CHAPTER 2

Studying Child Development

To me, research is discovery: *an odyssey of surprises, confirmations, and unexpected twists and turns that contribute to the excitement of a research career. . . . The excitement of a research career is that the story told by the data is always more interesting than the one you expect to confirm. In this sense, human behavior is far more interesting and provocative than even the most thoughtful theories allow, and this means that the scientist must be instructed by the lessons revealed by unexpected research findings—while maintaining humility about her or his capacity to predict the next turn in the road.* (Thompson, 1996, p. 69)

These words, written by developmental researcher Ross Thompson, reveal the genuine enthusiasm of the scientist for the task of systematically observing and making sense of human behavior. Like investigators in many disciplines, developmental psychologists are firmly committed to the idea that theories and hypotheses, such as those described in the chapter titled "Themes and Theories," should be thoroughly and systematically tested using sound principles of science. But as Thompson suggests, researchers must be prepared to modify or even cast off theories if their observations suggest other truths. At first glance, this outcome may seem discouraging. But as many researchers can attest, great rewards lie in the simple notion of discovering something new.

Part of the reason that researchers get drawn into the enterprise of developmental psychology is that they are captivated by and want to understand the fascinating, complex, and oftentimes surprising array of behaviors children display. Moreover, there is the sheer fun of being a "child watcher." As even the most casual of observers can confirm, children are simply delightful subjects of study. Research can also make a real difference in the lives of children. For example, newborn nurseries for premature infants now contain rocking chairs so that parents and nurses can rock and stimulate babies previously confined to isolettes. Bilingual education programs capitalize on the ease with which young children master the complexities of language. The benefit of each of these approaches has been revealed through the systematic study of the child.

Collecting data about children, then, is an essential and rewarding aspect of scientific developmental psychology, and being well grounded in research techniques is important for students of the discipline. With this principle in mind, we devote this chapter to methodological issues in developmental psychology. In addition, from time to time throughout the book, we highlight the research methodology used in particular studies. We hope that by alerting you to important issues in the research process, we will better equip you to think critically about the findings of the numerous studies you will encounter in subsequent chapters.

Research Methods in Developmental Psychology

Like their colleagues in all the sciences, researchers in child development seek to gather data that are objective, measurable, and capable of being replicated in controlled studies by other researchers. Their studies, in other words, are based on the **scientific method.** Frequently they initiate research to evaluate the predictions of a specific theory (e.g., is cognitive development stagelike, as Piaget suggests?). The scientific method dictates that theories must be revised or elaborated as new observations confirm or refute them. The process of scientific fact-finding involves a constant cycle of theorizing, empirical testing of the resulting hypotheses, and revision (or even outright rejection) of theories as the new data come in. Alternatively, the investigators may formulate a research question to determine an application of theory to a real-world situation (e.g., can early intervention programs for preschoolers

scientific method Use of objective, measurable, and repeatable techniques to gather information.

boost IQ scores?). Regardless of the motivation, the general principles of good science are as important to research in child development as they are to any other research arena. Although many of the methods child development researchers use are the very same techniques psychologists routinely employ in other specialized areas, some methodological approaches are particularly useful in studying changes in behavior or mental processes that occur over time.

Measuring Attributes and Behaviors

All researchers are interested in identifying relationships among **variables,** those factors in a given situation that have no fixed or constant value. In child development studies, the variables are individual attributes, experiences, or behaviors that differ from one time to the next or from one person to another. Ultimately, researchers are interested in determining the causal relationships among variables; that is, they wish to identify those variables directly responsible for the occurrence of other variables. Does watching television cause children to behave aggressively? Do withdrawn children have academic problems once they enroll in school? Does the way a parent interacts with a toddler raise or lower the child's later intelligence? In posing each of these questions, researchers are hypothesizing that some attribute or experience of the child is causally related to another attribute or behavior.

The first problem the researcher faces is that of **operationally defining,** or specifying in measurable terms, the variables under study. Take the case of aggression. This term can be defined as parental ratings of a child's physical hostility, the child's own reports of his or her level of violent behavior, or the number of hits and kicks recorded by an observer of the child's behavior. The key point is that variables must be defined in terms of precise measurement procedures that other researchers can use if they wish to repeat the study.

The measurement of variables must also be valid and reliable. **Validity** refers to how well an assessment procedure actually measures the variable under study. Parental reports of physical violence, for example, or even the child's own self-reports may not be the best indicators of aggression. Parents may not want a researcher to know about their child's misbehavior, or they may lack complete knowledge of how their child behaves outside the home. Children's own reports may not be very accurate because the children may wish to present themselves to adults in a certain way. If a trained observer records the number of hits or kicks the child displays during a school day, the resulting measurement of aggression is likely to be valid.

Reliability is the degree to which the same results will be obtained consistently if the measure is administered repeatedly or if several observers are viewing the same behavior episodes. In the first case, suppose a child takes an intelligence test one time, then two weeks later takes the test again. If the test has high *test-retest reliability,* she should obtain similar scores on the two testing occasions. In the second case, two or more observers viewing a child's behavior should agree about what they are seeing (e.g., did the child smile in the presence of a stranger?); if they do agree, the test has high *inter-rater reliability*. Both types of reliability are calculated mathematically and are usually reported by researchers in their published reports of experiments; both are very important factors in good scientific research. Measurements of behavior that fluctuate dramatically from one observation time to another or from one observer to another are virtually useless as data.

variable Factor having no fixed or constant value in a given situation.

operational definition Specification of variables in terms of measurable properties.

validity Degree to which an assessment procedure actually measures the variable under consideration.

reliability Degree to which a measure will yield the same results if administered repeatedly.

Methods of Collecting Data

What is the best way for researchers in developmental psychology to gather information about children? Should they simply watch children as they go about their routines in natural settings? Should children be brought into the researcher's laboratory to be observed? Should the researcher ask the child questions about the topic under study? Each approach offers advantages and disadvantages, and the choice of re-

search tactic will often depend on the nature of the investigator's questions. If we are interested in exploring children's spontaneous tendencies to behave aggressively as they play (e.g., do boys play more aggressively than girls?), we will probably find a *naturalistic approach* most appropriate. If we want to see whether children's behavior is influenced by the presence of an aggressive model, we might use a *structured observation* to systematically expose some children to this manipulation in a laboratory setting. If we want to examine how children understand aggression, its antecedents, and its consequences, we might adopt another strategy, such as a *structured interview* or a *questionnaire*. Sometimes researchers combine two or more of these data collection methods within a study or series of studies.

● **Naturalistic Observation** Researchers have no better way to see how children really behave than to observe them in natural settings: in their homes, playgrounds, schools, and other places that are part of their everyday lives. After all, the ultimate goal of developmental psychology is to describe and explain changes in behavior that actually occur. **Naturalistic observations** do not involve the manipulation of variables; researchers simply observe and record behaviors of interest from the natural series of events that unfold in a real-world setting.

A study by Herbert Ginsburg and his colleagues (Ginsburg, Pappas, & Seo, 2001), for example, used naturalistic observations to assess the degree to which preschool-age children used mathematical concepts in their spontaneous free-play activities. The study was conducted in four daycare centers that enrolled children from different ethnic and social class backgrounds. Each of the eighty children in the study was videotaped for fifteen minutes during free-play time. Then raters coded the videotapes for the presence of six types of mathematical activities: classification, dynamics (or transformation of objects), enumeration, magnitude comparison, spatial relations, and pattern and shape exploration. The results showed that children spent almost half of the observation period engaged in some form of mathematical activity. Furthermore, there were no gender or social class differences in the tendency to use mathematical concepts in free play.

Several methodological issues are especially relevant to naturalistic observations. First, as researchers code the stream of activities they observe, they need to use clear operational definitions of the behaviors of interest. Ginsburg and his colleagues did

In naturalistic observations, researchers observe and record children's behaviors in real-life settings such as playgrounds, schools, or homes.

naturalistic observation
Study in which observations of naturally occurring behavior are made in real-life settings.

so by specifying the elements that constituted each particular form of mathematical activity. For example, enumeration was defined as counting, use of one-to-one correspondence, estimation of quantity, or any statement of number words. Second, researchers must be aware that children (and others) might react to the presence of an observer by behaving in untypical or "unnatural" ways. To reduce such **participant reactivity,** children in this study were acclimated to the video camera and cordless microphone they wore before the recordings began. Finally, to minimize the effects of **observer bias,** the possibility that the researcher would interpret ongoing events to be consistent with his or her prior hypotheses, pairs of independent observers coded thirty of the eighty children to ensure the reliability of the findings. Researchers usually require that at least one of the observers is unfamiliar with the purposes of the study.

An important advantage of naturalistic observations is that researchers can see the events and behaviors that precede the target behaviors they are recording; they can also note the consequences of those same target behaviors. In this way, they may be able to discern important relationships in sequences of events. Moreover, naturalistic observations give researchers powerful insights into which variables are important to study in the first place, insights they may not derive solely by observing children in the laboratory. For example, a laboratory study might not reveal the high level of unguided engagement preschoolers have with mathematical concepts. Often the trends or phenomena identified in such preliminary studies become the focus of more intensive, controlled laboratory experiments. Naturalistic observations also have the distinct advantage of examining real-life behaviors as opposed to behaviors that may emerge only in response to some contrived laboratory manipulation.

