

## Chapter 2

# *Researching Sex and Gender*

*Does Gender Matter?*  
—*Nature*, July 13, 2006

### *Lecture Outline*

- A. The headline story asked if gender matters, referring to a controversy begun by Harvard president Lawrence Summers, who speculated that the reason so few women occupy prominent positions in science is their lack of intrinsic aptitude. Ben Barres answered the question he asked about gender, contending that gender matters in science. Barres is a neuroscientist who speaks from an unusual position: he underwent sex-change surgery to become male and has thus experienced the treatment accorded to female and male scientists. He contended that gender does matter.
- B. **HOW SCIENCE DEVELOPED** is a story that dates to the 16th and 17th centuries, when science replaced religion as a way to know about the world. Science is based on the notion that **empirical observation** allows researchers to discover the lawful principles by which the world works. Science grew and became the dominant way to know about the world. One of the cornerstones of science is **objectivity**, but critics contend that science has fallen short of this goal.
- C. **APPROACHES TO RESEARCH** include both quantitative and qualitative methods. **Quantification** is the process of collecting **data** (observations) as numbers, but some researchers object to the information that is lost in this process and prefer **qualitative research** techniques. Each approach includes various methods.
  1. **Quantitative Research Methods** share the approach of turning observations into numbers, which may leave the mistaken impression that this approach is precise. Rather, quantification narrows the observations to one aspect. In addition, researchers restrict their studies by specifying the **variable** or variables of interest. Quantitative methods include both **descriptive research methods** and experimental approaches.
    - a. **Experimental Designs** involve **experiments**, which must include the manipulation of an **independent variable** and the measurement of a **dependent variable** while holding all other factors constant. The need for such control usually requires a laboratory situation. Properly conducted experiments allow researchers to make conclusion concerning causal relationships between independent and dependent variables.
    - b. **Ex Post Facto Studies** are a type of quasi-experimental research that allows researchers to study variables that they cannot manipulate, for either ethical or practical reasons. In these studies researchers choose **subject variables**—characteristics of participants that can be used to place participants into contrast groups. Because no variable is manipulated, this type of study is not a true experiment; researchers cannot make causal conclusions based on the results.
    - c. **Surveys** provide a way to gather information by asking people questions, but constructing a survey includes many choices that can affect the information gathered. Asking questions and receiving self-report answers rather than directly observing behavior is a limitation of this method.
    - d. **Correlational Studies** involve finding a relationship between two variables and the calculation of the correlation coefficient to quantify the strength and direction of the relationship. Correlational or other studies may require the formulation of an **operational definition**, a definition of a variable in terms of the operations used to create it.

Correlation and all other nonexperimental methods allow a description of the observed phenomena but no conclusions concerning causality.

2. **Qualitative Research Methods** provide alternatives to quantitative research. Rather than reducing their data to numbers, qualitative researchers tend to include more complex data and less statistical analysis than quantitative methods.

a. **Case Studies** involve the intensive study of one case, usually one individual. This limitation prevents generalization but allows a full examination of one case.

b. **Interviews** in qualitative research allow the exploration of the topic through the exchange of information between interviewer and participant.

c. **Ethnography** involves researchers who immerse themselves in a group to gather information. These researchers collect data but also interact with participants, often over a lengthy period of time.

d. **Focus groups** bring together a group of (usually 6 to 8) people to participate in an intensive discussion on a topic.

3. **Researchers' Choices** include whether to take the quantitative or qualitative approach as well as which specific method to choose. Traditional research is quantitative, and that choice is still the most common. Qualitative research is becoming more popular but often supplements rather than replaces quantitative research methods.

#### D. GENDER BIAS IN RESEARCH

Gender is one of the topics most strongly related to criticisms of science. One type of criticism comes from the **constructionists**, who view science as a process of invention rather than discovery.

1. **Sources of Bias** range from the possibility that science has an inherent masculinist bias to the process of choosing the topic of study, designating variables, formulating a **hypothesis**, collecting and analyzing data, and interpreting results. When a result is **statistically significant**, it is unlikely to have occurred on the basis of chance, but such a result may not be large enough to be of **practical significance**. Confusion between these two concepts can lead to erroneous conclusions about the importance of gender differences.

