

# Conducting a Good Experiment II: Final Considerations, Unanticipated Influences, and Cross-Cultural Issues

CHAPTER

7

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In this chapter we continue our discussion of research basics by considering the type and number of participants to be used, the type of apparatus or testing equipment to be employed, whether the experimenter or participants may be extraneous variables, and the cross-cultural implications of research.

## Participants

Both the type and the number of participants who take part in a research project are important considerations in the formulation of an experiment. We discuss these aspects in this section.

### Types of Participants

A moment's reflection will indicate that there is a wealth of potential organisms that can serve as participants in a psychological experiment. For example, animal researchers might choose from bumblebees, flies, dolphins, chimpanzees, elephants, rats, and so on. Likewise, researchers dealing with humans might choose as their participants infants, young adults, the aged, the gifted, the handicapped, or the maladjusted, among many others. The range of participants for your research project may be overwhelming. Which one represents the best

choice? Considering three things can help you answer this question: *precedent*, *availability*, and the *nature of the problem*.

**Precedent** If your literature review indicates that researchers have worked with a particular type of participant successfully in prior research projects in your area of interest, you may want to consider using this type of participant. For example, when Willard S. Small (1901) conducted the first rat study in the United States, he began a **precedent**, an established pattern, that continues to this day. Likewise, the precedent for using college students (especially those enrolled in introductory psychology) has a venerable history. For example, research in the area of human memory and cognitive processes relies heavily on projects conducted with college students. How strong is this reliance? We selected a copy of the *Journal of Experimental Psychology: Learning, Memory and Cognition* (Vol. 24, No. 4, July 1998) at random and examined it. Of the 15 articles published in this issue, 12 reported results from experiments that used college students exclusively as participants; 3 reported using paid volunteers or participants who may have been college students. It is noteworthy that in many of the articles using college students, the participants were drawn from a subject pool, or they participated in order to receive partial course credit.

**Precedent** An established pattern.



Such precedents for the selection of participants have their advantages and disadvantages. What are they?

The fact that a particular type of participant has been used repeatedly in psychological research ensures that a body of knowledge exists about that type of participant. Researchers can take advantage of this wealth of knowledge as they plan their research. They can implement already validated procedures without expending hours of exploratory testing and designing new equipment. Being able to draw on this body of already proven techniques means the *likelihood of success* (see Chapter 2) is increased.

However, the continual use of one type or species of participant can limit the *generalizability* of the information that is gathered (see the discussion of external validity in Chapter 8). For example, although the study of self-esteem in college students may tell us about this trait in that group, it may not tell us much about self-esteem in the general population. Likewise, although the choice to use white rats in an experiment may be prompted by the extensive literature that already exists on this animal, additional rat studies may not provide any useful information about other species.

**Availability** The continued use of white rats and college students also stems from another source, their availability. White rats are relatively inexpensive, at least compared to many other animals, and they are easy to maintain. Likewise, college students, especially those students enrolled in introductory psychology classes, constitute an easily accessible population from which to draw participants. For example, in his study of male and female differences in altruism (unselfishly helping another person), Nicholas Schroeppel, a student at the

University of Nebraska in Lincoln, and his faculty advisor, Gustavo Carlo, administered questionnaires to college students (Schroeppel & Carlo, 2001). In addition to their availability, college students are inexpensive participants because researchers do not usually pay them for their participation. At some institutions participation in a research project may be a course requirement, thus ensuring the ready availability of research participants. Availability, of course, does not guarantee that the researcher has selected the best or most appropriate participants.

Clearly, availability of one type of participant may discourage the use of others. In turn, we have seen that developing a large body of knowledge about a particular type of participant can result in pressures to use that participant in future research projects. Obviously, the problem can easily become circular. The precedent for using one type of participant is established and leads to the development of an extensive literature concerning that type of participant, which further encourages the use of that type of participant.

**Type of Research Project** Often the nature of your research project will determine the type of participant you decide to use. For example, if you are interested in studying the visual ability of birds of prey, you are limited to studying birds such as eagles, vultures, hawks, and owls; ducks, geese, and songbirds are not predators. Likewise, if you want to study hallucinations and delusions, you have limited your choice of potential participants to humans who are able to communicate and who experience those phenomena.

Consider the research project conducted by Molly Claus (2000), a student at Nebraska Wesleyan University in Lincoln. She was interested in studying the relation between toy preferences and assertiveness. The nature of this research question dictated that she use children as participants; she studied preschoolers. Her research indicated that children who played with masculine toys (e.g., trucks and blocks) were more assertive than children who chose to play with feminine toys (e.g., a tea set).

## Number of Participants

Once you have decided what type of participant to use in your research project, you must then determine how many participants you are going to test. In making this decision, there are numerous factors to take into account, including these:

1. **Finances.** How much will it cost to test each participant? Animals must be purchased and cared for. It may be necessary to pay humans for their participation. Does the person who actually conducts the experiment have to be paid? If so, this cost also must be considered; it will rise as you test additional participants.
2. **Time.** As you test additional participants, time requirements will increase, especially if you test participants individually.
3. **Availability.** The number of available participants may influence how many you choose to use in your experiment.

In addition to these more practical considerations, there is another factor that enters into our determination of the number of participants we will use. This factor is the amount of variability we expect to be present within each group. The less the *within-group* variability (i.e., the more homogeneous the participants), the fewer participants we will need. Conversely, the greater the *within-group* variability (i.e., the more heterogeneous the participants), the greater the number of participants we will need.



What is the reasoning behind these statements about variability and the number of participants to be tested in an experiment? In thinking about this question, you may want to review the material on nuisance variables (see Chapter 6).