Some cautions regarding this method are in order, however. A wide range of variables may influence the behaviors under observation, and it is not always possible to control them. Cause-and-effect relationships, therefore, cannot be deduced. Do preschoolers evidence mathematical thinking because they are in a "school" environment or because certain kinds of toys or materials are available to them? Or do none of these environmental circumstances matter? Answering questions such as these requires the systematic manipulation of variables, a tactic that is part of other research approaches.

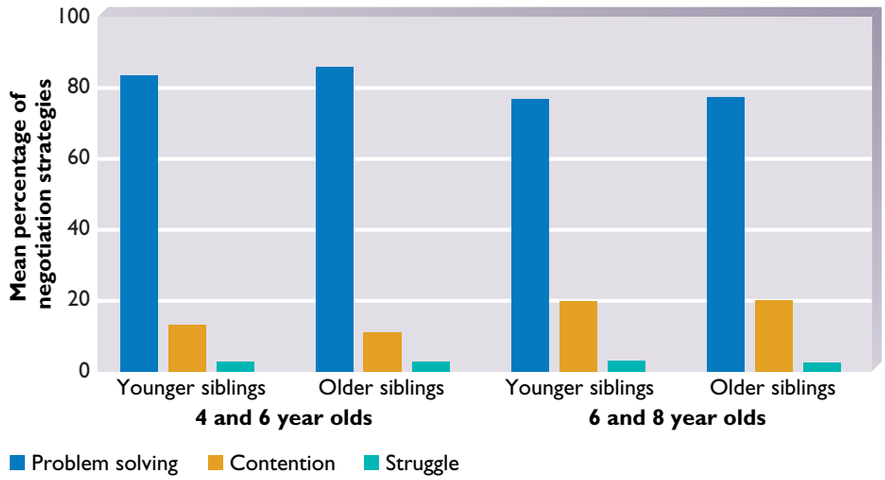
● **Structured Observation** Researchers cannot always depend on a child to display behaviors of scientific interest to them during observation. Researchers who observe a child in the home, school, or other natural setting may simply not be present when vocalization, sharing, aggression, or other behaviors they wish to study occur. Therefore, developmental psychologists may choose to observe behaviors in a more structured setting, usually the laboratory, in which they devise situations to elicit those behaviors of interest to them. **Structured observations** are the record of specific behaviors the child displays in a situation the experimenter constructs. Structured observations, like naturalistic observations, are a way to collect data by looking at and recording the child's behaviors, but this form of looking takes place under highly controlled conditions.

A recent study of the ways in which siblings resolve potential conflicts illustrates how structured observations are typically conducted (Ram & Ross, 2001). Pairs of siblings ages four and six years and six and eight years, respectively, were brought to a laboratory. First, each child was escorted to a private room and was asked to rate the quality of his or her relationship with the sibling. Each child was also asked to indicate how much he or she liked six toys that the siblings could later take home. Next, the siblings were reunited and instructed to divide up the toys between themselves. The researchers were interested in the types of negotiation strategies these children used. A portion of the results is shown in Figure 2.1. As the graph shows, the most prevalent strategy was "problem solving," attempting to achieve a solution that satisfied both children. Least frequent was a class of behaviors the researchers called "struggle," the display of some form of overt conflict.

participant reactivity Tendency of individuals who know they are under observation to alter natural behavior.

observer bias Tendency of researchers to interpret ongoing events as being consistent with their research hypotheses.

structured observation Study in which behaviors are recorded as they occur within a situation constructed by the experimenter, usually in the laboratory.



Source: Adapted from Ram & Ross, 2001.

FIGURE 2.1
A Structured Observation

What happens when siblings are instructed to divide up desirable toys? Ram and Ross (2001) structured a laboratory task in which children had to decide which of six toys each sibling would get. Their negotiation strategies were coded as *problem solving* (attempts to satisfy each child in the pair), *contention* (attempts to satisfy one's own desire), and *struggle* (withdrawing from the negotiation or using an aggressive strategy). The results show that the predominant strategy used by both older and younger children was problem solving.

Although these researchers could have attempted to conduct their study of sibling interactions through naturalistic observations in children's homes, they might have had to wait a long time for the targeted interactions to take place spontaneously. Furthermore, by doing this study in a laboratory, the researchers were able to keep tight control over the instructions the children received and the specific toys they had to divide between themselves.

At the same time, structured observations may have limitations, especially if they are conducted in a laboratory setting. Children may not react in the same ways in the research room as they do in "real life." They may be reticent to display negative behaviors, such as lack of cooperation with a brother or sister, in front of the researcher, or they may show heightened distress or shyness because of the unfamiliar setting. One solution to this problem is to confirm the results of laboratory studies by conducting similar studies in children's natural environments.

Structured observations can focus on a variety of types of behaviors. Like many structured observations, the study by Ram and Ross focused on children's overt actions, in this case their physical and verbal behaviors. Researchers often record other behaviors, such as the number of errors children make in a problem-solving task, the kinds of memory strategies they display, or the amount of time they take to learn a specified task. When structured observations are conducted in the laboratory, it is also possible for researchers to obtain *physiological measures,* the shifts in heart rate, brain wave activity, or respiration rate that can indicate the child's reaction to changes in stimuli. Physiological measures are especially useful in examining the behavior of infants, because the range of overt responses very young children usually display is more limited than that of older children.

● **The Interview and the Questionnaire** Sometimes the best way to glean information about what children know or how they behave is not simply to observe them but to ask them directly. Researchers have found that talking with children about their conceptions of friendships, gender roles, problem-solving skills—in fact, almost anything in the child's world—has yielded a wealth of material for analysis.

Many investigators use the technique of **structured interviews,** studies in which each participant is asked the same sequence of questions. For example, the goal of a study conducted by Mary Levitt and her colleagues (Levitt, Guacci-Franco, & Levitt, 1993) was to explore the sources of social support for seven-, ten-, and fourteen-year-old children from different ethnic backgrounds. More than three hundred African American, Anglo American, and Hispanic American children were interviewed

structured interview Standardized set of questions administered orally to participants.

individually about the people most important in their lives. Each child was questioned by an interviewer of the same cultural background as the child to maximize the child's comfort with the session and the accuracy of his or her responses. Examples of the standard questions employed in this study include "Are there people who make you feel better when something bothers you or you are not sure about something?" and "Are there people who like to be with you and do fun things with you?" The results showed that for all children, regardless of ethnic background, the family was an important source of social support. Moreover, members of the extended family (such as grandparents, aunts, or uncles) played an increasing role during middle childhood, whereas peers assumed a significant support role during adolescence.

Another "asking" technique researchers use with children is to obtain written responses to a standard set of items in a **questionnaire.** Because questionnaires can be administered to large numbers of children at the same time, researchers can use this method to obtain a large set of data very quickly. Questionnaires can also be scored quickly, particularly if the items ask participants to pick from a set of multiple-choice items or to rate items on a numerical scale. Children, however, may have difficulty understanding the items and may not be able to answer accurately without guidance from an adult. Under those conditions, oral interviews with individual children may provide more reliable and valid information about how children think and feel.

Researchers who use interviews and questionnaires to collect data from children must be careful, though. Sometimes young respondents, like their adult counterparts, will try to present themselves in the most favorable light or answer questions as they think the researcher expects them to. In the study of children's sources of social support, for example, participants may have said they talked with their parents when they had problems because they knew this was the expected response. To prompt participants to answer as honestly as possible, researchers try not to react positively or negatively as the participant responds and also try to explain the importance of answering truthfully before the start of the interview or questionnaire.

Another way to collect data by interview is the **clinical method,** a flexible, open-ended technique in which the investigator may modify the questions in reaction to the child's response. A notable example was Jean Piaget's use of the clinical method to explore age-related changes in children's thinking capabilities. Consider the following segment, in which Piaget (1929) questions a six-year-old boy about the sun:

Piaget: How did the sun begin?
Child: It was when life began.
Piaget: Has there always been a sun?
Child: No.
Piaget: How did it begin?
Child: Because it knew that life had begun.
Piaget: What is it made of?
Child: Of fire . . .
Piaget: Where did the fire come from?
Child: From the sky.
Piaget: How was the fire made in the sky?
Child: It was lighted with a match. (p. 258)

Note how Piaget follows the child's line of thinking with each question he asks. The format of the interview changes with an older boy, age nine years:

Piaget: How did the sun start?
Child: With heat.
Piaget: What heat?
Child: From the fire.
Piaget: Where is the fire?
Child: In heaven.
Piaget: How did it start?

questionnaire Set of standardized questions administered to participants in written form.

clinical method Flexible, open-ended interview method in which questions are modified in reaction to the child's responses.

Child: God lit it with wood and coal.
Piaget: Where did he get the wood and coal?
Child: He made it. (p. 265)

Piaget gained some enormous insights into the thinking processes of children by using the probing, interactive questions typical of the clinical method. Having the flexibility to follow the child's train of thought rather than sticking to a rigid protocol of predetermined questions allows the researcher to gather fresh insights. The weakness of this approach, however, lies precisely in this flexibility. Because the questions asked of different participants are likely to vary, systematic comparisons of their answers are difficult to make. Moreover, the researcher may be tied to a theoretical orientation that biases the formulation of questions and the interpretation of answers. Nonetheless, the clinical method can be a valuable research tool, particularly in exploring the way children think and reason.

● **The Meta-analytic Study** Sometimes researchers do not actually collect empirical data themselves but instead make a statistical analysis of a body of previously published research on a specific topic that allows them to draw some general conclusions. Instead of looking or asking, they "crunch" data; that is, they combine the results of numerous studies to assess whether the central variable common to all has an important effect. This technique, called **meta-analysis,** is particularly useful when the results of studies in the same area are inconsistent or in conflict with one another.