2. **Ways to Deal with Bias in Science** include either attempting to transform science or striving to make it more objective by decreasing bias.

a. **Advocating Transformation** is the position of *feminist standpoint epistemologies*, which calls for a rejection of traditional science as hopelessly biased and urges an acceptance of women-centered research. This position can enhance research, but will likely not replace it.

b. **Decreasing Bias** is the position of the *feminist empiricists*, who want to adhere to traditional scientific methods without the biases that have plagued the study of gender. Researchers need to guard against bias in every stage of research. Another way to make more valid conclusions is through the use of the statistical technique called **meta-analysis**, which allows the evaluation of research from many studies to understand the magnitude of the effects. For example, meta-analysis of mathematical abilities has shown that gender differences in the performance of girls and boys are large enough to be statistically but not practically significant.

#### Multiple Choice Questions

- a 1. When Harvard President Lawrence Summers proposed that women's innate aptitude for science is less than men's,
  - a. he mentioned stereotypical views of women's innate deficiencies in math and science.
  - b. he quoted recently published research indicating that women's lower math ability blocks their science achievement.

- c. he also mentioned discrimination in education and employment as more important barriers.
  - d. he emphasized the importance of the female gender role.
- c 2. Ben Barres has a unique perspective on the treatment of women in science and contends that
  - a. women and men receive similar treatment for good work.
  - b. women have many advantages in science; men are the ones who are now discriminated against.
  - c. women are still discriminated against in science.
  - d. men and women work together with few problems; the perception of discrimination comes mostly from administrators, not scientists.
- c 3. In his speculation that the low number of female scientists is due to women's innately lower ability, Lawrence Summers used
  - a. a constructivist argument.
  - b. a logical argument that is based on scientific research.
  - c. an essentialist argument.
  - d. a profeminist argument.
- c 4. Science replaced \_\_\_\_\_ as a way of knowing about the world.
  - a. intuition
  - b. personal observation
  - c. religion
  - d. magic
- a 5. Unlike earlier ways of understanding the world, early scientists
  - a. assumed that the world works by a set of laws.
  - b. advocated religious authority as a valid way to gain knowledge.
  - c. questioned the value of observation and knowledge gained through observation.
  - d. proclaimed the need for justification by trial.
- c 6. Early scientists adhered to the principle of empirical observation, which is
  - a. the philosophy that held metaphysics as valid.
  - b. the philosophy that all things can be described in physical terms.
  - c. the philosophy that valid information can be obtained only through observation.
  - d. the hypothesis that science and the legal system should work on similar principles.
- c 7. Those who defend science contend that \_\_\_\_\_, whereas those who criticize science hold that \_\_\_\_\_.
  - a. science improves technology but not knowledge . . . science improves knowledge but not technology
  - b. physical sciences are the most valid . . . social sciences are the most valid
  - c. the process of science is objective . . . objectivity is not possible
  - d. men have a natural ability to be scientists . . . sexist bias invalidates all scientific research
- d 8. The assumptions that form the basis for the social sciences
  - a. differ from those for the natural sciences, which are more objective.
  - b. differ from the assumptions and methods in the natural sciences.
  - c. are the same as for the natural sciences, but the methods differ.

- cd are the same as for the natural sciences—both claim to be objective and open to investigation through observation.
- b 9. When scientists say that one criterion for scientific investigation is observability, they mean that
  - a. the subject matter must be clear to the person doing the observing but not necessarily to others.
  - b. the subject matter must be publicly observable.
  - c. the observer must gather information according to a plan.
  - d. the observer is the authority on what she or he observed.
- c 10. When scientists say that a criterion for scientific investigation is that their observations must be systematic, they mean that
  - a. the subject matter must be clear to the person doing the observing.
  - b. the subject matter must be publicly observable.
  - c. the observer must gather information according to a plan.
  - d. the observer is the authority on what she or he observed.
- d 11. Scientific observation differs from personal observation in
  - a. the training versus the lack of training of the observers.
  - b. the laboratory versus the real world as the setting for the observation.
  - c. the use of authority versus personal preference for formulating the hypothesis.
  - d. the existence of a systematic plan for gathering information in science.
- e 12. What makes science precise?
  - a. The systematic observation upon which the information is based.
  - b. The empirical basis of the data.
  - c. The quantification of information in the form of numbers and the use of statistics to analyze the information.
  - d. all of the above
  - e. none of the above
- b 13. Quantification refers to
  - a. the process of measurement in precise quantities.
  - b. the process of turning observations into numbers.
  - c. the process of changing qualitative research into observations.
  - d. all of the above
- c 14. The data that researchers collect are usually
  - a. personal impressions.
  - b. norms.
  - c. numbers.
  - d. research citations.
- b 15. A variable is
  - a. the level of interest in a research study.
  - b. a factor of interest that has more than one level or value.
  - c. a factor that remains at a constant level throughout a study.
  - d. a background factor that may become of primary interest through the research process.
- a 16. Descriptive research methods allow researchers to
  - a. gather information about existing phenomena.