When a nuisance variable, in this case the heterogeneous nature of the participants, is present, the scores within each group spread out considerably and the amount of group overlap is increased. The variability of the scores makes it more difficult to see absolute differences between the groups. One way to deemphasize these extreme scores is to test more participants. By increasing the number of scores (i.e., participants), we should increase the number of scores that cluster in the center of the distribution and, therefore, decrease the impact of the extreme scores. When nuisance variables are not present (i.e., the groups are more homogeneous), there are fewer extreme scores and the differences between the groups can be seen more clearly.

As you saw in Chapter 4, another way to create more homogeneous groups is to use stratified random sampling. By sampling a more specific type of participant, we remove extremes from our sample. We will have more to say about the number of observations and variability in the next chapter.

The number of participants tested is related to the *power* of our statistical test. **Power** is the likelihood (probability) that the statistical test will be significant (i.e., the experimental hypothesis is accepted when it is true). Generally speaking, the greater the number of participants, the higher the power of the statistical test; therefore, it is to your advantage to use as many participants as possible under the specific constraints of your research. Statistics books routinely discuss power and present formulas and tables that will aid you in determining the number of participants you will need to test in order to achieve significance.

**Power** The probability that a statistical test will be significant (i.e., the experimental hypothesis is accepted when it is true).

You should also use your literature review as a guideline concerning the number of participants you need to use in your experiment. If previous studies in your area have successfully used a certain number of participants, you can assume you will need to test a comparable number. For example, based on precedent, Kimberly Kiker (2001), a student at the University of Florida in Gainesville, chose to use 20 first-grade schoolchildren and 20 third-grade schoolchildren in her research on measurement errors in young children. If you are conducting a project in an area that has not received much research attention, however, you will want to test as many participants as possible given your financial, time, and availability constraints.

## Apparatus

While you are deciding on the number and type of participants to use in your research, you also need to consider the type of apparatus, if any, you will be using. It is possible to use apparatus both for presenting the independent variable (IV) and for recording the dependent variable (DV).

### IV Presentation

Often the nature of the IV will influence the type of apparatus you choose to use. For example, Michael Jones (2001), a student at Lincoln Memorial University in Harrogate, Tennessee,

was interested in studying the effects of noise and sex of participant on recall and spatial task (completing a block design) performance of children between 9 and 11 years old. He presented unstructured white noise (static) or a popular song to groups of children. His experiment dictated that he use audio equipment. He recorded the popular song on a continuous-loop tape that played the same song again and again. He presented the song and the white noise at exactly 74 decibels (dB), as measured by a digital sound meter. The results of this study indicated that participants in the white-noise condition performed better on both tasks than did the group of children who heard the popular song.

The possible ways in which you can present the IV are limited by the type of IV you are manipulating, by finances, and by your ingenuity. Clearly, the presentation of certain types of IVs requires specialized equipment. For example, the administration of a particular type of light will require a specialized projector. On the other hand, presenting food to a hungry rat that has learned to press a lever does not have to involve the purchase of an expensive Skinner box or a food-pellet dispenser. We have seen very effective handmade Skinner boxes and food-delivery systems. For example, a sturdy cardboard box works just fine in place of a commercial Skinner box. What about the lever? No problem. Anything that protrudes into the box that the rat can learn to press or touch will work fine. In fact, some students have simply drawn a circle on one wall and required that the rat touch it with its nose before food is delivered. A piece of plastic tubing can serve as the food-delivery system. Simply fasten the tubing to the outside of the box so that one end is at the top and the other end enters the box near the bottom and is situated over a small dish. Dropping a piece of food down the tube results in a reinforcer being delivered into the food dish in the box. Some creative thought at this stage of planning might save you substantial amounts of money.



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*"Besides operant equipment, Professor, have the federal cutbacks hurt you?"*

Although large research laboratories may require extensive funds and elaborate equipment, you can conduct meaningful research on a limited budget with little or no fancy equipment.

## DV Recording

Although recording evidence in great detail at the scene of a crime may be a major concern to the detective, recording the DV is such a fundamental task that it sometimes is taken for granted or overlooked by the psychologist. However, there are problems and options to be addressed. For example, you do not want the researcher's presence to interfere with or modify the participant's behavior. Sometimes being inconspicuous may mean that the researcher will need to use a simple paper-and-pencil data sheet instead of elaborate, highly visible electronic equipment. In short, it is important for the observer to be inconspicuous while recording data.



Although technologically sophisticated equipment can be beneficial in conducting research, potential drawbacks are associated with its use. What are some of these drawbacks?

Whether presenting the IV or recording the DV, the experimenter should not become a slave to the equipment that is available. Just because you have access to a certain piece of equipment does not mean that you must use it. If a handheld stopwatch provides data equivalent to or better than what can be obtained with an elaborate computer setup, the experimenter should prefer the less elaborate equipment. If researchers begin to rely too heavily on their equipment, then the choice of research problems may start to be dictated by the equipment, not by the researchers' creativity. In such situations there is more concern for the IV that can be presented by the equipment than there is for the problem that is being investigated. Also, the presence of elaborate pieces of equipment assumes that the researcher has sufficient funds to provide appropriate maintenance for such equipment. Consider the problems you would face if your research depended on a particular piece of equipment that was broken and you had no funds to pay for its repair.

In some instances a good pair of eyes may be your best equipment. Consider the following exchange between Sherlock Holmes and Dr. Watson:

"What can you learn from this battered old felt?" Watson asks Holmes. "Here is my lens. You know the methods."

"I can see nothing."

"On the contrary, Watson, you can see everything." (Doyle, 1927, p. 246)

## REVIEW SUMMARY

1. **Precedent**, availability, and the nature of the problem are factors that influence the choice of participants to use in psychological research.
2. The number of participants used in a research project will be determined by financial considerations, time constraints, and participant availability. Generally speaking, the larger the number of participants, the greater the **power**.

3. The use of homogeneous groups of participants allows the experimenter to test smaller groups, whereas heterogeneous groups dictate using more participants.
4. Automated equipment can be used for IV presentation and DV recording, but often quality data can be recorded with less sophisticated equipment.

