It Gets Crowded With an Elephant and an Ape in the Room: Teaching About Female and Male Cognitive Differences and Similarities

Diane F. Halpern

Abstract

It is important to understand the many controversies about cognitive sex differences because beliefs about these differences are often used to justify public policies and individual actions. As teachers of psychology, we need to provide a safe environment where students can think and argue about why, how, and how much females and males are similar and different in cognitive abilities. We need to recognize that biological and social/environmental variables do not operate independently. Depending on the environment, we could be enhancing, creating, diminishing, or eliminating cognitive sex differences. In order to foster critical thinking about this volatile topic, we need to remind students that females and males are both similar and different and that we cannot expect simple answers to complex problems.

Keywords

gender differences, cognitive differences, cognitive abilities

Conducting a sex/gender analysis of data is a matter of doing good science.

(Wetherington, 2006, Section V, ¶ 9).

Stereotypes, our generalized beliefs about the ways in which groups differ, are discussed in a wide variety, perhaps even a majority, of psychology classes. Most psychologists will agree that stereotypes are important for understanding how people think and act; yet, when it comes to studying how groups differ, there are many objections. I teach, study, and write about sex differences in cognitive abilities—a hot topic for many reasons. The first question I am usually asked is, “Why is this an important topic for our students?” There are many reasons why we should be teaching our students how to read and think about cognitive sex differences, including the fact that women and men predominate in different spheres of life (U.S. Department of Labor, 2009). For example, although women comprise close to half the workforce in the United States and in many westernized countries, they make up only 25% of the science, technology, engineering, and mathematics workforce. Correspondingly, few men work as secretaries or in early childhood education (U.S. Department of Commerce, 2011).

The way we understand cognitive sex differences has implications for a wide range of public policies including affirmative action, single sex or coeducation, child-rearing practices, and the wage gap, to name just a few. A college education should allow for an honest examination of this hot topic. Even a casual review of the academic literature, talk shows, comics, and popular books will show that people have strong feelings about this topic, but few have knowledge of the relevant research.

Teaching about cognitive sex differences is unpopular because most of us dislike the idea of differences; we are far more comfortable talking about ways in which groups are similar. So it is not surprising that I am frequently asked why I study and teach about differences and not about similarities. The answer is simple: You cannot study only differences or similarities—any study of one also involves study of the other. Many of the methods we use in psychological research focus on ways to determine if there are differences between groups, but meta-analyses and other methods, including declining effect sizes over time and training interventions, provide evidence for similarities.

My usual conversation with students and faculty about cognitive sex differences often goes something like this:

1. Students and faculty: “There are no differences—period.” Many people often tell me that they do not agree with this view, but instead argue that we cannot expect simple answers to complex problems.

1 Department of Psychology, Claremont McKenna College, Claremont, CA, USA

Corresponding Author:

Diane F. Halpern, Department of Psychology, Claremont McKenna College, 850 Columbia Avenue, Claremont, CA 91711, USA.

Email: diane.halpern@cmc.edu
believe there are any differences between males and females (except for reproduction). I respond, “But what about the many well-done studies that show there are some differences? Should we ignore them?”

2. Students and faculty: “Okay, but if there are any differences, they are small and probably due to chance or bias.” I respond, “I agree that this is true for some claims about differences, but there are also many studies showing consistent and large differences over time, across the life span, and around the globe.”

3. Students and faculty: “Well, if there are some differences, they are due to socialization—no other answer is tenable.” I respond, “It is undeniable that we treat females and males differently in all societies, and some portion of the differences that researchers have found is due to socialization and other environmental factors. But there is also plenty of good evidence supporting the idea that some of the differences are rooted in biology.”

In teaching about cognitive sex differences, I always assign some research articles about the effects of hormones on cognition—both prenatally, postnatally, and later in life (e.g., Berenbaum, 1999; De Vries & Sodersten, 2009; Hassett, Siebert, & Wallen, 2008). Does anyone really believe that biology is irrelevant?