A good example of meta-analysis is a study conducted by Janet Hyde and her colleagues to assess the existence of sex differences in children's mathematical skills (Hyde, Fennema, & Lamon, 1990). Many researchers have concluded that boys perform better than girls on tests of mathematical skill, particularly after age twelve or thirteen (Halpern, 1986; Maccoby & Jacklin, 1974). Such observations have spawned numerous debates about the origins of this sex difference. Is mathematical skill biologically given, or is it learned through experiences in the environment? The answer to this question has important educational implications for male and female students. Hyde and her colleagues collected one hundred studies conducted from 1967 through 1987 that examined the question of sex differences in mathematics performance. (This body of studies represented the participation of more than 3 million participants!) For each study, a statistical measure representing *effect size* was computed, a mathematical way of expressing the size of the difference in male and female scores. Hyde and her colleagues (1990) found that the average difference between males and females across all studies was small, leading the researchers to conclude that sex differences in mathematical ability are not large enough to be of great scientific significance.

Conducting a meta-analysis requires the careful transcription of hundreds of statistical figures, a powerful computer, and a good deal of computational skill. Because the researcher taking this approach did not design the original studies, she or he cannot always be sure the central variables have been defined in identical ways across studies. Moreover, studies that do not present their data in the form necessary for analysis may have to be eliminated from the pool; potentially valuable information may thus be lost. Despite these difficulties, the meta-analytic approach allows researchers to draw conclusions based on a large corpus of research, not just individual studies, and thereby to profit from an accumulated body of knowledge. This technique has recently become increasingly popular in developmental research and has provoked the reevaluation of more than one traditional notion about children.

From our discussion it should be clear that there is no one right way to study children. Researchers must consider their overall goals and their available resources as they make decisions about how to construct a research study. Table 2.1 summarizes the advantages and disadvantages of the four general types of data collection just described.

meta-analysis Statistical examination of a body of research studies to assess the effect of the common central variable.

TABLE 2.1 Advantages and Disadvantages of Information-Gathering Approaches

Approach	Description	Advantages	Disadvantages
Naturalistic Observations	Observations of behaviors as they occur in children's real-life environments.	Can note antecedents and consequences of behaviors; see real-life behaviors.	Possibility of participant reactivity and observer bias; less control over variables; cause-and-effect relationships difficult to establish.
Structured Observations	Observations of behaviors in situations constructed by the experimenter.	More control over conditions that elicit behaviors.	Children may not react as they would in real life.
Interviews and Questionnaires	Asking children (or parents) about what they know or how they behave.	Quick way to assess children's knowledge or reports of their behaviors.	Children may not always respond truthfully or accurately; systematic comparisons of responses may be difficult; theoretical orientation of researcher may bias questions and interpretations of answers.
Meta-analytic Studies	Statistical analysis of other researchers' findings to look for the size of a variable's effects.	Pools a large body of research findings to sort out conflicting findings; no participants are observed.	Requires careful mathematical computation; variables may not have been defined identically across all studies.

Research Designs

Besides formulating their hypotheses, identifying the variables, and choosing a method of gathering information about children, investigators must select the research design they will use as part of their study. The *research design* is the overall conceptual approach that defines whether the variables will be manipulated, how many children will be studied, and the precise sequence of events as the study proceeds. Research designs may be fairly complex, and an investigator might choose more than one design for each part of a large study. Generally, however, researchers select from one of three study types: the correlational, the experimental, and the single-case design.

correlational study Study that assesses whether changes in one variable are accompanied by systematic changes in another variable.

positive correlation Relationship in which changes in one variable are accompanied by systematic changes in another variable in the same direction.

negative correlation Relationship in which changes in one variable are accompanied by systematic changes in another variable in the opposite direction.

correlation coefficient (*r*) Statistical measure, ranging from +1.00 to −1.00, that summarizes the strength and direction of the relationship between two variables; does not provide information about causation.

● **The Correlational Design** Studies in which the researcher looks for systematic relationships among variables use the correlational design and are called **correlational studies.** Instead of manipulating the variables, in this design the investigator obtains measures of two or more characteristics of the participants and sees whether changes in one variable are accompanied by changes in the other. Some variables show a **positive correlation;** that is, as the values of one variable change, scores on the other variable change in the same direction. For example, if a positive correlation exists between children's television viewing and their aggression, as the number of hours of TV viewing increases, the number of aggressive acts committed increases as well. A **negative correlation** indicates that as scores on one variable change, scores on the other variable change in the opposite direction. Thus, using our example, a negative relationship exists if aggression decreases as TV viewing increases.

The statistic used to describe the strength of a relationship between two variables is called the **correlation coefficient,** or ***r.*** Correlation coefficients may range from +1.00 (perfectly positively correlated) to −1.00 (perfectly negatively correlated). As the correlation coefficient approaches 0.00 (which signifies no relationship), the relationship between the two variables becomes weaker. A rule of thumb is that correlations of .70 or higher usually signify strong relationships, whereas those below .20

represent weak relationships. In most cases, values falling in between indicate a moderate relationship between two variables.

We can use a portion of a study conducted by Carol MacKinnon-Lewis and her colleagues (MacKinnon-Lewis et al., 1994) to illustrate the key features of correlational research. One objective of these investigators was to see if relationships existed between boys' aggressive behaviors and several family variables, such as the number of negative life events the child experienced. The latter included experiences such as a parent leaving home or a divorce between parents. The investigators found a statistically significant correlation of $r = .40$ between the number of negative life events reported by boys and the number of fights they started with peers. Thus, the more stress the boys experienced within the family, the more fights they initiated in school. In contrast, the number of negative life events experienced by boys correlated $r = .04$ with the mothers' tendency to judge their sons as having hostile intentions in interactions with others, suggesting no relationship between these two variables.

Because researchers do not actively manipulate the variables in correlational studies, they must be cautious about making statements about cause and effect when strong relationships are found. In the previous study, for example, do negative life events cause boys to be aggressive? Or does their aggression contribute to stress and negative events within the family? Still another possibility is that some third factor not measured by the researchers influences both variables. Perhaps, for example, the child's father is aggressive and that factor influences both the son's aggression and the number of negative life events in the family.

Despite these limitations on interpretation, correlational studies are often a useful first step in exploring which variables might be causally related to one another. In addition, in many instances experimenters are unable to manipulate the variables that are the suspected causes of certain behavior. In the preceding study, for example, it would be impossible to systematically vary the number of negative life events experienced by boys. In such cases, correlational studies represent the only approach available to understanding the influences on child development.

● **The Experimental Design** The **experimental design** involves the manipulation of one or more **independent variables**—the variables that are manipulated or controlled by the investigator, often because they are the suspected cause of a behavior—to observe the effects on the **dependent variable,** the suspected outcome. One major goal of this type of study is to control for as many as possible of the factors that can influence the outcome, aside from the independent variables. Experimental studies are frequently conducted in laboratory situations, in which it is possible to ensure that all participants are exposed to the same environmental conditions and the same task instructions. In addition, **random assignment** of participants to different treatment groups (in which one group is usually a *control group* that receives no treatment) helps to avoid any systematic variation aside from that precipitated by the independent variables. As a consequence, one distinct advantage of the experimental study design is that cause-and-effect relationships among variables can be identified.

To illustrate the experimental design, consider the following questions: Can young infants recognize their own faces as compared with the faces of other infants? Do they distinguish social stimuli—that is, the faces of babies—from the face of a nonsocial stimulus, a puppet? In one portion of a study reported by Maria Legerstee and her colleagues (Legerstee, Anderson, & Schaffer, 1998), five-month-old children were shown video images (without sounds) of their own faces, the face of a peer, and the face of a puppet with scrambled features. The amount of time infants spent looking and smiling at, as well as vocalizing to, each of the stimuli was recorded. In this experiment, the independent variable was the type of stimulus presented in the video, and the dependent variables were the three infant behaviors: looking, smiling, and vocalizing.

On the surface, it may seem that the design of this study was relatively straightforward. However, infants may prefer to look and smile at or vocalize to stimuli for any

experimental design Research method in which one or more independent variables are manipulated to determine the effect on other, dependent variables.

independent variable Variable manipulated by the experimenter; the suspected cause.

dependent variable Behavior that is measured; suspected effect of an experimental manipulation.

random assignment Use of principles of chance to assign participants to treatment and control groups; avoids systematic bias.

FIGURE 2.2
Stimuli for the Study of Infants' Responses to Faces

Shown in these photographs are examples of the stimuli used by Legerstee et al. (1998) to examine an infant's reactions to his or her own face (left), to the face of a peer (middle), and to the scrambled face of a puppet (right).