## ■ Check Your Progress

1. Explain the relation between precedent and the type of participant used in a research project.
2. Why are white rats and college students the favorite participants in psychological research?
3. Group homogeneity is best associated with
  - a. testing a larger number of participants
  - b. testing a smaller number of participants
  - c. multiple-strata sampling
  - d. nonrandom sampling
4. One of the best guidelines for the number of participants to be used in a successful research project is
  - a. cost
  - b. availability
  - c. past research
  - d. type of IV presentation
5. You would like to assess the effects of trauma in people's lives, but you have ethical problems with causing traumatic events to occur to people. You have a problem with
  - a. IV presentation
  - b. IV recording
  - c. DV presentation
  - d. DV recording
6. Describe the concern the experimenter must be aware of when using automated equipment to present the IV or the DV.

Although you may believe that you are ready to move forward with your research project, we still have some preliminary issues to consider. Just as the good detective is careful, precise, and thorough, researchers cannot exercise too much care in developing their experiments. In the following sections we highlight two potential extraneous variables that often go overlooked: the experimenter and the participant. As the science of psychology matures, researchers pay increasing attention to these factors.

## The Experimenter as an Extraneous Variable

Just as the characteristics of the detective can influence the responses of the suspects who are questioned, several aspects of the experimenter can influence the responses of the participant (Rosenthal, 1976). First we explore experimenter characteristics; then we will consider experimenter expectancies.



## Experimenter Characteristics

Both physiological and psychological attributes of the experimenter can influence the outcome of your research. Physiological characteristics include such variables as age, sex, and race. Research has shown that each of these variables can have an influence on participants' responses. For example, Robert Rosenthal (1977) has shown that male experimenters are more friendly to their participants than female experimenters.



If all participants in an experiment are tested by the same experimenter, then constancy (see Chapter 6) is established, and this extraneous variable is controlled. If such control is exercised, why are experimenter characteristics, such as age, sex, and race, of potential concern?

Even though constancy is achieved by having one experimenter conduct the research project, it is possible that the experimenter will influence the participants in a unique manner. Perhaps the friendliness of a male experimenter will encourage all participants to perform at a very high level, thus making the differences between the treatment groups less evident. Hence, problems can arise when one attempts to compare the results of similar research projects conducted by different experimenters. If these projects yield different results, you cannot be sure whether the differences are attributable to differences in the IV or to effects created by the different experimenters.

The psychological attributes of the experimenter that can influence the results of an experiment include personality characteristics such as hostility, anxiety, and introversion or extraversion. An experiment conducted by an experimenter who is highly anxious is likely to yield different results than an experiment conducted by a confident, self-assured experimenter. The same is true for other personality characteristics.

## Experimenter Expectancies

In addition to physiological and psychological characteristics, the experimenter's expectations concerning the participants' behavior can, and do, affect performance. The experimenter's expectations cause him or her to behave toward the participants in such a manner that the expected response is, indeed, more likely shown. The experimenter is literally a cause of the desired or expected response.



Are experimenter expectancies best categorized as extraneous variables that can confound the experiment, or are they simply nuisance variables that obscure the effects of the IV?

If experimenter expectancy is operating in your experiment, you cannot tell whether your results are due to the influence of the IV or experimenter expectancy; hence, they are best labeled as confounders.



Such effects have been demonstrated in both human and animal experiments. One of the most widely cited studies of the effects of human experimenter expectancy involved the IQ scores of grade-school children (Rosenthal & Jacobson, 1968). At the start of the school year all children in the classes that were studied took an IQ test. Then, several children in each class were randomly selected, and their respective teachers were told that these children were “intellectual bloomers.” Several months later, when all the children retook the IQ test, the IQ scores of the intellectual bloomers had increased more than those of the other children. Because the intellectual bloomers were randomly selected, it is doubtful that they were intellectually superior. However, they were perceived in this manner and were treated differently by the teachers. In turn, these students responded in accordance with the teachers’ expectations.

Experimenter expectancy is not limited to studies of humans; even rats will perform in accordance with what the experimenter anticipates. Rosenthal and Fode (1963) told half the students in a class that the rats they were going to train were “maze bright”; the remainder of the students were told that their rats were “maze dull.” In actuality, there were no differences among the rats at the start of the project. The results, however, were consistent with the students’ expectations: The “smart” rats learned the maze better and more quickly than did the “dumb” rats. Because the rats did not differ at the start of training, this study clearly highlights the strong effects that experimenter expectancies can have on participants’ performance. Be-

cause Rosenthal and his colleagues were among the first systematically to study experimenter expectations, the results of such expectations are often called **Rosenthal effects**.

**Rosenthal effect** The result when an experimenter’s preconceived idea of appropriate responding influences the treatment of participants and their behavior.

## Controlling Experimenter Effects

**Physiological and Psychological Effects** The reason for experimenters traditionally paying little attention to these variables may be clear by now: They are difficult to control. For example, to achieve constancy, *all* these characteristics would have to be measured in *all* potential experimenters and then the choice of

experimenters would be determined by the level of each factor that was desired—a difficult, if not impossible, task. Likewise, we saw in Chapter 6 that balancing can be used to avoid confounding caused by the sex of the experimenter. Although this control technique equates the groups for experimenter sex, it does not simultaneously control for other physiological and psychological characteristics. At present, the most common procedures for controlling general experimenter characteristics are to (a) use standardized methods, (b) use careful training to a set standard when the experimenter administers procedures, and (c) standardize appearance, attitude, and so forth as much as possible. Replicating your research also provides a good check on possible experimenter effects; if you replicate the findings with a different experimenter, then experimenter effects are less likely to be a factor. A thorough literature review will help make you aware of any relevant experimenter variables in your area of research interest.