- b. manipulate independent variables.
  - c. measure dependent variables.
  - d. manipulate both independent and dependent variables.
- a 17. Researchers sometimes use operational definitions in conducting their studies, which means that they
  - a. define their variables(s) in terms of the operations used to obtain it.
  - b. use experimental terminology in creating their independent variables.
  - c. define their variables naturalistically rather than manipulate them experimentally.
  - d. change the definition of their variables to conform to the operations they need to perform.
- c 18. An operational definition
  - a. is less objective than a conceptual definition.
  - b. complicates the research procedure.
  - c. specifies the operations used to obtain data.
  - d. can supplement a conceptual definition rather than replace such a definition.
- a 19. An experimental design involves
  - a. manipulation of at least one independent variable.
  - b. a statistically significant correlation.
  - c. a survey in which all variables are correlated with all others.
  - d. an operational definition of both independent variables.
- b 20. In an experiment, the \_\_\_\_\_ is what the experimenter manipulates, and the \_\_\_\_\_ is what the experimenter measures.
  - a. correlational variable . . . . independent variable
  - b. independent variable . . . . dependent variable
  - c. dependent variable . . . . independent variable
  - d. extraneous variable . . . . control variable
- c 21. In psychology research, dependent variables are
  - a. internal events rather than publicly observable responses.
  - b. measured by physiological responses rather than by voluntary behaviors.
  - c. observable responses or behavior.
  - d. not defined before the beginning of the study.
- b 22. When an experimenter finds that the manipulation of an independent variable produced a change in the dependent variable, with all other factors held constant, then
  - a. the correlation between the independent and dependent variables must show significant differences.
  - b. the experimenter can conclude that the change in the independent variable caused the change in the dependent variable.
  - c. the change in the dependent variable was the cause of the differences in the independent variable.
  - d. the experimenter can make no conclusions except that the groups differ.
- c 23. The research method that can show cause and effect relationships is
  - a. case study.
  - b. the survey method.
  - c. the experimental method.
  - d. the ex post facto method.

- e. any of the above
- d 24. If a variable such as sexual orientation is not open to manipulation, then
  - a. researchers must choose more than two levels of this variable to have a valid experiment.
  - b. the dependent variable must be operationally defined or the experiment is invalid.
  - c. both subject and independent variables must be controlled.
  - d. researchers cannot conduct an experiment using this variable as an independent variable.
- e 25. Sexual orientation is an example of a variable that researchers study but cannot manipulate, which makes it
  - a. a poor choice for research of any type.
  - b. easier to control than variables that can be manipulated.
  - c. easier to measure than variables that can be manipulated.
  - d. an independent variable.
  - e. a subject variable.
- a 26. Rather than create the levels of the independent variable through manipulation, researchers can select people who fall into groups the researchers want to contrast.
  - a. This latter type of research is an ex post facto design rather than an experimental design.
  - b. The researchers must control other variables, or they will not be able to make clear interpretations of causality in this nonexperimental research.
  - c. The researchers should consider a survey rather than the design they had planned.
  - d. The researchers should include another independent variable to add contrasts.
- b 27. A subject variable differs from an independent variable in
  - a. the number of levels required for an adequate test of each—the subject variable requires more levels.
  - b. the manner of their creation—the subject variable was chosen according to characteristics of subjects and the independent variable was manipulated.
  - c. the type of dependent variable appropriate for each—subject variables requires attitude measures as dependent variables but independent variables may include any measurable response or behavior.
  - d. all of the above
  - e. none of the above
- c 28. When researchers use gender as a subject variable,
  - a. they perform experiments that require careful attention to control of other variables.
  - b. they use the social categories of male and female to contrast attitudes about men and women.
  - c. they usually compare a group of men or boys to another group of women or girls.
  - d. they must manipulate gender as their independent variable.
- d 29. Researchers who use gender as a subject variable
  - a. study men's judgments about the acceptability of various behaviors of men and women.
  - b. study women's judgments about what constitutes masculinity and femininity.
  - c. also examine the social context and social expectations of men and women.
  - d. compare a group of girls or women to a group of men or boys and look for differences or similarities.