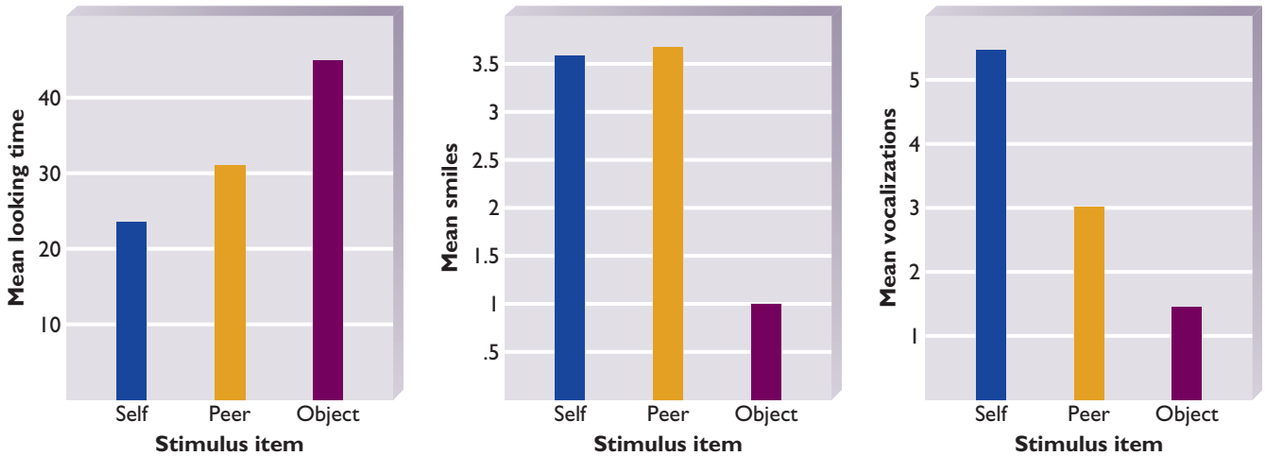
number of reasons, such as a preference for the color of one stimulus item over another or the unique movement patterns of a given stimulus figure. Therefore, it was important for the researchers to control for as many variables as possible—in this case by holding them constant—such that only the independent variable changed across conditions. Under these circumstances, the experimenter can be more confident that the independent variable is causing changes in the dependent variable. The experimenters took great care in this regard. Each stimulus figure was clothed in a yellow robe. Each infant's own hair and skin color were matched to those of the peer and the puppet. Even the movements of each stimulus figure on the video were constructed to be as similar as possible. Figure 2.2 shows the stimulus items that were used for one of the participants.

The results of this experiment, shown in Figure 2.3, indicated that infants looked longer at the peer than at the self. As we discuss in the chapter titled "Basic Learning and Perception," infants show a fairly distinct preference for novelty. Thus the findings for looking behavior are as expected if we assume that infants recognize their own faces as familiar. They also looked at the puppet longer than at any of the other stimuli. Moreover, babies directed fewest of their social signals, smiles and vocalizations, to the nonsocial object, the puppet. The experimental approach suggests that it was the degree of humanlike qualities of the stimulus items that was responsible for these variations in infant responses rather than some other aspect of the stimuli. Thus, early in development, infants are well equipped to respond to the social features of their environment. (By the way, do you think the researchers should have used a puppet with a normal face configuration instead of an abstract one? Why or why not?)

The experimental approach has been the traditional design choice for many developmental psychologists because of the "clean" answers it provides about the causes of developmental phenomena. Yet it has also been criticized for providing a narrow portrait of child development. Development in the real world is likely to be caused by many variables; few changes are likely to be the result of a single or even a few independent variables. In that sense, experimental studies typically fail to capture the complexities of age-related changes. Moreover, we have already mentioned that children may not react normally when they are brought into the laboratory setting, where most experiments are conducted. Children may "clam up" because they are shy about being in unfamiliar surroundings with strangers and mechanical equipment. Or they may rush through the experimental task just to get it over with.

In recognition of these problems, many researchers have tried to achieve a more homelike feeling in their laboratories, with comfortable couches, chairs, tables, and rugs instead of sterile, bare-walled rooms filled with equipment. Another tactic has been to conduct **field experiments,** in which the experimental manipulations are actually carried out in a natural setting, such as the child's home or school. In one such field experiment, Grover Whitehurst and his colleagues (Whitehurst et al., 1994) randomly assigned children attending their preschools to one of three experimental conditions to see if the type of reading experiences they had influenced their language skills. For six weeks, a ten-minute period was allocated each day to one of the following conditions: (1) school reading, in which the teacher read a book and concurrently asked children numerous questions about the story and promoted discussion; (2) school plus home reading, in which teachers read to children in the same special

field experiment Experiment conducted in a "natural," real-world setting such as the child's home or school.



Source: Data from Legerstee et al., 1998.

FIGURE 2.3
An Experimental Study

These three graphs show the mean duration of looking and the number of smiles and vocalizations that five-month-old infants made when viewing the self, a peer, and a puppet. The type of stimulus item was the independent variable. Looking time, smiling, and vocalizations were the three dependent variables, each one shown separately on its own graph. Because the researchers controlled for extraneous variables that could have affected looking, smiling, and vocalizing, it is plausible to conclude that there was something about the familiarity of the self and the "humanness" of the self and peer that was responsible for differential responding.

manner but parents were also trained to read to children at home using an active discussion approach; and (3) control, in which children engaged in ten minutes of teacher-supervised play. The groups were formed such that no more than five children participated in each at any single time. The results, displayed in Figure 2.4, showed that at the end of six weeks, children in both reading groups scored significantly higher on a test of vocabulary compared with the control group and that the school plus home reading group scored higher than the school reading group. In the follow-up phase six months later, both reading groups continued to show advantages over the control group in language skills. Because the only known variation in children's experiences was systematically introduced by the researchers in their manipulation of the independent variable (the type of reading group children were exposed to), changes in behavior could be attributed to type of reading program. In addition, the natural setting of this field experiment minimized the problems associated with bringing children into the artificial surroundings of a laboratory.

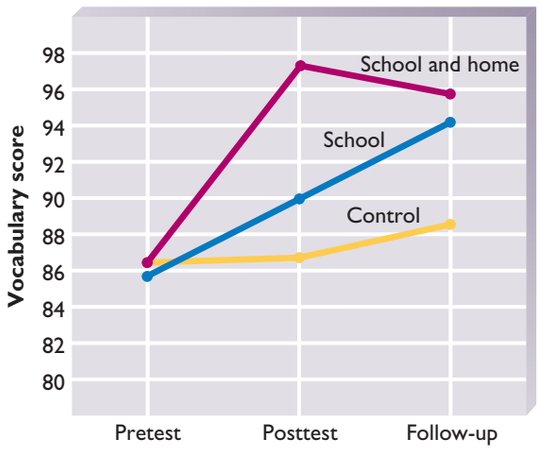
In some instances, it is not possible for the researcher to randomly assign participants to treatment groups because of logistical or ethical difficulties. In these cases, the researcher may take advantage of the natural separation of participants into different groups. **Quasi-experiments** are studies in which researchers investigate the effects of independent variables that they do not manipulate themselves but that occur as a result of children's natural experiences. Suppose a researcher wanted to investigate the effects of a longer school year on children's academic skills. One way to make sure that it is the length of the school year that influences performance rather than the initial characteristics of the children is to randomly assign children to the two groups, one with a longer school year and one with a regular school year. That way, children with higher and lesser abilities, for example, would be equally likely to appear in both groups. However, it would be unethical, and also logistically very difficult, to assign children to different schools in this way. Julie Frazier and Frederick Morrison (1998) learned of one elementary school that was extending its school year from 180 to 210 days and took the opportunity to assess the impact on the achievement of kindergartners in mathematics, reading, general knowledge, and vocabulary. The researchers found that children with additional time in school during the year showed greater gains in achievement, especially in mathematics, compared with students who attended a school with a regular 180-day calendar.

The results of quasi-experimental designs must be interpreted with caution. The children who experienced an extended school year may have differed in systematic ways from children who had a regular academic year, ways that could have accounted for their better performance. For example, the former group may have had parents who were very concerned with academic achievement and spent more time teaching

quasi-experiment Study in which the assignment of participants to experimental groups is determined by their natural experiences.

FIGURE 2.4
A Field Experiment

The data from Whitehurst et al.'s (1994) field study show that children who had special reading experiences at school and at school plus home received higher scores on a test of vocabulary on a posttest (six weeks after the program began) and a follow-up (six months later) compared with the control group. A field experiment employs many of the features of an experiment but is conducted in a natural setting.



Source: Adapted from Whitehurst et al., 1994.

them at home. The investigators took great care to try to make the two groups equivalent at the outset of the study by matching them on intelligence test scores, medical history, parents' occupations, parents' expectations about school, and several other dimensions. Could other competing explanations for the outcomes be ruled out? Because they were in the same district, the curricula in the two schools were equivalent. Most revealing, though, was the pattern of exactly at what time gains in achievement were made. Through the winter, when the two school programs still had an equivalent number of days, the students in both groups showed similar patterns of growth in achievement. However, it was during the summer, after the extended days occurred, that student achievement patterns diverged. Thus researchers who conduct quasi-experimental studies must be very concerned with ruling out alternative explanations for their findings. Despite these methodological difficulties, quasi-experimental studies offer a way to address important questions about the complex influences on child development, questions that often have powerful real-world implications.

● **Case Studies and the Single-Case Design** Some notable discoveries about developmental processes have come from the in-depth examination of a single child or just a few children. At times, psychologists make an intensive description of an individual child, much as the baby biographers did. Freud and Piaget both relied heavily on such **case studies** of individuals to formulate their broad theories of personality and cognitive development, respectively. Case studies can be particularly revealing when researchers discover a child with an unusual ability or disability or an uncommon past history. The details of a child's background, cognitive skills, or behaviors can, in some cases, provide important insights about the process of development or even a critical test of a theory. For example, researchers (Fletcher-Flinn & Thompson, 2000) recently reported the case of a three-and-a-half-year-old child who was able to read at the level of an eight-and-a-half-year-old. Did this precocious reader focus on the sounds made by each letter in a word, a process that many reading specialists say is essential to skilled reading? Extensive tests and observations indicated that this child had little awareness of the correspondence between individual letters and their sounds, a finding that suggests that successful reading may not depend on phonics skills for all children. Although case studies can provide a rich picture of a given aspect of development, they must also be interpreted with caution. The observations reported in case studies can be subjective in nature and thus vulnerable to the phenomenon of observer bias that was discussed earlier in this chapter.