**Experimenter Expectancies** Several things can be done to reduce, or possibly eliminate, experimenter expectancies. First, the instructions that the experimenter gives to the participants should be carefully prepared so their manner of presentation will not influence the participants’ responses. Likewise, any instructions concerning scoring the participants’ responses should be as objective and concrete as possible and established before beginning

the experiment. If these instructions are subjective, then there is room for experimenter expectancies to dictate how they will be scored.

A second method for controlling experimenter expectancies involves the use of instrumentation and automation. For example, instructions to participants may be tape-recorded prior to experimental testing in order to reduce any influences the experimenter might have. In many instances, potential influences of the experimenter are eliminated through the use of printed instructions or computer displays. Also, automated equipment can ensure the accurate recording and storage of response data. In some instances, the participants' responses are entered directly at a computer terminal and thus are stored and ready for analysis at any time.

A third method for minimizing experimenter expectancies is to conduct a single-blind experiment. The **single-blind experiment** keeps the experimenter in the dark regarding which participants receive which treatment(s). (As we will see, this procedure can be used to control participant effects as well.) For example, suppose you are conducting an experiment testing the effects of different descriptions of an individual's degree of altruism on the amount of warmth that individual is perceived to possess. Quite likely the different written descriptions will be printed in such a way that they all have the same appearance (constancy). If these different descriptions have the same demographic cover sheet, then all materials will appear to be identical. If another experimenter is in charge of determining which participants read which descriptions, and arranging the order in which to distribute the testing materials to the participants, then the experimenter who actually conducts the research sessions will not know which descriptions are being read by which participants at any session, and therefore experimenter expectancies cannot influence the participants' responses. The single-blind procedure can also be used effectively when the IV consists of some type of chemical compound, whether it be in tablet or injection form. If all tablets or injections have the same physical appearance, the experimenter will be unaware of which participants are receiving the active compound and which participants are receiving a placebo. The experimenter truly does not know what treatment condition is being administered in single-blind experiments of this nature.

**Single-blind experiment**  
An experiment in which the experimenter (or participants) is unaware of the treatment the participants are receiving.

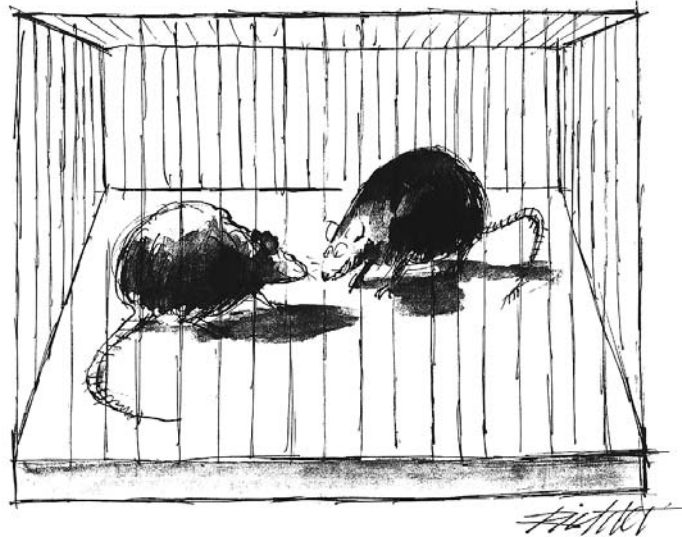
## Participant Perceptions as Extraneous Variables

Just as the experimenter can unintentionally influence the results of an experiment, so can the participants. As you will see, numerous aspects of the participants' perception of the research project can operate as extraneous variables and nuisance variables.

### Demand Characteristics and Good Participants

If you have ever served as a participant in a psychological experiment, you know that most participants believe that they are supposed to behave in a certain manner. As we have seen, the cues used by participants to guide their behavior may come from the experimenter; they may also be part of the experimental context or IV manipulation. When participants use these cues to determine what the experimenter's hypothesis is and how they are supposed to act, the cues are referred to as the **demand characteristics** of the experiment (Orne, 1962). In short, participants in psychological research may attempt

**Demand characteristics**  
Features of the experiment that inadvertently lead participants to respond in a particular manner.



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"Haven't we met in a previous experiment?"

It is important that participants not communicate about the nature of a psychological experiment.

to figure out how they are supposed to respond and then behave in this manner. The desire to cooperate and act as the participants believe the experimenter wants them to is called the **good participant effect** (Rosenthal & Rosnow, 1991).

#### Good participant effect

The tendency of participants to behave as they perceive the experimenter wants them to behave.

Allison Dickson, James Morris, and Keri Cass, students at Southwestern University in Georgetown, Texas, and their faculty advisor, Traci Giuliano, investigated race, stereotypes, and college students' perceptions of rap and country music performers. The "participants made judgments about either a Black or a White musician who performed either rap or country music" (Dickson, Giuliano, Morris, & Cass, 2001, p. 175). Rather than tell the participants that they were studying the effects of race and stereotypes, the researchers simply "asked them to contribute to an investigation exploring 'people's perceptions of music'" (Dickson et al., 2001, p. 177). Had they divulged the exact nature of their hypothesis, then the demand characteristics would have been quite strong, and the participants might have tried to decide which group they were in and how they were expected to respond. Dickson et al. (2001) found that the participants rated the black rap performer more favorably than the black country performer. The participants also rated the white country performer more favorably than the white rap performer.



Although experimenters have an ethical responsibility (see Chapter 2) to inform the participants about the general nature of the experiment, we have just seen that they usually do not want to reveal the exact nature of their experimental hypothesis. To do so can introduce strong demand characteristics that could influence the participants' behavior. Do demand characteristics operate as extraneous variables or nuisance variables?