The classes in which I teach about cognitive sex differences also become a laboratory for the study of confirmation bias. The bias to prefer evidence that supports what we believe is present in virtually every context where we deal with sex differences and similarities. The literature on sex differences is huge, and not surprisingly, it is possible to find a research article that fits with almost any belief. Our beliefs about why, how, and how much females and males are similar and different in cognitive abilities are strong, so the studies we are willing to accept as valid depend very much on our prior beliefs and values. If the class has a mix of students with strong backgrounds in evolutionary psychology, social psychology, and neuroscience, there is some hope of exposing them to the way our biases direct how we think. But even in the best of circumstances, it is a near-impossible feat. Few students have enough knowledge about the important variables, for example, knowledge about the development of sex differences in the brain, the effects of socioeconomic status on cognitive outcomes, and the relevant research on stereotype threat (see below). Consequently, most students come to class not even aware that there are entire areas of study that explain sex differences in cognition about which they know virtually nothing.

Cognitive Sex Differences: Two Examples to Show How Research Findings are Complex and Can Be Used to Support Opposing Theories

Before I address some of the issues related to teaching about sex differences and similarities in cognitive abilities, I present two examples of the incendiary nature of research on this topic.

Stereotype Threat Is Not a Simple Concept

I am willing to bet that everyone reading this article knows something about stereotype threat. Research in this area has become a cottage industry ever since Steele (1997) provided powerful demonstrations of the way negative group stereotypes can depress performance on difficult and important tasks. There is a huge research literature on stereotype threat conducted in laboratories around the world showing that it can depress the scores of stereotyped groups, including female performance on difficult math tests (Shih, Pittinsky, & Ambady, 1999). But nothing in psychology is clear-cut, and it is important that teachers convey some of the real-world messiness to their students. Consider the “war” between those who do and those who do not believe that stereotype threat has been demonstrated on high-stakes tests. In a study by Stricker and Ward (2006), students took the Advanced Placement (AP) Calculus AB Examination and the Computerized Placement Test under a threat condition (indicating if they were female or male before taking the test) or a no-threat condition (indicating their sex after taking the test). Stricker and Ward concluded that the effect size for this manipulation was too small to be meaningful. Danahar and Crandall (2008), however, reanalyzed Stricker and Ward’s data and concluded that, although the effect size was small, 5.9% additional females and 4.7% fewer males would achieve a passing score of 3 or higher if students indicated their sex and race after the test. The result would be 2,789 more females starting college with credit already achieved for calculus. Thus, Danahar and Crandall concluded that stereotype threat has significant consequences on high-stakes tests, even though the effect size is small.

Stricker and Ward (2008) countered that Danahar and Crandall’s reanalysis was faulty because they made unwarranted assumptions about the data and ignored the finding that the mean difference in women’s AP scores was not statistically different. A distinguished group of psychologists have written to the president of the Educational Testing System and the College Board asking them to “refrain from collecting sensitive demographic information immediately prior to high-stakes testing” (Stroessner et al., 2012, ¶ 3). This request is based on hundreds of studies that show that stereotype threat harms the performance of stigmatized groups. At the time of writing this article, there has been no official response, but my personal guess is that the testing companies will change this procedure in the near future. I have no crystal ball, but it seems that there is no harm in collecting demographic data after testing or at the time students register for the test, which makes it hard to justify the current practice.

The controversy over stereotype threat brings several important topics together, including the idea that small effects can have large consequences and that these consequences can potentially alter public policies. So far, we cannot know who will win this particular battle. There are good data showing that stereotype threat can account for some of the differences found on standardized tests, which tend to favor males, especially when the tests are not directly related to what is taught in schools. Moreover, at least two meta-analyses have shown that...
stereotype threat may be responsible for a portion of the sex differences on some cognitive measures (e.g., 19–21 points on SAT Mathematics), but a substantial difference still remains, even when we take stereotype threat into account (Nguyen & Ryan, 2008; Walton & Spencer, 2009).

Cross-Cultural and Other Head-Scratching Data

A majority of studies about cognitive sex differences have used data collected in the United States and other westernized countries, a phenomenon known as “Myopia USA.” Fortunately, this is changing, and we are now able to compare data collected from many different regions of the world. Massive data collection on the Internet, especially from the large-scale British Broadcasting Corporation site, has yielded samples of over 500,000 from people of all ages in many countries. But the results are not easy to interpret and are likely to disappoint almost everyone who holds firmly to either a mostly biological or mostly environmental explanation of cognitive sex differences.