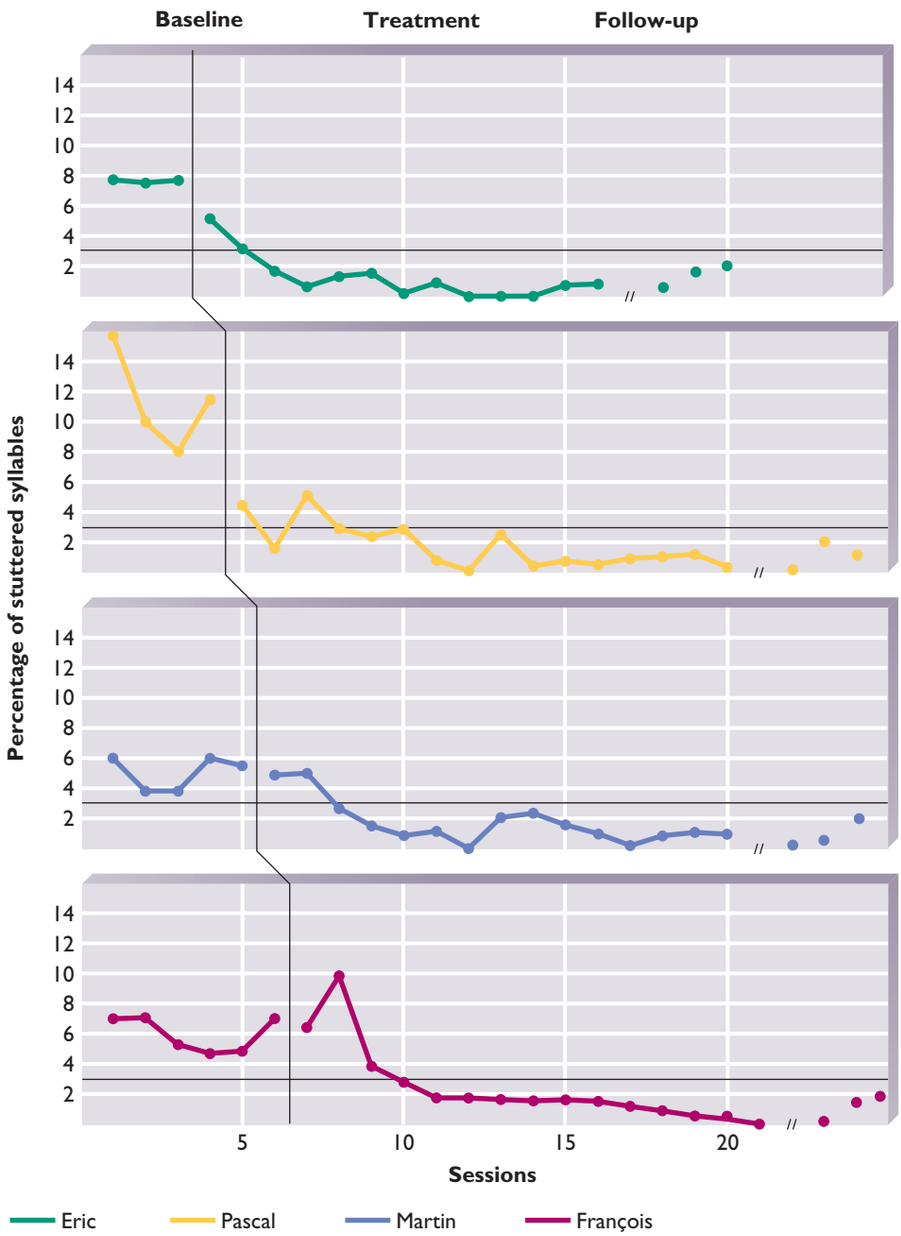
In other instances, researchers introduce experimental treatments to one or a few children and note any changes in their behavior over time. The emphasis is on the systematic collection of data, rather than on providing a detailed narrative, as is often done in case studies. Frequently the purpose of these **single-case designs** is to

case study In-depth description of psychological characteristics and behaviors of an individual, often in the form of a narrative.

single-case design Study that follows only one or a few participants over a period of time, with an emphasis on systematic collection of data.

evaluate a clinical treatment for a problem behavior or an educational program designed to increase or decrease specific activities in the child.

Suppose we wish to evaluate the effectiveness of a treatment for stuttering in children. One team of researchers selected four boys, ages ten to eleven years, who had difficulties with stuttering (Gagnon & Ladouceur, 1992). Their first step was to record the percentage of stuttered syllables each boy spoke during the baseline period, prior to the start of the treatment. Next, the treatment began. During two one-hour sessions per week, each boy received instruction on how to recognize stuttering and how to regulate breathing during stuttering. Special speaking exercises and parent information sessions were also introduced. Finally, the participants' speech was assessed at one month and six months following the end of treatment. Figure 2.5 shows the decline in percentage of stuttered syllables among the children from baseline through follow-up periods. Was the treatment effective? The facts that all four participants showed similar declines in



Source: Gagnon & Ladouceur, 1992.

FIGURE 2.5
A Single-Case Design

In this example of a single-case design, four boys with stuttering problems were observed during a baseline period. Next, a program to treat their speech problems was begun. The graph shows that the percentage of stuttered syllables declined dramatically following the onset of treatment and remained low during the follow-up period. Because the four children showed similar patterns of behavior change, and because the behavior change was maintained long after the treatment ended, the researchers concluded that their treatment was effective.

TABLE 2.2 Strengths and Weaknesses of Research Designs

Design	Description	Strengths	Weaknesses
Correlational Design	Researcher sees if changes in one variable are accompanied by systematic changes in another variable.	Useful when conditions do not permit the manipulation of variables.	Cannot determine cause-and-effect relationships.
Experimental Design	Researcher manipulates one or more independent variables to observe the effects on the dependent variable(s).	Can isolate cause-and-effect relationships.	May not yield information about real-life behaviors.
Field Experiment	Experiment conducted in real-life, naturalistic settings.	Can isolate cause-and-effect relationships; behaviors are observed in natural settings.	Less control over treatment conditions.
Quasi-experiment	Assignment of participants to groups is determined by their natural experiences.	Takes advantage of natural separation of children into groups.	Factors other than independent variables may be causing results.
Case Study/ Single-Case Design	In-depth observation of one or a few children over a period of time.	Does not require large pool of participants.	Can be vulnerable to observer bias; ability to generalize to the larger population may be limited.

stuttering and that the stuttering remained low during follow-up several months later suggest that it was.

Single-case designs do not require large groups of children or the random assignment of participants to groups. Each participant essentially serves as his or her own control by experiencing all conditions in the experiment over a period of time. As with any study involving only one or a few individuals, however, researchers' ability to generalize to a larger group of children may be limited. Perhaps the child or children they selected for the study were particularly responsive to the treatment, a treatment that might not work as well for other children. In addition, the researcher must be aware of any other circumstances concurrent with the treatment that may have actually produced the behavior changes. For example, did the children in the stuttering study mature neurologically, and did that maturation cause the reduction in speech problems? The fact that the treatment started at different times for each of the four children and was immediately followed by a decrease in stuttering suggests that the treatment and not some other factor caused the changes.

Table 2.2 presents an overview of the strengths and weaknesses of case studies and single-case designs, as well as other research designs we have briefly examined here.

Strategies for Assessing Developmental Change

The developmental researcher faces a problem unique to this field: how to record the changes in behavior that occur over time. The investigator has two choices: to observe individual children repeatedly over time or to select children of different ages to participate in one study at a given time. Each approach has its strengths and limitations, and each has contributed substantially to our understanding of child development.

longitudinal study Research in which the same participants are repeatedly tested over a period of time, usually years.

The Longitudinal Study

Longitudinal studies assess the same sample of participants repeatedly at various points in time, usually over a span of years. This approach has the longest historical tradition in developmental psychology. The early baby biographies were in essence longitudinal observations, and several major longi-

Longitudinal studies assess the same individuals over a span of years, sometimes ranging from infancy through adolescence. This strategy for assessing developmental change allows researchers to identify the stability of many human characteristics.

tudinal projects that were initiated in the early 1900s continued for decades. One of the most famous is Lewis Terman's study of intellectually gifted children, begun in 1921 (Terman, 1925; Terman & Oden, 1959).

Terman identified 952 children aged two to fourteen years who had scored 140 or above on a standardized test of intelligence. He was interested in answering several questions about these exceptionally bright children. Would they become extraordinarily successful later in life? Did they possess any specific cluster of common personality traits? Did they adapt well socially? The sample was followed until most participants reached sixty years of age, and a wealth of information was collected over this long span of time. One finding was that many individuals in this sample had highly successful careers in science, academics, business, and other professions. In addition, contrary to many popular stereotypes, high intelligence was associated with greater physical and mental health and adaptive social functioning later in life.