Depending on how the demand characteristics are perceived, they can operate either as an extraneous or nuisance variable. If it is very clear to the participants which group they are in and how that group is expected to act, then the demand characteristics are functioning as an extraneous variable, and the experiment is confounded. When the experiment is completed, the experimenter will not be able to tell whether the differences between the groups were due to the effects of the IV or the demand characteristics. If, however, the participants perceive the demand characteristics *but* are not sure which group they are in, then the demand characteristics may function as a nuisance variable. In this situation we would expect the demand characteristics to produce both increases and decreases in responding within all groups. Thus, the scores of *all* groups would spread out more.

## Response Bias

Several factors can produce a response bias on the part of research participants. Here we examine such influences as yea-saying and response set.

**Yea-Saying** You probably know individuals who seem to agree with everything, even if agreeing sometimes means that they contradict themselves. We may never know whether these individuals agree because they truly believe what they are saying or because they are simply making a socially desirable response at the moment. Clearly, these individuals, known as **yea-sayers**, who say yes to all questions, pose a threat to psychological research. (Individuals who typically respond negatively to all questions are known as **nay-sayers**.) Contradicting one's own statements by answering yes (or no) to all items on a psychological inventory or test seriously threatens the validity of that participant's score.

**Response Set** Sometimes the experimental context or situation in which the research is being conducted can cause participants to respond in a certain manner or have a **response set**. The effects of response set can be likened to going for a job interview: You take your cues from the interviewer and the surroundings. In some cases, you will need to be highly professional; in other interview situations, you can be a bit more relaxed.

Consider the two following descriptions of an experimenter and the testing room in which the research is being conducted. In the first instance, the experimenter is wearing a tie and a white laboratory coat. The experiment is being conducted in a nicely carpeted room that has pleasing furnishings, several bookcases, and attractive plants; it looks more like an office than a research room. The second experimenter is dressed in jeans, a sweatshirt, and tennis shoes. In this case the research is being conducted in a classroom in a less-than-well-kept building. Have you already developed a response set for each of these situations? Will you be more formal and perhaps give more in-depth or scientific answers in the first situation? Even though the second situation may help put you at ease, does it seem less than scientific? Notice that our descriptions of these two situations did not make reference to the physiological or psychological characteristics of the experimenters or to the type of experiment being conducted. Hence, we are dealing with an effect that occurs in addition to experimenter and demand effects.

**Yea-sayers** Participants who tend to answer yes to all questions.

**Nay-sayers** Participants who tend to answer no to all questions.

**Response set** The result when an experimental context or testing situation influences the participants' responses.

Likewise, the nature of the questions themselves may create a response set. For example, how questions are worded or their placement in the sequence of items may prompt a certain type of response; it may seem that a socially desirable answer is being called for. Also, it may seem that a particular alternative is called for. In such cases a response bias is developed. Clearly, response set can be a major influence on the participant's response.

## Controlling Participant Effects

As we have seen, there are aspects of the participant that can affect the results of our research. Although such factors are rather difficult to control, researchers have developed several techniques.

**Demand Characteristics** You will recall that one technique used to control for experimenter expectancies is to keep the experimenter in the dark by conducting a single-blind experiment. This same approach can be applied to the control of demand characteristics, only this time the participants will be unaware of such features as the experimental hypothesis, the true nature of the experiment, or which group they happen to be in.

It takes only a moment's thought to reach the conclusion that these two approaches can be combined; we can conduct an experiment in which both the experimenter and the participants are unaware of which treatment is being administered to which participants. Such experiments are known as **double-blind experiments**.

Regardless of whether a single- or double-blind experiment is conducted, it is likely that the participants will attempt to guess what the purpose of the experiment is and how they should respond. It is difficult to conceal the fact that they are participating in an experiment, and the information provided them prior to signing the informed consent document (see Chapter 3) may give the participants a general idea concerning the nature of the experiment.

### Double-blind experiment

An experiment in which both the experimenter and the participants are unaware of which treatment the participants are receiving.



Let's assume that you are conducting a single- or double-blind experiment and you are leaving your participants to their own devices to guess what the experiment concerns. In this case you may be introducing an unwanted variable into your research project. Is this factor an extraneous variable or a nuisance variable? What effect(s) might it have?

It is almost certain that all participants will not correctly guess the true nature of the experiment and which group they are in. Those participants who make correct guesses may show improved performance; those participants who make incorrect guesses may have inferior performance. If the ability to guess correctly the nature of the experiment and which group one is in is comparable in all groups, then the scores within *all* groups will spread out. You have introduced a *nuisance variable* that will make it more difficult to see the differences that develop between the groups. Is there any way to avoid this problem? The answer is yes.

Another technique that can be used to control for demand characteristics is to give all participants incorrect information concerning the nature of the experiment. In short, the experimenter purposely deceives *all* the participants, thus disguising the true nature of the experiment and keeping the participants from guessing how they are supposed to respond.



Although this procedure can be effective, it suffers from two drawbacks. First, we have already seen that the use of deception raises ethical problems with regard to the conduct of research. If deception is used, a good Institutional Review Board (IRB; see Chapter 2) will be careful to make sure it is a justifiable and necessary procedure. The second problem is that the information used to deceive the participants may result in erroneous guesses about the nature of the experiment; the participants are then responding to the demand characteristics created by the deception. Clearly, demand characteristics may be very difficult to control.

**Yea-Saying** The most typical control for yea-saying (and nay-saying) is to rewrite some of the items so that a negative response represents agreement (control for yea-saying) or a positive response represents disagreement (control for nay-saying). After some of the items have been rewritten, the experimenter needs to make a decision concerning the order for their presentation. All the rewritten items should not be presented as a group. One presentation strategy is to randomize the complete list, thereby presenting the original and rewritten items in an undetermined sequence. This approach works quite well with longer lists. If the list is smaller, within-subject counterbalancing can be used. Table 7-1 illustrates these two presentation styles and the use of within-subject counterbalancing.