In cross-cultural comparisons, countries are ranked along a scale of gender equity (there are international rankings available), and scores on various tests are compared for females and males. As the environmentalists would predict, the male advantage in standardized math tests virtually disappears in societies that are high on gender equity. But reading performance shows a different pattern of results. Guiso, Monte, Sapecinza, and Zingales (2008, p. 1165) found that, “In more gender-equal societies, girls perform as well as boys in mathematics and much better than them in reading.” But the size of the difference in visuospatial skills (skills used when reasoning from visual displays), where males typically outperform females, grows larger in egalitarian countries (Lippa, Collaer, & Peters, 2009). If you think these results are just an anomaly, studies in other areas of psychology have also shown an increase in sex differences in countries that are “prosperous, healthy, and egalitarian” (Schmitt, Realo, Voracek, & Allik, 2008, p. 168). In a study of personality traits across 55 different cultures, Schmitt, Realo, Voracek, and Allik (2008) reported that sex differences were larger in cultures in which women have opportunities that are more equal to those of men. Specifically, women scored higher than men on personality scales that measured neuroticism, agreeableness, extraversion, and conscientiousness, and these differences were largest in the most egalitarian cultures.

Finally, other types of data show the impossibility of finding simple answers to questions about cognitive sex differences. These differences are present throughout the life span (Maylor et al., 2007), and infants as young as 4 months old show sex differences (favoring males) in some visuospatial tasks (Quinn & Liben, 2008). Want more? The size of the male advantage among the most gifted takers of standardized tests has shrunk dramatically over the last several decades, but the ratio has plateaued at between three and four males for every female among the top 0.01% (Wai, Cacchio, Putallaz, & Makel, 2010).

Ultimately, we need to recognize that biological and social/environmental influences are not independent variables. Biological predispositions alter the environments we select, and our experiences in these environments affect biology. Depending on the environment, we could be enhancing, creating, diminishing, or eliminating cognitive sex differences.

The Biological Revolution: How It Is Driving (Sometimes in the Wrong Direction) Our Thinking About Cognitive Sex Differences

Another factor that has changed the way we think about cognitive sex differences is the biological revolution. Modern neuroscience has permeated every area of psychology and the other sciences and social sciences, but even with its rapid developments, it is clearly in its own infancy. One of the most distressing outcomes of modern neuroscience is the way findings are being misused to advance political agendas. Fine (2010) coined the term “neurosexism” for the misuse of neuroscience to justify sex-role stereotypes. In a clever play on words, she called the irresponsible use of findings from the brain sciences “brain scams.” Supporters of the idea that men and women are essentially different—not just in their respective roles in reproduction, but also in how they learn and think—cite differences in the female and male brain to support their conclusions (e.g., Brizendine, 2006). These supporters do not seem to understand that there are very long leaps from neurons to actual behavior and that experiences alter the brain. Like any field, there are careful neuroscientists who make claims that are appropriate for the evidence. But there is also real junk. The egregious examples of junk need to be explained and contrasted with the careful work of other brain researchers in this area.

Consider, for example, the following argument for why boys and girls need separate classrooms: The founder of the National Association for Single-Sex Public Education (Sax, 2006, p. 195) has argued that because of physiological differences in how boys and girls hear sounds, teachers in boys’ classrooms should “speak loudly and in short, direct sentences with clear instructions: ‘Put down your papers. Open your books. Let’s get to work! Mr. Jefferson, that includes you.’.” In contrast, in the girls’ classrooms, teachers should “speak much more softly, using more first names with more terms of endearment and fewer direct commands: ‘Lisa, sweetie, it’s time to open your book. Emily, darling, would you please sit down for me and join this exercise?’.” There are no physiological data that support these recommendations, but statements like these have led many teachers to educate girls and boys separately, complete with different lighting in the room (dimmer for girls), heating (warmer for girls), and learning activities (more active for boys, more group work for girls). The American Council for CoEducational Schooling (coedschools.org) was formed in response to the misuse of biological data in public education. Its mission is “to promote and improve coeducation in schools from preschool through higher education.” (Disclaimer: I am a member of this group.) It is a new world of stereotyping, this time justifying itself with bad science.