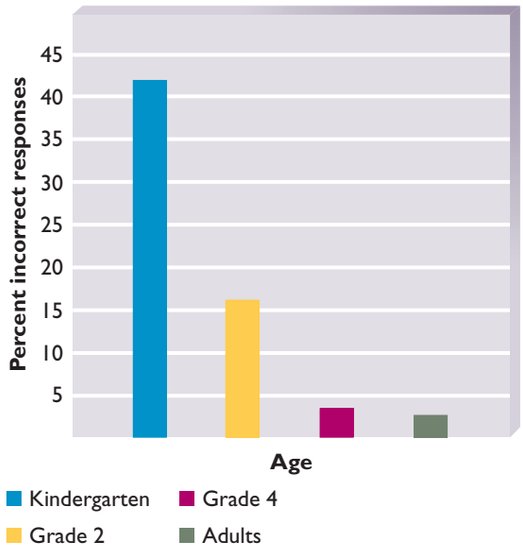
Longitudinal research is costly and requires a substantial research effort. Participants followed over a period of years often move or become unavailable for other reasons; just keeping track of them requires constant and careful recordkeeping. In addition, one might raise questions about the characteristics of the people who remain in the study: perhaps they are less mobile, or perhaps those who agree to participate in a thirty-year study have unique qualities that can affect the interpretation of the project's results (e.g., they may be less energetic or be more curious about themselves and more introspective). Another difficulty lies in the fact that participants who are tested repeatedly often get better at the tests, not because of any changes in their abilities but because the tests become more familiar over time. Participants who take a test of spatial skill again and again may improve due to practice with the test and not as a result of any developmental change in their abilities. If the researcher attempts to avert this outcome by designing a different version of the same test, the problem then becomes whether the two tests are similar enough!

One of the biggest methodological drawbacks of longitudinal research is the possibility of an **age-history confound.** Suppose a researcher began a twenty-year

age-history confound In longitudinal studies, the co-occurrence of historical factors with changes in age; affects the ability to interpret results.

FIGURE 2.6
A Cross-Sectional Study

In this example of a cross-sectional study, children of different ages were asked two progressively misleading questions about each of several portions of a video clip they watched. Kindergarten children made significantly more incorrect responses to the second set of misleading questions. Cross-sectional studies allow researchers to examine age differences in performance quickly and efficiently.



Source: Data from Cassel, Roebers, & Bjorklund, 1996.

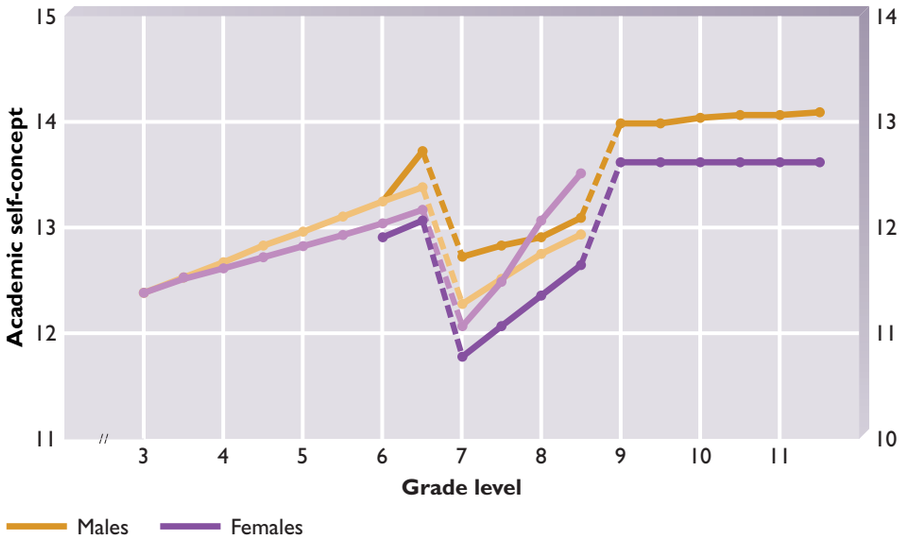
longitudinal study in 1970 and found that individuals' gender-role beliefs became less stereotyped as the years progressed; that is, participants were less likely to believe that females are dependent, passive, and emotional and males are independent, aggressive, and logical. Are these shifts in attitude associated with development? Or did some historical factor, such as the women's movement, bring about the changes in beliefs? Because participants age as cultural and historical events occur, it is often difficult to decide which factor affects the results of a longitudinal study. Moreover, consider a twenty-year longitudinal study begun in the 1940s versus a similar study begun in the 1990s. Many of the factors that are likely to influence children's development today—television, daycare, and computers, to name a few—probably would not have been included in studies begun five decades ago.

Despite all these difficulties, the longitudinal approach has distinct advantages no other research tactic offers; in fact, certain research questions in child development can *only* be answered longitudinally. If a researcher is interested in identifying the *stability* of human characteristics—that is, how likely it is that early attributes will be maintained later in development—the longitudinal approach is the method of choice. Only by observing the same person over time can we answer such questions as "Do passive infants become shy adults?" or "Do early experiences with peers affect the child's ability to form friendships in adolescence?" For researchers interested in understanding the process of development and the factors that precede and follow specific developmental phenomena, particularly with respect to individual differences, the longitudinal strategy remains a powerful one.

● **The Cross-Sectional Study** Possibly the most widely used strategy for studying developmental differences is the **cross-sectional study,** in which children of varying ages are examined at the same point in time. Cross-sectional studies take less time to complete and are usually more economical than longitudinal studies.

A good example of cross-sectional research is the investigation of children's responses to repeated questions about a past event conducted by William Cassel and his colleagues (Cassel, Roebers, & Bjorklund, 1996). Children from kindergarten, second, and fourth grades, as well as adults, watched a video of two children fighting over a bicycle. One week later, participants were asked to recall what they saw. In one portion of the experiment, they were also asked two increasingly misleading questions about each of several segments in the videotaped episode. Figure 2.6 shows the results: kindergartners gave significantly more incorrect responses to the second set of misleading questions compared with the other age groups.

cross-sectional study Study in which individuals of different ages are examined at the same point in time.



Source: Adapted from Cole et al., 2001.

FIGURE 2.7
A Sequential Study

Age differences in behavior patterns over time can be assessed with sequential studies. In a study of children's self-concepts from elementary school through high school, Cole and his colleagues (Cole et al., 2001) assessed two groups of children over a period of six years. The first was a group of third-graders. The data in the graph show changes in their academic self-concept from third through eighth grade (based on a test with the scale shown on the left y-axis). The second group was in the sixth grade at the start of the study. The data in the graph show changes in their self-concepts from sixth through eleventh grade (based on a test for older children with the scale shown on the right y-axis). Thus information about a nine-year age span was obtained in six years.

The cross-sectional approach allowed the researchers to make a rapid assessment of the children's performance without waiting for them to grow several years older. They were, however, unable to draw conclusions about individual children and about how characteristics observable at one age might be related to characteristics at another age. Would the children who were most resistant to misleading suggestions also resist those suggestions years later? The cross-sectional approach does not provide answers to these kinds of questions. Most cross-sectional studies involve pooling the scores of individual participants such that the average performance of an entire group of children of a specified age is reported; the average scores of two or more groups of children are then compared. The result is that information about individuals is not the focus of data analysis in this type of study.

Another difficulty with cross-sectional designs is that cohort effects may interfere with our ability to draw clear conclusions. **Cohort effects** are all the characteristics shared by children growing up in a specific social and historical context. For example, many of today's five-year-olds have had extensive peer experience through their enrollment in daycare and other preschool programs, whereas many fifteen-year-olds probably have not. A researcher comparing the two groups might mistakenly conclude that younger children are more sociable than older children, but the differential exposure to agemates early in life—that is, the cohort effect—may be responsible for the findings rather than changes in sociability with age. Cross-sectional studies are a quick means of providing descriptions of age changes in all sorts of behaviors. Where they sometimes fall short is in helping us to understand the processes underlying those age-related changes.

SEE FOR YOURSELF
psychology.college.hmco.com
Childhood Today

● **The Sequential Study** One way to combine the advantages of both the longitudinal and cross-sectional approaches is the **sequential study,** in which groups of children of different ages are followed repeatedly but for only a few years. For example, David Cole and his colleagues (Cole et al., 2001) examined changes in children's self-concepts from the elementary to high school years. Two groups of children—a group of third-graders and a group of sixth-graders—were followed for a period of six years. Every six months, children took a battery of tests assessing several aspects of self-confidence, such as academic competence, social acceptance, and physical appearance. Thus, by the end of the study, data were available for children in the third through eleventh grades.

Figure 2.7 shows the results for academic competence. Both boys and girls showed gains in this domain from third through sixth grade but evidenced a decline in

cohort effects Characteristics shared by individuals growing up in a given sociohistorical context that can influence developmental outcomes.

sequential study Study that examines groups of children of different ages over a period of time; usually shorter than a longitudinal study.

TABLE 2.3 Strategies for Assessing Developmental Change

Approach	Description	Advantages	Disadvantages
Longitudinal Study	Repeated testing of the same group of children over an extended period of time.	Can examine the stability of characteristics.	Requires a significant investment of time and resources; problems with participant attrition; can have age-history confound.
Cross-Sectional Study	Comparison of children of different ages at the same point in time.	Requires less time; less costly than longitudinal study.	Cannot study individual patterns of development or the stability of traits; subject to cohort effects.
Sequential Study	Observation of children of two or more different ages over a shorter period of time than in longitudinal studies.	Combines the advantages of both longitudinal and cross-sectional approaches; can obtain information about stability of traits in a short period of time.	Has same problems as longitudinal studies, but to a lesser degree.

seventh grade, followed by increases in successive years. (Note that both groups of children were measured in sixth, seventh, and eighth grades.) Because subsets of the children were assessed repeatedly, information about the stability of self-concept for individual children was available just as it would have been in a longitudinal study. The benefit of the sequential design was that it allowed information about a nine-year span to be obtained in six years.