- e. both a and b
- a 30. When researchers compare a group of girls or women to a group of men or boys and look for differences or similarities, those researchers are using what approach?
  - a. gender as a subject variable
  - b. gender as a survey topic
  - c. gender as a social category
  - d. the feminist approach
- a 31. In an ex post facto study researchers \_\_\_\_\_, and in an experimental study researchers \_\_\_\_\_.
  - a. choose participants according to preexisting characteristics . . . . . manipulate conditions to produce differences
  - b. assign participants to groups randomly . . . . assign participants to groups according to some personal characteristics of participants
  - c. use more than one independent variable . . . . use one independent variable with two or more levels
  - d. conduct a survey . . . . conduct a correlation
- d 32. Your friend read a research report concluding that college men scored 25 points higher on a mathematics achievement test than college women and said, "Being a woman really causes them to be worse at math." You reply,
  - a. "Twenty-five points may not be a significant difference, so maybe it's not important."
  - b. "But the same report said that women scored 30 points higher on the synonym test for verbal fluency, so being a woman causes superior verbal performance."
  - c. "This experiment may not have controlled for number of math classes completed, so the experimenter could not make clear conclusions of causality, and you shouldn't, either."
  - d. "Any study with gender as a variable is not experimental, so any conclusions of causality are inappropriate."
- b 33. Studies in which gender is a subject variable are \_\_\_\_\_, and studies in which gender is a social category are usually \_\_\_\_\_.
  - a. survey research . . . . ex post facto studies
  - b. ex post facto studies . . . . experimental studies
  - c. experiments . . . . naturalistic observations
  - d. naturalistic observations . . . . surveys
- c 34. When researchers consider gender as a social category, they
  - a. concentrate on the physical differences that produce gender-related behaviors.
  - b. ignore gender-related differences and concentrate on the social context of sexual behavior.
  - c. consider gender as a piece of information upon which people make judgments.
  - d. narrow the focus of their studies, omitting inappropriate content from their research.
- a 35. When researchers use gender as a social category,
  - a. they can manipulate gender as an independent variable.
  - b. they usually compare a group of men or boys to another group of women or girls.
  - c. they must perform longitudinal research, which takes time, so this technique is not a very common approach to gender research.
  - d. gender is the dependent variable rather than the independent variable

- a 36. A serious limitation for the survey method is
- its use of self-reports rather than direct observations of behavior.
  - the exclusion of operational definitions for this type of research.
  - the limited number of variables that can be studied.
  - the inevitable bias that comes from introspection.
- e 37. Participants in survey research
- may lie about their behavior.
  - may experience problems in accurately recalling the information requested.
  - may withhold information that is embarrassing.
  - both a and b
  - all of the above
- b 38. Researchers often use surveys to
- study questions that are not empirical.
  - study questions that might be difficult to observe directly.
  - answer questions that other researchers have studied experimentally.
  - explore data collected by other researchers.
- c 39. Correlational studies allow researchers to determine the \_\_\_\_\_ between two variables.
- causal direction
  - experimental source of variance
  - strength of the relationship
  - inverse causality
- b 40. When reading a research report, you find the expression  $r = .67$ . From this information you know that
- the researchers did an experiment with two variables.
  - the research was a correlational study.
  - the study failed to reveal significant results.
  - the study revealed significant results.
  - none of the above
- a 41. One of your friends says, "Wow, the researchers in this assigned reading found a really high correlation— +1.23." You should say,
- "I think you've misread something—correlations can't be higher than +1.00."
  - "But was there a significant differences between the experimental and control groups?"
  - "Is that level of correlation statistically significant?"
  - "Wow, may I see it?"
- c 42. If two variables are highly correlated, then
- they are also causally related.
  - they are not causally related.
  - they may be causally related, but the correlation does not allow any deductions concerning causality.
  - the two variables must be related to a third variable before deductions of causality are possible.