**Response Set** The best safeguard against response set is to review all questions that are asked or items to be completed to determine whether a socially desired response is implied in any manner. The answer given or response made should reflect the participant's own feelings, attitudes, or motives rather than an attempt to appear intelligent or well-adjusted or otherwise "normal." Checking for response set offers excellent opportunities for pilot testing and interviewing of participants to determine whether the questions or behavioral tasks create a particular outlook. Additionally, you should carefully examine the nature of the experimental situation or context to avoid the presence of undesired cues.

**TABLE 7-1** Controlling for Yea-Saying

The following yes–no items are based on the Type A scale developed by Friedman and Rosenman (1974). In Part A a "yes" answer is associated with the Type A personality. Yea-sayers, even though they are not Type A persons, would likely be assigned to this category with such questions. In Part B half of the items are rewritten so that a "no" answer is associated with Type A characteristics. Within-subject counterbalancing is also used with the items in Part B.

- A. "Yes" answers are associated with Type A characteristics.
  1. Do you play games like Monopoly to win?
  2. Do you eat, speak, and walk rapidly?
  3. Do you constantly schedule more activities than time allows?
  4. Do you feel a sense of guilt if you try to relax?
- B. "Yes" answers (Items 1 and 4) and "no" answers (Items 2 and 3) are associated with Type A characteristics. The 1(yes)–2(no)–3(no)–4(yes) sequence illustrates within-subject counterbalancing.
  1. Do you play games like Monopoly to win?
  2. Do you eat, speak, and walk slowly?
  3. Do you constantly schedule just enough activities to fill the time available?
  4. Do you feel a sense of guilt if you try to relax?

## ■ REVIEW SUMMARY

1. Experimenter characteristics can affect the results of an experiment. Physiological experimenter characteristics include such aspects as age, sex, and race. Psychological experimenter attributes include such personality characteristics as hostility, anxiety, and introversion or extraversion.
2. Experimenter expectancies can produce behaviors in the experimenter that influence participants to make the desired response. Such experimenter expectancy effects are often called Rosenthal effects.
3. Because of their potential abundance, experimenter characteristics are difficult to control.
4. Experimenter expectancies can be controlled through the use of objective instructions and response-scoring procedures, as well as instrumentation and automation. A **single-blind experiment**, in which the experimenter does not know which participants are receiving which treatments, also can be used to control experimenter expectancies.
5. **Demand characteristics** refer to those aspects of the experiment that may provide the participants with cues concerning the experimenter's hypothesis and how they are supposed to act. Demand characteristics can be controlled through the use of single-blind and **double-blind experiments** (in which both the experimenter and the participants do not know which treatment the participants are to receive).
6. The desire to cooperate and act in accordance with the experimenter's expectation is called the **good participant effect**.
7. Response bias is caused by several factors. **Yea-saying** refers to the tendency to answer yes to all questions; **nay-saying** refers to the tendency to answer no to all questions. Yea- and nay-saying are controlled by writing some items in such a way that a negative response represents agreement (control for yea-saying) and a positive response represents disagreement (control for nay-saying).
8. When the experimental situation or context prompts a certain response, a **response set** has been created. The best safeguards against a response set are careful scrutiny of the experimental situation, thorough review of all questions, pilot testing, and interviewing the participants.

## ■ Check Your Progress

1. Explain how the experimenter can be an extraneous variable.
2. Matching
 

<ol style="list-style-type: none"> <li>1. age, sex, race</li> <li>2. hostility or anxiety</li> <li>3. Rosenthal effects</li> <li>4. single-blind experiment</li> <li>5. double-blind experiment</li> </ol>	<ol style="list-style-type: none"> <li>A. psychological experimenter effects</li> <li>B. experimenter expectancies</li> <li>C. physiological experimenter effects</li> <li>D. control for demand characteristics and experimenter expectancies</li> <li>E. control for experimenter expectancies</li> </ol>
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3. An experiment in which the researcher doesn't know which treatment the participants are receiving
  - a. is a blind experiment
  - b. is a confounded experiment
  - c. cannot be replicated
  - d. is unable to employ randomization
4. Explain how instrumentation and automation can control experimenter expectancies.
5. Demand characteristics refer to
  - a. demands the experimenter places on the participants
  - b. cues that tell the participants how to act
  - c. IRB requirements for conducting research
  - d. the need to publish research in order to receive tenure and promotion
6. Which of the following is an example of response bias?
  - a. demand characteristics
  - b. single-blind experiment
  - c. nay-saying
  - d. balancing

## The Interface Between Research and Culture

The recent and continuing explosion in international information technology, coupled with the increased availability of air travel, highlights the diverse, multicultural nature of our planet. For example, it is common to see live reports on the television evening news from countries on the other side of the world. In our own country the "information superhighway" instantly links diverse peoples in the farthest reaches of the United States.

As we complete the material on the basics of experimentation, it is important to keep such cultural differences in mind; they may influence how research is conceptualized, conducted, analyzed, and interpreted. To this end, cross-cultural psychology has grown dramatically in recent years. The goal of **cross-cultural psychology** is to determine whether research results and psychological phenomena are universal (found in individuals from different cultures) or specific to the culture in which they were reported. Before we examine cross-cultural research, we need a definition of culture.

**Cross-cultural psychology**  
A branch of psychology whose goal is to determine the universality of research results.



Rather than simply giving you a definition of culture, we would like you to spend a few minutes on this topic. Before reading further, decide which aspects or features should be included in a definition of culture.

You probably began thinking about culture with the word *similar*. After all, it's the similarities that help define our culture and distinguish it from other cultures. If you then started listing the important aspects that serve to distinguish cultures, you're on the right track. Among the important features that differentiate one culture from another are attitudes, values, and behaviors. Moreover, these culture-defining attitudes, values, and behaviors must

be long-lasting or enduring. This enduring quality indicates that these attitudes, values, and behaviors are communicated or transmitted from one generation to the next. Putting these considerations together, we can tentatively define **culture** as the lasting values, attitudes, and behaviors shared by a group of people and transmitted to subsequent generations. It is important to note that our definition does not imply that race and nationality are synonymous with culture. Individuals can be of the same race or nationality and not share the same culture. Carrying this thought one step further, we can see that several cultures may exist within the same country or even in the same large city. Now, let's see how culture is related to what we consider to be truth.

