the animals have learned, in the first stage of the experiment, that they have no control over their environment and its consequences. This helplessness will generalize to the second stage of the experiment and the dogs will not even try to escape because they previously learned to be helpless. Professor Z believes that this phenomenon of learned helplessness could have important implications for understanding depression in humans. He believes that people who become depressed may do so because they learn that they have no control over their environments, just like the dogs in the second group of this experiment.

Adapted from *Experimental Psychology* (p. 133), by A. Myers & C. H. Hansen, 1993, Pacific Grove, CA: Brooks/Cole.