- c 43. Some researchers have objected to the distillation of behavior into numbers, claiming that this process omits some of the important aspects of the situation. These critics prefer \_\_\_\_\_ approach to research.
- a. a quantitative
  - b. an objective
  - c. a qualitative
  - d. social category
- c 44. Qualitative research
- a. involves manipulation of multiple variables.
  - b. involves measurement of multiple variables.
  - c. does not involve manipulation of independent variables or control of other variables.
  - d. both a and b
- b 45. Case studies focus on
- a. collecting information on as many cases as necessary to obtain a representative sample.
  - b. studying one case intensively.
  - c. interviewing according to operational definitions.
  - d. reversing the order of questions for alternative participants to avoid bias in collecting information.
- c 46. Qualitative interviews
- a. are identical to survey interviews except that qualitative interviews are shorter.
  - b. are usually shorter than survey interviews.
  - c. may not include a standard set of questions that all participants answer.
  - d. all of the above
- a 47. Researchers conducting ethnographic studies
- a. immerse themselves in a situation to gather information and understand the situation.
  - b. maintain objectivity by observing without the knowledge of those who are the objects of study.
  - c. are careful to maintain the separation of researcher and participant.
  - d. have a standard set of responses that they seek from all research participants.
- b 48. Focus groups
- a. focus on interpersonal variables and both manipulate and measure such variables.
  - b. consist of a small group of participants whose discussion focuses on a particular topic.
  - c. are like ex post facto studies in the inclusion of subject variables rather than independent variables.
  - d. need to have large samples or the results will be invalid.
- d 49. Qualitative research methods
- a. focus less on objectivity than quantitative research methods.
  - b. include a more open relationship between researcher and participant than quantitative research.
  - c. emphasize objectivity more than quantitative research.
  - d. a and b
  - e. all of the above
- a 50. Conclusions concerning the causes of differences in gender-related behaviors
- a. cannot come from ex post facto studies.

- b. must be based on correlational studies.
  - c. require statistically significant differences based on comparisons of groups of men and women.
  - d. require measurements of biological responses as well as behavioral responses.
- c 51. Qualitative research methods
  - a. have decreased in popularity over the past 10 years.
  - b. have increased in popularity and replaced quantitative methods over the past 15 years.
  - c. have gained in popularity but usually supplement rather than replace quantitative methods.
  - d. now account for over half the research in feminist scholarship but less than 5% in other areas of research.
- c 52. “We do not discover reality, we invent it” is a statement consistent with the \_\_\_\_\_ viewpoint.
  - a. scientific reactionary
  - b. radical feminist
  - c. constructionist
  - d. methodologist
- b 53. The saying “seeing is believing” is consistent with \_\_\_\_\_, and “believing is seeing” is consistent with \_\_\_\_\_.
  - a. feminist empiricists . . . masculinist objectivists
  - b. traditional empiricist science . . . the constructionist view
  - c. the structuralist school . . . the functionalist movement
  - d. subjective experience in research . . . empiricism
- a 54. Constructionists argue that the observations upon which science is based are
  - a. inevitably biased.
  - b. objective.
  - c. difficult to define.
  - d. feminist.
- d 55. Despite the notion that science is objective, bias can enter the process through
  - a. the selection of topics to study.
  - b. the choice of research method.
  - c. their expectations for certain results.
  - d. all of the above
- c 56. When researchers make a hypothesis, they are
  - a. analyzing data.
  - b. explaining results.
  - c. predicting the outcome of the study.
  - d. all of the above
  - e. none of the above
- d 57. Portrayals of female scientists in the movies
  - a. show men but not women as competent scientists.
  - b. show impossibly glamorous women working in laboratories in which they are the primary investigators with male subordinates.
  - c. show women as well-accepted by their male colleagues.
  - d. show a higher proportion of female scientists than exist in reality.