**Culture** Lasting values, attitudes, and behaviors that are shared by a group and transmitted to subsequent generations.

## Culture, Knowledge, and Truth

**Etic** A finding that is the same in different cultures.

**Emic** A culture-specific finding.

A finding that occurs across cultures is called an **etic**. You can think of an etic as a universal truth or principle. The finding that reinforcement increases the probability of the response it follows appears to be an etic; people of all cultures respond to reinforcement similarly. In contrast, an **emic** is a finding that is linked to a specific culture. The value placed on independence and individuality is an emic; it varies from culture to culture. Some cultures (e.g., the United States) are individualistic and place a premium on individual accomplishments. Other cultures (e.g., China) are collectivist and stress contributions to the welfare of the group. Emics represent truths that are relative to different cultures, whereas etics represent absolute truths. Given the great diversity of cultures, it should not surprise you to find that the number of emics is considerably greater than the number of etics.



At this point you may be wondering how this discussion relates to a course in research methods or experimental psychology. Consider this issue before reading further.

**Ethnocentric** Other cultures are viewed as an extension of one's own culture.

If the goal of your research project is to discover the effects of IV manipulations only within a certain culture, then this discussion may have little relevance. However, few researchers purposely set their research sights on a single culture (see also Chapter 8). In fact, the question of culture may never enter the researcher's mind as a study is taking shape. Similarly, when the data are analyzed and conclusions reached, cultural considerations may not be addressed. The result is a project that one *assumes* is not culture dependent. In short, researchers often become **ethnocentric**—they view other cultures as an extension of their own. Hence, they interpret research results in accord with the values, attitudes, and behaviors that define their own culture and assume that these findings are applicable in other cultures as well. For example, many researchers probably consider the *fundamental attribution error* (Ross, 1977), in which actions are attributed to the individual even in the face of compelling situational cues, to be a universal finding. Although the fundamental attribution error is shown in individualistic, Western societies (Gilbert & Malone, 1995), situational cues are taken into account in collectivist societies, and this effect is appreciably smaller (Miller, 1984). We will have more to say about the generalizability of research findings in Chapter 8 when we consider the external validity of our research.

## The Effect of Culture on Research

If you step back from your culture and try to put research in a more international perspective, it is clear that culture influences all aspects of the research process. We will consider cultural effects on the choice of the research problem, the nature of the experimental hypothesis, and the selection of the IV and the recording of the DV. To solve their respective problems, the detective and the research psychologist need a broad base that includes cultural information.

**Choice of the Research Problem** In some cases there may be no doubt that the choice of your research problem is culture dependent. For example, let's assume you are interested in studying the nature of crowd interactions at a rock concert. Whereas this topic may represent a meaningful project in the United States, it has much less relevance to a psychologist conducting research in the bush country of Australia. In this example, culture clearly dictates the nature of the research project; some problems are important in one culture but not in another. Likewise, whereas the study of individual achievement motivation is a topic of considerable interest and importance in an individualistic society like the United States, it would be a less important research topic in a collectivist society like China (Yang, 1982).

**Nature of the Experimental Hypothesis** When you have selected a problem that is relevant beyond your own culture, you must deal with the experimental hypothesis. For example, even though the study of factors that determine one's personal space is relevant in a number of cultures, the creation of an experimental hypothesis that applies to all cultures will be most difficult. In some cultures, very little personal space is the norm, whereas considerable personal space is expected in other cultures. For example, Italians typically interact within a smaller personal space (i.e., they prefer closer proximity) than either Germans or Americans (Shuter, 1977). Such cultural differences may lead to very different hypotheses.

**Selection of the IV and Recording of the DV** Culture also can influence the selection of the IV and the DV. In technologically advanced cultures such as those of the United States, Japan, or Great Britain, IV presentation may be accomplished via a computer. Likewise, DV measurement and recording may be conducted by computer. Because such technology is not available in all cultures, the choice of the IV and the procedure for recording the DV may differ considerably. For example, handheld stopwatches, not digital electronic timers, may be used to record the time required to complete an experimental task. Similarly, the participants may read the stimulus items in booklet form rather than having them presented at set intervals on a video screen by a computer. In fact, stimuli that have high (or low) meaning in one culture may not have the same meaning in another culture.

## Methodology and Analysis Issues

In either conducting or evaluating cross-cultural research, a number of methodological issues will necessitate careful and thorough consideration. Among these issues are the participants and sampling procedures used, the survey or questionnaire employed, and the effects of cultural response set on data analysis.

**Participants and Sampling Procedures** The basic question here is whether the sample of participants is representative of the culture from which they were drawn. Do sophomore college students represent the culture of the United States? What steps have been taken to ensure that the sample is representative of the culture in question? For example, extreme differences may exist between samples drawn from large urban centers and those drawn from rural areas.

Assuming you can satisfy the requirement that a sample is representative of its culture, you are likely to be faced with an equally difficult task: being able to ensure that samples from two or more cultures are equivalent before conducting the research. We have stressed, and will continue to stress, the importance of establishing group equivalence before an IV is administered. Only when group equivalence is demonstrated can we have confidence in saying that our IV has had an effect in producing any differences we observe.



Let's assume you are reading research reports from three different cultures. All three investigations used freshman-level college students as participants. Can you assume that the requirements of group equivalence among these studies has been satisfied through the use of this common type of participant?