Fortunately, there have been good outcomes from modern neuroscience. Perhaps one of the greatest contributions from the biological revolution is that we can now see changes in the
brain that result from experience. In a strange twist, modern biological techniques have advanced our understanding of the importance of environmental variables. It allows us to “see” how environmental variables “get into” our brains, thereby blurring the line between nature and nurture.

**Special Problems When Teaching About Cognitive Sex Differences and Similarities**

Most psychology faculty will agree that psychology is an empirical science, which means that data should inform our work. But there are at least three problems that teachers often encounter when teaching about cognitive sex differences and similarities. First, depending on where you teach, religion is likely to be influencing the way many of your students interpret research findings. As if the topic was not already “hot” enough, with religious beliefs added in, no wonder many faculty prefer to avoid the topic of sex differences.

Whenever students raise religious beliefs, as they usually do at some point in the semester, I try to understand what they are really asking. Our cultural background strongly influences what we believe to be “true” and “normal,” and culture frequently covaries with religion. For example, when a student states that it is “natural” for women to stay at home with children, I try to determine the origin of this belief. I never dispute student beliefs about what is “natural,” but I do try to get them to think about the origins of their beliefs. Did this belief come from their personal experiences, knowledge about what is valued in their culture, or is it part of a religious doctrine? Otherwise, I can end up like an embarrassed parent who, upon hearing her young child ask, “Where did I come from?”, launches into a long story about the birds and the bees, when, in reality, the child simply wanted to know where the family used to live.

I also always make a distinction between religion and science. Religion is a matter of faith, whereas science requires evidence. Unfortunately, this distinction sometimes rings hollow. In a recent class, we spent a week reviewing research about cognition in gays and lesbians. We read about six studies—although there are more (see Halpern, 2012 for a complete list)—that found average differences in the cognitive patterns of gay and straight men. When we review research in my courses, the question we always come back to is, “What does that mean?” There are religions that believe being gay or lesbian is a sin—as students often remind me. I want my students to question their thinking about sex and cognition, but it is not my intention to have them question their faith—that is not my job. Can I do one without the other? This is a difficult question, but I believe that as psychologists, we have an obligation to provide students with accurate information on the research that studies difficult topics. If we fail to do this in our classes, where else will our students learn about this research? Our students cannot reconsider their prior unquestioned beliefs if we do not help them understand what the research on a controversial topic shows.

A second problem is related to one of the core concerns that arise when teaching about any group differences: How do you avoid obscuring or minimizing the overwhelming similarities between males and females in a class where you are talking about differences? This is a legitimate question, and the answer is “very carefully.” There are mountains of data, so it is important to be balanced and fair in the way you present the data and to remind the class repeatedly that the question about whether females and males are similar or different is a false dichotomy. They are both similar and different. The bigger challenge is to understand why and when we find similarities and differences.

A third problem relates to unstated fears and assumptions. An elephant is a large (and smelly) animal. When there is “an elephant in the room,” we are referring to an important issue that people are deliberately avoiding. The elephant that teachers often encounter when teaching about cognitive sex differences is the usually unstated concern that women and girls do not have the cognitive abilities to be scientists, engineers, or mathematicians. Some psychologists have said that men evolved better brains for the spatial reasoning that underlies these academic areas as an evolutionary by-product of being the hunters in hunter-gatherer societies. But there is another smelly animal in our classrooms—a 600-pound gorilla. Women comprise a majority of college enrollments, and their earnings, although still far behind those of men, have been growing at a faster rate (U.S. Department of Education, 2009). More males drop out of school, leading some to label contemporary society as a “war on boys.” Both smelly animals, the elephant and the gorilla, can be banished with some hard work. Evolutionary theories ignore the many spatial skills needed by the women gatherers who had to find crops in different locations that varied with the season and who had to find their way in a nomadic society. Similarly, there are many areas in which men (on average) excel, and they still earn more money than comparably educated women and overwhelmingly occupy leadership positions (Halpern & Cheung, 2008).