- a 58. One way that film portrayals of female scientists are accurate is that
  - a. female scientists experience harassment and lack of respect in the movies and in the laboratory.
  - b. male scientists are less likely than female scientists to be employed in government research in movies.
  - c. female scientists are portrayed as directors and administrators, positions that they occupy as often as male scientists.
  - d. all of the above are similarities.
- b 59. Results that are statistically significant are
  - a. based on experimental rather than correlational research.
  - b. based on some pattern rather than random chance.
  - c. indicative of large and important differences.
  - d. indicative of cause and effect relationships.
- b 60. A gender-related difference has practical significance when it
  - a. is statistically significant.
  - b. can make a difference in the lives of men and women.
  - c. is likely to have occurred on the basis of chance alone.
  - d. both a and b
- a 61. A statistically significant result can lack practical significance if the result is
  - a. small.
  - b. correlational.
  - c. experimental.
  - d. not based on a representative sample.
- c 62. The technique of meta-analysis allows researchers to
  - a. draw causal conclusions from correlational research.
  - b. draw causal conclusions from ex post facto research.
  - c. combine results from several studies and evaluate the overall significance of the effect.
  - d. evaluate each of several studies independently.
- a 63. Researchers who find gender similarities in math ability
  - a. may have trouble getting their results published.
  - b. tend to make headlines, as their results are unexpected.
  - c. prove the null hypothesis.
  - d. feel that they have to include a replication, as their results are unexpected.
  - e. both c and d
- c 64. The tendency to publish results that show differences
  - a. can lead to an accurate picture of the underlying biological basis of gender-related differences.
  - b. can lead to a bias in favor of the null hypothesis.
  - c. is a factor in the perception of widespread gender-related differences.
  - d. is unimportant to scientists, who are objective in their hypotheses.
- d 65. Some feminist critics of science have argued that science is an inevitably biased activity, whereas others have contended that
  - a. the masculine values of science are the best approach to gain knowledge.

- b. science is value-free and unbiased.
  - c. the history of sexist and racist bias in science is in the past and not in the present.
  - d. scientists must make greater efforts to avoid bias, and greater objectivity is possible.
- b 66. Of the scholars who have called for a change in the scientific method, feminist empiricists have
- a. rejected traditional science and called for an alternative set of method to study women.
  - b. called for stricter adherence to the empiricist principle to overcome sexist bias in science.
  - c. proposed alternative categories for analyzing sex and gender.
  - d. offered few criticisms or alternatives to traditional science.
- a 67. Of the scholars who have called for a change in the scientific method, those who adopt feminist standpoint epistemologies have
- a. rejected traditional science and called for an alternative set of methods to study women.
  - b. called for stricter adherence to the empiricist principle to overcome sexist bias in science.
  - c. proposed alternative categories for analyzing sex and gender.
  - d. offered few criticisms or alternatives to traditional science.
- c 68. By adding alternative methodologies, such as qualitative methods, researchers
- a. will eliminate bias from scientific research.
  - b. provide ways for traditional methods to gain sensitivity to women.
  - c. can gain information that they could not through traditional methods.
  - d. add problems to the already complex research process.
- b 69. Those researchers who have proposed methods to minimize sexist bias in research would be classified as
- a. advocates of feminist standpoint epistemologies.
  - b. feminist empiricists.
  - c. multicultural observers.
  - d. female psychologists.
- a 70. When researchers gather information through observation
- a. their data may still contain biases.
  - b. their data will be objective.
  - c. their data will be subjective.
  - d. operational definitions are not necessary.
- d 71. To minimize sexist bias in research, researchers should
- a. perform all appropriate significance tests.
  - b. be alert to bias in explanatory systems.
  - c. be alert to the many way in which bias can enter the research process.
  - d. all of the above

### ***Essay Questions***

1. What is the constructionist position and how does that position differ from traditional science?

2. In what ways do the limitations of the experimental and ex post fact methods have an impact on the study of gender?
3. Contrast quantitative and qualitative research methods.
4. Discuss how a statistically significant result may be unimportant.
5. Discuss and give examples of how gender bias can become a factor in research.

*Look for the following points in students' answers:*

1. A. Constructionists believe that
  1. Scientists (and others) create their view of the world rather than discovering the world.
  2. Objectivity in science is impossible.B. Constructionists challenge the assumptions of traditional science, including
  1. The notion that scientists are objective and free from bias.
  2. The notion that objective reality exists, and scientists can understand the world through empirical observations.
2. A. Limitations include
  1. Experimental studies tend to be artificial.
  2. Ex post facto studies are also usually laboratory studies, but researchers cannot draw conclusions about causality based on these studies.B. Impact on gender research
  1. Gender of participants cannot be an independent variable in experimental research, because researchers cannot manipulate participants' gender.
  2. Ex post facto studies use gender as a subject variable, comparing female to male participants, but researchers cannot make legitimate conclusions about cause-and-effect relationships based on this research method.
3. A. Researchers using quantitative methods
  1. Often conduct their research in laboratories.
  2. Strive for objectivity, including a distinction between the role of researcher and participant.
  3. Concentrate on obtaining a representative group of participants to allow generalization.
  4. Collect data in terms of numbers.
  5. Use statistics to do significance testing.
  6. Attempt to simplify complex situations and control the research situation.B. Researchers using qualitative research methods
  1. Usually conduct research in natural settings.
  2. Accept more subjectivity, including an equal power balance between researchers and participants.
  3. Often seek unusual participants or situations rather than a representative sample.
  4. Rarely collect information in the form of numbers or use statistics.
  5. Strive to retain the complexity of the research situation.
4. A. The concept of statistical significance
  1. Applies to the evaluation of research results.
  2. Indicates a pattern of results that were not likely to have occurred on the basis of chance alone, suggesting that some other factor has influenced the results.