Even though the same *type* of participant—freshman college students—was used, you cannot assume the groups were equivalent before the research was conducted. Before you can make this assumption, you must be able to demonstrate that the same type of student attends college in all three cultures and that the “freshman” designation is equivalent across all three cultures. Perhaps the collegiate experience in one culture is quite different from the collegiate experience in another culture and therefore attracts students who differ from those in the culture with which it is being compared. For example, economics may dictate that only the wealthy attend college in some cultures. In short, assessing group equivalence will not be an easy task for cross-cultural research.

**Type of Survey or Questionnaire Used** Although an existing survey or questionnaire may work in a few instances, the researcher probably will not be able to use it for research in a different culture. The chances are good that the questionnaire or survey will have to be translated into a different language. Assuming the translation has been completed, how do you know that it is accurate and the correct meanings have been retained? The same word can have different meanings in different cultures. One technique for evaluating the accuracy of the translation is to have a *back translation* done. This procedure involves having another person translate the translated questionnaire back into its original language. If the back translation and the original version match, then the original translation was successful. The importance of the back translation is clearly reflected by Sou and Irving in their comments on the limitations of their research on student attitudes toward mental health in the United States and Macao (see Chapter 2). These researchers stated that “the survey items created for this study did not receive a backward translation to ensure reliability between the Chinese and English versions; therefore, group differences may be due to inherent differences in the meaning of the survey items after translation” (Sou & Irving, 2002, p. 21).

Aside from these problems, which are faced in translating the instrument into another language, there is the very real problem of whether the other cultures to be tested value the concept that is to be measured or evaluated. If they do not, then the survey or questionnaire is worthless.

Even if you determine that the concept or trait in question is valued in other cultures, there remains the problem of making sure that the *specific items* are equivalent when the survey or questionnaire is prepared for use in other cultures. Just translating the items into another language may not be sufficient. For example, a question about riding the subway, which is appropriate for an industrialized society, may have no meaning in a less-developed culture or even in some parts of the industrialized society. Clearly, the same comment can be made for questions dealing with customs, values, and beliefs.

**Cultural Response Set** Earlier in this chapter you learned that research participants may begin an experiment with a preexisting response set; some participants may be yea-sayers and others are nay-sayers. We have the same general concern, only on a larger scale, when conducting cross-cultural research.

In this instance it is the response of the entire culture, not individual participants, that concerns us. A **cultural response set**, or tendency of a particular culture to respond in a certain manner, may be operative. How often have individuals in another culture answered questions on a Likert-type rating scale like those commonly used in the United States? What reaction(s) will they have to being tested by such a scale?

The fact that you use such scales effectively in your research does not mean participants in other cultures will find them easy to understand and answer. The same comments can be made about any survey or questionnaire. Both the type of questionnaire (Likert-type scale, true–false, multiple choice, etc.) and the nature of the items themselves may intensify an already existing cultural response set.

How do you know whether a cultural response set is present? If differences exist among the groups tested in various cultures, a cultural response set may be operating.

**Cultural response set**  
The tendency of a particular culture to respond in a certain manner.



The presence of a cultural response set is one possible cause for the differences among groups from various cultures. What other factor might cause such differences? What problem is created if you cannot distinguish between these two causes?

If you indicated that the influence of a manipulated IV or differences in the specific trait being measured could also be responsible for the differences among groups, you are absolutely correct. If you then indicated that an extraneous variable is present and the research would be confounded (see Chapter 6) if the researcher could not distinguish whether the scores on a questionnaire were caused by the trait or IV or the cultural response set, then you are correct again. Remember that our research results are worthless when a confounder is present. Hence, it is vitally important that cultural response set be accounted for whenever you are conducting or evaluating cross-cultural research.

The purpose of this section was not to teach all the fine points of cross-cultural research; it would take an entire book to accomplish that goal. Rather, we wanted to make you aware of these issues and problems before we began our discussions of internal and external validity, statistics, and research designs. Being acquainted with the issues involved in cross-cultural research will make you a better consumer of psychological research, regardless of where it is conducted.

## ■ REVIEW SUMMARY

1. The goal of **cross-cultural psychology** is to determine whether research findings are culture specific (i.e., **emics**) or universal (i.e., **etics**).
2. **Culture** can influence the choice of a research problem, the nature of the experimental hypothesis, and the selection of the IV and the DV.

3. In conducting or comparing cross-cultural research, the cultural representativeness of the participants and the sampling procedures used to acquire the participants must be carefully evaluated.
4. The appropriateness of a survey or questionnaire for cross-cultural research must be evaluated. When the general trait or concept has been accepted, the specific items must be examined and deemed acceptable for cross-cultural use.
5. The presence of a **cultural response set** must be considered in conducting cross-cultural research.

## ■ Check Your Progress

1. The goal of cross-cultural psychology is best described as
  - a. determining whether psychological findings are universal
  - b. testing a variety of participants
  - c. using a variety of test equipment
  - d. conducting tests in a variety of locations
2. A finding linked to a specific culture best describes
  - a. ethnocentrism
  - b. an ertic
  - c. an emic
  - d. an etic
3. Why is the goal of cross-cultural research incompatible with ethnocentrism?
4. In what ways can culture affect the conduct of psychological research?
5. The tendency of a culture to behave in a certain way best describes
  - a. an etic
  - b. a cultural response set
  - c. ethnocentrism
  - d. the just world stereotype

## ■ Key Terms

Precedent, 127	Yea-sayers, 137	Etic, 142
Power, 129	Nay-sayers, 137	Emic, 142
Rosenthal effect, 134	Response set, 137	Ethnocentric, 142
Single-blind experiment, 135	Double-blind experiment, 138	Cultural response set, 145
Demand characteristics, 135	Cross-cultural psychology, 141	
Good participant effect, 136	Culture, 142	

## ■ Looking Ahead

So far, our view of research in psychology has been rather general. At this point in the book we are on the verge of discussing specific research designs. (Our consideration of research designs begins in Chapter 10.) Before moving to this topic we will consider the internal and external validity of our research (Chapter 8) and the use of statistics in psychological research (Chapter 9).