**Guiding Class Discussions: Two Really Big Questions**

Here are two questions that you can use to guide class discussions on cognitive sex differences and similarities: (a) What is the meaning of “differences?” and (b) Why are we so afraid of them? In response to the first question, we need to reiterate the fact that “differences” are not “deficiencies.” Groups can differ, on average, but that does not mean that one group is superior to the other. In fact, the research on cognitive sex difference shows that females perform better than males on some types of cognitive tasks, and males perform better than females on other types of cognitive tasks (e.g., Pearman, 2009; Programme for International Assessment, 2009; Voyer, Postma, Brake, & Imperato-McGinley, 2007). There is no evidence for a smarter sex. Although some psychologists have claimed that one sex is smarter than the other, they are wrong. I believe these psychologists routinely disregard evidence showing that, although there are some differences, there is no support for the idea of a smarter sex.
With regard to the second question—Why are psychologists, educators, and many others afraid of differences research?—the answer is, “Because we should be.” Many people fear that research findings will be misused in ways that support a misogynist agenda or that they will be used to legitimate false stereotypes and provide fuel for those determined to convince the world of the inferiority of females. Such fears are understandable, given social inequalities such as “mommy tracks” and “glass ceilings” that work against women in industrialized countries and the disproportionate rates of abortion and infanticide of females in many other regions of the world (Kristof, 2010). In response to the naysayers, I counter that sex is a fundamental component of everyone’s identity; it is the primary way of classifying humans into groups. Does it make sense to ignore such a primary variable or pretend that it is not important?

Ultimately, findings of group differences have been used against minority groups throughout history and are still being used against women in many parts of the world. But the only alternative to an open and full inspection of the relevant data is censorship and that will not reduce stereotypes or create a more just world.

The Hard Business of Sense Making

When I taught a course on cognitive sex differences in Turkey, a perceptive student recognized that I was culturally disadvantaged and suggested that I consult the centuries-old wisdom of The Hoca. According to Turkish legends (with similar legends in other countries), Nasreddin Hoca was a 13th-century folk philosopher who was well known for his witty anecdotes that reflected a philosophy based on intelligence. Stories about him are well known throughout Eastern Europe. Let me tell you one.

Hoca was once a judge. One day a man came to his house to complain about his neighbor. Hoca listened carefully and then said to him, “My good man, you are right.”

The man went away happily. Later, the first man’s neighbor came to see Hoca. He complained about the first man. Hoca listened carefully to him too and then said, “My good man, you are right.”

Hoca’s wife had been listening, and when the second man left, she turned to Hoca and said, “Hoca, you told both men they are right. That’s impossible. They can’t both be right.”

Hoca listened carefully to his wife and then said to her, “My good woman, you are right.”

The next time someone tells you that sex differences in cognitive abilities are caused by stereotypes, or by mothers’ attitudes, or by hormones, please recall the ancient wisdom of the Hoca. I ask you to recognize that each of the various perspectives on the complex issues of sex and cognition is both right and wrong. We cannot expect simple answers to complex problems.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

Note

a. I use the term “sex” to refer to both biological and psychosocial aspects of the differences between males and females because these two aspects of human existence are so closely coupled in our society. It is frequently difficult or impossible to decide if the differences that are found between females and males are due to biological (sex) differences or the psychosocial concomitants (gender) of biological sex.

References


**Author Biography**

**Diane F. Halpern** is the McElwee Family Professor of Psychology at Claremont McKenna College and a past president of the American Psychological Association. She has published hundreds of articles and many books including, *Thought and Knowledge: An Introduction to Critical Thinking* (5th ed., 2014), *Sex Differences in Cognitive Abilities* (4th ed.), and *Women at the Top: Powerful Leaders Tell Us How to Combine Work and Family* (coauthored with Fanny Cheung). Her other recent books include *Psychological Science* (4th ed. with Michael Gazzaniga and Todd Heatherton) and the edited book, *Undergraduate Education in Psychology: A Blueprint for the Future of the Discipline*. Her most recent projects are the development of Operation ARA, a computerized game that teaches critical thinking and scientific reasoning (with Keith Millis at Northern Illinois University and Art Graesser at University of Memphis) and the Halpern Critical Thinking Assessment (Schuhfried Publishers) that uses multiple response formats that allow test takers to demonstrate their ability to think about everyday topics using both constructed response and recognition formats.