3. Is accepted by researchers as an indication of whether or not their studies worked as hypothesized, based on the results of analyzing the data with the appropriate statistical test.
  - B. A result may be statistically significant yet not large.
    1. Statistical significance determines patterns of data and compares that pattern to a random pattern.
    2. Even small differences may reveal a pattern that is not likely to have occurred on the basis of chance.
  - C. The concept of practical significance
    1. To be important, differences must be large enough to make a difference in people's lives.
    2. This criterion is more difficult and rarer than statistical significance.
5. A. Gender bias can enter the research process at any point.
- B. Those points include
1. Finding a problem to study, which can be biased by allowing personal and social factors to guide the choice.
  2. Choosing variables, which can be biased by inaccurate definitions or incomplete information.
  3. Choosing a design, which can be biased by a design that did not allow for the inclusion of information about the context of a behavior.
  4. Formulating a hypothesis, which can be biased by adhering to a gender-biased theory.
  5. Collecting data, which can be biased by allowing personal factors to bias observations.
  6. Analyzing data, which can be biased by ignoring gender as a factor in the analysis.
  7. Interpreting results, which can be biased by failing to discuss a negative finding for the gender variable.

## **ACTIVITIES**

### ***Looking behind the Headline***

The headline story for this chapter featured Ben Barres and his views of the controversy prompted by Lawrence Summers's remarks about women's aptitude for careers in science. Barres's viewpoint is unique; as a transgendered individual, he has experienced being both a female and male scientist. Barres addressed not only Summers's remarks but also those of his defenders, including psychologist Steven Pinker.

Acquainting your students with the details of this controversy and Barres's experience makes an interesting activity. Wikipedia is a place to start; the site includes information on Barres, including links interviews and articles. In addition, a video file is available at <http://video.google.com/videoplay?docid=608750863703097892#>, presents a talk by Barres on the scarcity of women in science.

### ***Examining the Media***

Each of the "According to the Media" and "According to the Research" paired boxes offers an opportunity for a follow-up class activity. For Chapter 2, this feature describes the inaccuracy of media portrayals of science and scientists, listing some inaccurate presentations. Your class can find additional (and more current) examples that would make good class presentations. Many media portrayals are based on some actual person or incident but changed to make better entertainment. Students can find information on the real case and the Hollywood version, then analyze and contrast the elements that stayed the same and those that changed.

If you would like a list of points to consider for any analysis of the media, download a module on media at [www.gendercc.net/.../c2.2\\_WACC\\_Mission\\_Possible\\_Gender\\_and\\_Advocacy\\_toolkit\\_Module5-11.pdf](http://www.gendercc.net/.../c2.2_WACC_Mission_Possible_Gender_and_Advocacy_toolkit_Module5-11.pdf). A briefer alternative guideline for assessing gender in media appears at [www.mediaaccuracy.org/files/pdfs/MALA\\_GUIDELINES.pdf](http://www.mediaaccuracy.org/files/pdfs/MALA_GUIDELINES.pdf). Either or these assessments may be useful not only for this activity but for examining the media in later chapters.

### ***Gender in the Headlines***

You can use "Gender in the Headlines" as part of a class activity to involve your students in a survey of the impact of news reports. If you have your students on the lookout for media reports about gender research, they will find some reports that have appeared in local, perhaps even campus, newspapers and on television.

When such reports appear, get the story and, if possible, the original research report for class discussion. However, before your students discuss the original research, have them survey their acquaintances about the media report, asking if people heard the report and what they remember about it. That is, try to have your students gather information about people's impression of a news report to determine the impact of the story. Did people remember hearing or reading the story? Is there a gender difference in attention to stories about gender? Did people remember the story as it appeared, or did they use a gender lens that distorted the findings? What do people believe to be the implications for the results of the reported study?