Although most developmental researchers still prefer to conduct cross-sectional studies because of their expediency, the sequential study provides a convenient way to reap the advantages of both cross-sectional and longitudinal approaches to studying developmental change.

Table 2.3 summarizes the relative benefits of each of the research strategies for assessing developmental change.

Cross-Cultural Studies of Development

Some of the most fundamental questions about the nature of development concern the universality of the various features of psychological growth. Do all children learn language in the same way, regardless of the specific language they acquire? Does children's thinking develop in a universal sequence? Are certain emotions common to all children regardless of attitudes about the appropriateness of crying, smiling, or feeling angry in the larger social group in which they live?

If psychological development does display universal features, this circumstance has far-reaching implications. It could imply, for a start, that a child's behavior is largely shaped by biological factors and, more specifically, by the genes that govern the unfolding of some human behaviors. Variations in aspects of psychological development across cultures, on the other hand, imply that the differences in the child's experiences weigh heavily in bringing about those behaviors. **Cross-cultural studies,** which compare children from different cultural groups on one or more behaviors or patterns of abilities, can be extremely useful in answering questions such as these.

cross-cultural study Study that compares individuals in different cultural contexts.

Take, for example, the development of play. One hypothesis put forward by Piaget is that there is a general progression in early childhood from *exploratory play,* in which the toddler throws, manipulates, and otherwise learns about the functions of objects, to *symbolic play,* in which he or she pretends with objects, for example, sipping from an empty cup or using a block as a telephone. Marc Bornstein and his colleagues

Cross-cultural studies allow researchers to explore the extent to which children's behaviors are universal or specific to a given culture. For example, are the emotions expressed by these Dominican children as they make music also seen among children from other cultures?

(1999) recorded and coded the naturally occurring play behaviors of twenty-month-old children and their mothers in two countries, the United States and Argentina. Mother-child pairs were provided with the same set of eight toys and were told to play as they normally would for ten minutes. These researchers found that despite being the same age, children in the United States engaged in more exploratory play with their mothers, whereas Argentine children engaged in more symbolic play. Moreover, mothers' play behaviors were strongly related to children's patterns of play. Thus there were clear cultural differences, perhaps linked to the different social goals in the two groups. Exploratory play patterns, which involve manipulating and combining objects, are consistent with the emphasis on individual achievement, independence, and self-reliance in the United States. On the other hand, symbolic play patterns among Argentine mothers and their children often included social behaviors, such as feeding or putting a doll to sleep. These social behaviors are compatible with the orientation of Argentine society toward the larger, collective group. Thus the transition from one form of play to another may be less influenced by universal processes, as suggested by Piaget, than by culture-specific experiences.

Cross-cultural studies can present unique challenges to the researcher. If children from two cultural backgrounds are being compared, the researcher must make sure the tasks are well understood and have equivalent forms despite differences in language or the kinds of activities the children are used to doing. For example, children in some cultures may never have seen a photograph or a two-dimensional drawing. Asking these children to categorize objects in pictorial form may place them at an unfair disadvantage if they are to be compared with children who have extensive experience with two-dimensional representations. Moreover, if the researcher is an outsider to the cultural group being observed, he or she may provoke atypical reactions from the individuals under study. Parent-child interactions, peer play, and many other behaviors may not occur as they would in the natural course of events because of the presence of an outside observer. Cross-cultural researchers must thus pay special attention to the possibility of participant reactivity.

For some researchers, cross-cultural studies play a different sort of role in that they provide a way of understanding human development as it is shaped and formed by the unique contexts in which it occurs. From this perspective, a researcher may try to avoid imposing the values and concepts of his or her own culture on another,

trying instead to discover the particular beliefs, values, and modes of thinking in the group under study. The goal is not to compare cultures in order to document similarities and differences; rather, it is to study cultures in an in-depth fashion in order to describe behaviors and underlying meaning systems *within* that culture (Miller, 1999; Saarni, 1998; Shweder et al., 1998; Super & Harkness, 1997). A research approach that is often used to achieve these goals is **ethnography,** a set of methods that includes observations of behaviors within the natural environment and interviews with individuals about values and practices within the culture. Ethnographers often live within a particular culture as *participant-observers*, immersing themselves over an extended period of time in the daily routines and practices of a culture (Weisner, 1996). Using these methods, researchers have obtained rich descriptions of what it means to be a child in cultures as diverse as the Gusii tribe of western Kenya (LeVine et al., 1994), Samoa (Ochs, 1988), and the poor neighborhoods of modern-day Brazil (Scheper-Hughes, 1992).

The cross-cultural approach has benefits in terms of understanding human development as it occurs not only in other countries but also in our own society, in which cultural diversity is increasingly becoming a characteristic of the population. Consider some statistics. In Canada, almost 15 percent of children age fourteen years and under come from non-Caucasian background cultures (Statistics Canada, 1999). In the United States, 32 percent of children under age eighteen are African American, Hispanic, Native American, or Asian (U.S. Bureau of the Census, 2001). By the year 2010, the majority of children under eighteen will be of these ethnic heritages in several states, including Hawaii, California, Texas, New York, and New Mexico (McLoyd, 1998). Thus, in order to capture the elements of human development in the broadest and most meaningful sense, researchers will have to study concepts that are relevant and indigenous to these cultures. Individual autonomy and competition may be valued goals of socialization in middle-class Caucasian culture, for example, but they have less relevance for African American or Native American cultures (McLoyd, 1998). Cross-cultural studies can provide important insights into almost all aspects of child development. For this reason, we draw on available cross-cultural work as we discuss each aspect of the growth of children.

FOR YOUR REVIEW

- What issues must researchers pay attention to when they measure attributes and behaviors?
- What four information-gathering techniques do developmental researchers generally have available to them? What are the advantages and disadvantages of each approach?
- What are the different research designs that researchers might employ to study child development? What are the strengths and weaknesses of each design?
- What three research tactics allow researchers to address questions about developmental change? What are the strengths and weaknesses of each approach?
- What functions do different types of cross-cultural studies serve in developmental research?

Ethical Issues in Developmental Research

ethnography Set of methods, including observations and interviews, used by researchers to describe the behaviors and underlying meaning systems within a given culture.

All psychologists are bound by professional ethics to treat the participants under study humanely and fairly. In general, researchers try to minimize the risk of any physical or emotional harm that might come to participants from taking part in research and to maximize the benefits that will accrue from the findings of their work. The American Psychological Association has drawn up the following specific guide-

lines for the use of human participants. First, participants must give **informed consent** before participating in a research project; that is, they must be told the purposes of the study and informed of any potential risks to their well-being, and then they must formally agree to participate. Second, participants have the right to decline to participate or to stop participation, even in the middle of the experiment. Third, if participants cannot be told the true purpose of the experiment (sometimes knowing the experimenter's objective will influence how participants behave), they must be *debriefed* at the conclusion of the study. When participants are **debriefed,** they are told the true objective of the study and the reasons for any deception on the part of the experimenter. Finally, data collected from participants must be kept confidential. Names of participants must not be revealed, and care must be taken to protect their anonymity. To ensure that experimenters comply with these guidelines, virtually all research institutions in the United States are required to have review boards that evaluate any potential risks to participants and the researchers' compliance with ethical practice.

The same ethical guidelines apply to using children as participants in research, but frequently the implementation of these guidelines becomes a difficult matter. Who provides informed consent in the case of an infant or a young toddler, for example? (The parents do.) Is it proper to deceive children about the purposes of a study if they cannot understand the debriefing? (In general, it is a good idea to avoid any kind of deception with children, such as telling them you are interested in how quickly they learn a game when you are really interested in whether they will be altruistic with their play partner.) Are some subjects of study taboo, such as asking children about their concepts of death, suicide, or other frightening topics that might affect them emotionally? (Such studies, if conducted, must be planned very carefully and conducted only by trained professionals.) What about cases in which treatments are suspected to have beneficial outcomes for children? Can the control group properly have the treatment withheld? For example, if we suspect that children's participation in an early intervention preschool program will have real benefits for them, should children in the control group be kept out of it? (One solution to this thorny problem is to offer the control group the beneficial treatment as soon as possible after the conclusion of the study, although this is not always a satisfactory compromise. The control group still has to wait for a beneficial treatment or intervention.)

Many researchers assume that children's vulnerability to risk as they participate in psychological experiments decreases as they grow older. Because infants and young children have more limited cognitive skills and emotional coping strategies, they are viewed as less able to protect themselves and to understand their rights during participation in research. This assumption certainly has some logical basis and, in fact, is confirmed by research showing that second-graders have difficulty understanding the concept of confidentiality, as well as the contents of a debriefing statement (Hurley & Underwood, 2002). Some types of research, however, may actually pose a greater threat to older children. As Ross Thompson (1990) has pointed out, older children are developing a self-concept and a more elaborate understanding of the ways others evaluate them. Older children may thus be more susceptible to psychological harm than younger children when the researcher compares their performance with that of others or when they think teachers or parents may learn about their performance. In addition, older children may be more sensitive to research results that reflect negatively on their families or sociocultural groups. These situations require awareness on the part of the researcher of the subtle ways children can be adversely affected by the research enterprise.