After your students have collected the information about the impact of the story, hold a class discussion in which the original report of the research is contrasted with the media report. Did the media do a good job of reporting this research, or did the findings appear more clear-cut than they actually were? Could the reporters have done a better job and still presented a clear story, or did they try to highlight the differences between the genders?

### ***Science Got It Wrong***

As a growing number of critics have suggested, scientists have made major mistakes, and gender is an area in which such errors are plentiful. Arrange a class presentation in which students find and present research from the past that has been retracted due to errors. Emphasize how today's research is subject to the same problems.

### ***Bias in the Interpretation of Research: Difference = Deficit***

There seems to be a strong tendency to interpret any gender difference as a deficit for women. An example of this tendency surfaced with the media coverage of a research project that imaged the brains of men and women as they listened to passages from a novel. Conducted by Michael Phillips, Joseph T. Lurito, Mario Dzemidzic, Mark J. Lowe, Yang Wang, and Vincent Matthews, at the Indiana University School of Medicine, Department of Radiology, this research used functional magnetic resonance imaging to study women's and men's brains as they listened to a passage from a novel. The results showed that the brain activation patterns differed—an area in the left cerebral hemisphere was active for men, whereas areas in both hemispheres were active for women. Many headlines included the interpretation that men listen with only half of their brains and attributions of men's poorer listening to this difference. See one such report <http://www.skfriends.com/men-listen-half-brain-.htm>.

Dr. Phillips was very careful in his interpretations of the findings, saying that the study did not address proficiency of listening. He was, of course, correct, but his caution was not shared by the media or by Dr. Lurito, who speculated that the difference might actually indicate a deficit for women ([http://www.findarticles.com/p/articles/mi\\_m1355/is\\_2\\_99/ai\\_68648283](http://www.findarticles.com/p/articles/mi_m1355/is_2_99/ai_68648283)). He conjectured that women might actually have more trouble listening, resulting in using more brain to accomplish the task. His conjecture was not part of the results but represented a typically biased interpretation: Whenever researchers find gender differences, someone is willing to interpret that difference as a deficit. Unfortunately, that difference is too often a deficit for women.

### ***Comparison of Methods***

An increasing number of journals are publishing qualitative research, and your students may find a comparison of qualitative and quantitative articles interesting. Have your students find pairs of articles on the same topic, one using qualitative and one using quantitative. These article pairs should make an interesting comparison for the two approaches when presented in a class forum.

### ***On the Web***

If you are interested in the history of women in science, check out 4000 Years of Women in Science (<http://www.astr.ua.edu/4000WS/>). This website contains biographies, references, and photos, as well as links to other sites.

GirlGeeks (<http://www.girlgeeks.org/>) is an online community devoted to girls and women who are interested in science and technology. It includes career information and tips, a forum to share information and support, and information about girls and women who are contributing to the technology field.

The International Center for Research on Women maintains a website ([www.icrw.org](http://www.icrw.org)) with a page containing dozens of links to other sites of interest.



Women in Global Science and Technology maintains a website with links to papers and other sites concerning the status of women in science and technology around the world (<http://www.wigsat.org/>).

The Fathers' Manifesto (<http://fathersmanifesto.net/>) is an anti-feminist website oriented toward fighting feminism, ending affirmative action, expelling African Americans and Jews from the U.S., and restoring responsible fatherhood. The website is virulently racist as well as sexist, presenting muddled, emotional thinking. This site presents a great deal of "research" to demonstrate that feminism is the cause of many of the problems in modern society. An analysis of their information would make an interesting exercise in critical thinking concerning research and the interpretation of statistics. Their site includes many position papers and collections of statistics with many conclusions that provide good opportunities for critical thinking. This particular section presents the argument that feminism has raised the mortality rate (<http://fathersmanifesto.net/feminismortality.htm>) and another argues that the campaign to curtail drunk driving is misplaced; female drivers are more dangerous (<http://fathersmanifesto.net/madmadd.htm>).

### ***Videos***

*Evelyn Fox Keller: Science and Gender* is a video that features Evelyn Fox Keller, who has been a leading voice on the topic of gender and science. Keller contends that the gender bias in the history of science affects women's interest, efforts, and treatment in science today. (1988, 30 minutes) Available from Films for the Humanities & Sciences, PO Box 2053, Princeton, New Jersey 08543-2053, (800) 257-5126; online orders at <http://www.films.com>.