Table 2.4 sets forth the ethical guidelines on using children as participants in research established by the Society for Research in Child Development (1996). Probably the overriding guiding principle is that children should not be subjected to any physical or mental harm and should be treated with all possible respect. In fact, because children are frequently unable to voice their concerns and have less power than adults do, developmental researchers must be especially sensitive to their comfort and well-being.

Which Ethical Principles Apply?
psychology.college.hmco.com

informed consent Participant's formal acknowledgment that he or she understands the purposes, procedures, and risks of a study and agrees to participate in it.

debriefing Providing research participants with a statement of the true goals of a study after initially deceiving them or omitting information about its purposes.

TABLE 2.4 Ethical Guidelines in Conducting Research with Children

- *Nonharmful procedures:* The investigator may not use any procedures that could impose physical or psychological harm on the child. In addition, the investigator should use the least stressful research operation whenever possible. If the investigator is in doubt about the possible harmful effects of the research, he or she should consult with others. If the child will be unavoidably exposed to stress in research that might provide some diagnostic or therapeutic benefits to the child, the study should be reviewed by an institutional review board.
- *Informed consent:* The investigator should inform the child of all features of the research that might affect his or her willingness to participate and should answer all questions in a way the child can comprehend. The child has the right to discontinue participation at any time.
- *Parental consent:* Informed consent should be obtained in writing from the child's parents or from other adults who have responsibility for the child. The adult has the right to know all features of the research that might affect the child's willingness to participate and can refuse consent.
- *Deception:* If the research necessitates concealment or deception about the nature of the study, the investigator should make sure the child understands the reasons for the deception after the study is concluded.
- *Confidentiality:* All information about participants in research must be kept confidential.
- *Jeopardy:* If, during research, the investigator learns of information concerning a jeopardy to the child's well-being, the investigator must discuss the information with the parents or guardians and experts to arrange for assistance to the child.
- *Informing participants:* The investigator should clarify any misconceptions that may have arisen on the part of the child during the study. The investigator should also report general findings to participants in terms they can understand.

Source: Adapted from the ethical standards set by the Society for Research in Child Development, 1996.

CONTROVERSY: THINKING IT OVER

Should Researchers Reveal Information They Learn About Participants in Their Studies?

Researchers often study issues that are sensitive but that can have important consequences for the well-being of children. For example, a researcher might be interested in finding out the factors that predict the emergence of eating disorders in adolescents or the consequences of parental drug abuse for the child. However, research that can be very illuminating about the nature of childhood problems often raises difficult ethical dilemmas (Fischer, 1994).

What Is the Controversy?

Suppose the researcher discovers that a particular child has a serious eating disorder or that a young child has ingested harmful illegal drugs kept by the parents in the home. What are the ethical obligations of the researcher in such situations? Should the concerns about the welfare of individual children override any potential benefits of the research for children in general? Furthermore, should the identities of children with serious problems be revealed to parents, school personnel, or others responsible for their well-being at the risk of violating children's trust that data will be kept confidential?

What Are the Opposing Arguments?

Ethical guidelines state that researchers who discover that a child is at risk must take steps to make sure that the child obtains appropriate assistance. Such action is based on the concept of "jeopardy" outlined by the Society for Research in Child Development and referred to in Table 2.4. The idea is that ethical concerns about the welfare of children should be a primary concern and override any potential benefits of the research for children in general. Also implicit in the concept of jeopardy is the notion that in some circumstances, confidentiality must be broken to protect the best interests of the child.

However, as a consequence of such actions, the child may drop out of the study in order to receive some form of treatment or intervention. If several children in the study thus drop out, the opportunity to complete the research project could be lost, along with the potential benefits of the results of the study for a larger group of children (Beauchamp et al., 1982). Some researchers believe that the benefits of a well-conducted study can override the obligation to help a particular child for whom a problem has been revealed.

What Answers Exist? What Questions Remain?

In some cases, researchers may have a legal obligation to enforce the principle of jeopardy. A federal law, the Child Abuse Prevention and Treatment Act enacted in 1974, resulted in the creation of mandatory reporting procedures for suspected cases of child abuse and neglect in every state. In many states, researchers are included among individuals who are required to report. Thus a researcher who discovers that a child has been abused or neglected, as in the preceding example of a child who has ingested parents' illegal drugs, may be required by law to report the case to the proper authorities. The fact that the child might drop out of the study or that confidentiality is broken is simply a necessary consequence.

In other cases, the issue may be more difficult to resolve. Research can be of help, though, by supplying information on how children themselves feel when such ethical dilemmas arise. Celia Fisher and her colleagues (Fisher et al., 1996) asked adolescents to judge what researchers should do if they discover that a child has a substance abuse problem, has been physically or sexually abused, displays a life-threatening behavior, or engages in delinquent behaviors. Most adolescents favored reporting instances of child abuse or threats of suicide to a responsible adult. For less severe problems, such as cigarette smoking and nonviolent delinquent acts, adolescents were more inclined to say that the researcher should do nothing. In cases such as the latter, rather than reporting children to parents or authorities, researchers might decide to urge children to seek assistance on their own.

Other questions remain. Does the age of the child matter in such ethical decisions? Should these decisions be handled differently with adolescents than with younger children? How can research help us to address questions such as these?

CHAPTER RECAP

Summary of Topics

Research Methods in Developmental Psychology

- Like other scientists, developmental psychologists are concerned with using sound methodologies to glean information about children. The *scientific method* is used not only to test theories but also to gather information that can have applications in the lives of children.

Measuring Attributes and Behaviors

- Researchers need to be concerned with *operationally defining* the *variables* in the study. That is, the variables must be specified in measurable terms.
- Variables must be *valid*, that is, actually measure the concept under consideration.
- Variables must also be *reliable*, that is, obtained consistently from one time to another or from one observer to another.

Methods of Collecting Data

- *Naturalistic observations* involve the systematic recording of behaviors as they occur in children's everyday environments. Two special concerns in this approach are *participant reactivity*, the chance that children will react to the presence of an observer by behaving in untypical ways, and *observer bias*, the possibility that the researcher will interpret observations to be consistent with his or her hypotheses.
- *Structured observations*, usually conducted in the laboratory, allow the experimenter more control over situations that accompany children's behaviors. Researchers can measure children's overt behaviors or obtain physiological measures

such as heart rate or brain wave activity. One limitation of this approach is that children may not act as they would in a natural context.

- Researchers can employ *structured interviews* or *questionnaires* if they are interested in children's own reports of what they know or how they behave. Alternatively, they can use a more open-ended technique, the *clinical method*. Researchers need to be aware that children may not always answer questions truthfully and that systematic comparisons and unbiased interpretations by the researcher may be difficult to obtain, especially with the clinical method.
- *Meta-analysis* permits investigators to analyze the results of a large body of published research to draw general conclusions about behavior.

Research Designs

- In the *correlational design*, the investigator attempts to see whether changes in one variable are accompanied by changes in another variable. Researchers may observe a *positive correlation*, in which increases in one variable are accompanied by increases in another, or a *negative correlation*, in which increases in one variable are accompanied by decreases in the other. The statistic used to assess the degree of relationship is the *correlation coefficient*. One caution about this design is that cause-and-effect conclusions cannot be drawn.
- In the *experimental design*, the researcher manipulates one or more *independent variables* to see if they have an effect on the *dependent variable*. *Random assignment* of participants to different treatment groups helps to ensure that only the independent variable varies from one group to the other. Therefore, cause-and-effect relationships among variables can be identified. Variations on this technique are *field experiments*, in which the experimental manipulations are carried out in a natural setting, and *quasi-experiments*, in which the assignment of participants to experimental groups is determined by the participants' natural experiences. Because of this circumstance, researchers conducting quasi-experiments must be concerned with ruling out alternative explanations for their findings.
- In *case studies* or the *single-case design*, the researcher intensively studies one or a few individuals over a period of time. The former usually involves a detailed narrative description, whereas the latter involves the systematic collection of data. The ability to generalize to a larger population may be limited with these approaches.

Strategies for Assessing Developmental Change

- *Longitudinal studies* test the same participants repeatedly over an extended period of time. This approach requires a significant investment of time, may involve attrition of participants, and could be vulnerable to the *age-history confound*. It is the only method that allows researchers to examine the stability of traits.
- *Cross-sectional studies* examine participants of different ages at the same time. Although this approach requires less time and fewer resources than the longitudinal approach, it is vulnerable to *cohort effects*.
- *Sequential studies* examine children of two or more ages over a period of time, usually shorter than that used in longitudinal studies. This approach combines the advantages of the cross-sectional and longitudinal approaches but is also vulnerable to the problems associated with each.

Cross-Cultural Studies of Development

- *Cross-cultural studies*, which compare individuals from different cultural groups, can be especially helpful in answering questions about universals in development. Researchers must make sure that tasks are comparable across cultural groups, however.
- An important methodological tool, especially for those who wish to learn about the meaning systems within a culture, is *ethnography*, the use of observations and interviews by a researcher who acts as a participant-observer.

Ethical Issues in Developmental Research

- Researchers must be concerned with obtaining *informed consent*, allowing participants to decline participation, *debriefing* participants, and protecting participants' confidentiality.
- The overriding principle is that children should not be subjected to physical or mental harm and should be treated with all possible respect.