

1 DIFFERENCES

We're entering a new period in science, in which the rewards will come less from the breakthrough investigations of individual scientists than from fitting together the pieces of research to see what it all means . . . Social and biological insights are leaping together, part of a large and complex jigsaw puzzle to which the contributions of many sciences are essential.

—Shelley Taylor, professor of psychology, UCLA, 2002¹

Matthew turned five years old the summer before kindergarten started. He was looking forward to it. From what he had heard, kindergarten sounded like just one long play date with friends. He could hardly wait. So his mother, Cindy, was surprised when, in October, Matthew started refusing to go to school, refusing even to get dressed in the morning. More than once, Cindy had to dress him, carry him writhing and thrashing into the car, and then drag him from the car into the school. She decided to investigate. She sat in on his kindergarten class. She spoke with the teacher. Everything seemed fine. The teacher—gentle, soft-spoken, and well-educated—reassured Mom that there was no cause for alarm. But Cindy remained concerned, and rightly so, because major problems were just around the corner.

Caitlyn was a shy child and just the slightest bit overweight all through elementary school. In middle school, she underwent a metamorphosis from chubby wallflower to outgoing socialite. She lost weight so quickly that her mother, Jill, worried she might be anorexic. For the next four years, though, everything seemed great—in a frantic and crazy sort of way. Caitlyn was juggling a heavy academic load, had lots of friends, and maintained a full schedule of after-school activities, staying up until midnight or later doing homework. But she seemed happy enough: often frenzied and frazzled, sure, but still happy. Or at least that's what everybody thought until the phone rang at 3 A.M. that awful, unforgettable November night. A nurse told Jill that Caitlyn was in the emergency room, unconscious, having tried to commit suicide with an overdose of Vicodin and Xanax.

These true stories² share a grim common element: each kid started out okay, then took a turn in the wrong direction. There is another element in common as well. In both cases the problem arose because the parents did not understand some basic differences between girls and boys. In each case, trouble might have been averted if the parents had known enough about gender differences to recognize what was really happening in their child's life. In each case, the parents could have taken specific action that might have prevented or solved the problem.

We will come back to both of these kids later in this book. Right now it may not be obvious to you how each of these stories illustrates a failure to understand sex differences in child development. That's okay. Later on, we'll hear more about Matthew and Caitlyn. Armed with some basic knowledge about hardwired gender differences, you'll be able to recognize where the parents made the wrong decision or failed to act, and you'll see how the story might have ended differently.

The Dubious Virtue of Gender-Neutral Child-Rearing

I enrolled in the Ph.D. program in psychology at the University of Pennsylvania in September 1980. Governor Ronald Reagan was challenging President Jimmy Carter for the Presidency. The original Apple computer had recently come on the market. "My typewriter is working fine," was the answer the department secretary gave me when I asked her whether she would be getting a word processor anytime soon. Nobody I knew had ever heard of Bill Gates, e-mail, or the Internet. The invention of the World Wide Web still lay ten years in the future.

Among the courses I took that fall was a graduate seminar in developmental psychology. "Why do girls and boys behave differently?" my professor, Justin Aronfreed, asked rhetorically. "Because we *expect* them to. Imagine a world in which we raised girls to play with tanks and trucks, in which we encouraged boys to play with dolls. Imagine a world in which we played rough-and-tumble games with girls while we cuddled and hugged the boys. In such a world, many of the differences we see in how girls and boys behave—maybe even *all* the differences—would vanish."

In another seminar my fellow graduate students and I learned about the extraordinary work of Professor John Money at Johns Hopkins. Professor Money had been consulted by the parents of an unfortunate little boy whose penis had literally been sizzled off during a botched circumcision. At Dr. Money's recommendation, the boy had been raised as a girl, with excellent results (according to Dr. Money). The child loved to play dress-up, enjoyed helping Mom in the kitchen, and disdained "boy toys" such as guns or trucks. "Dr. Money's work provides further evidence that most of the differences we observe between girls and boys are socially constructed," professor Henry Gleitman told us. "We reward children who follow the sex roles we create for them while we penalize or at least fail to reward children who don't conform. Parents create and reinforce the differences we observe between girls and boys."

We nodded sagely. In clinical rotations we often encountered parents who still clung to the quaint notion that girls and boys were different from birth. But we knew better.

Or so we thought.

When I left Philadelphia to begin my residency in family practice, I threw out most of the papers I had accumulated during my six years at the University of Pennsylvania. Stacks of photocopied scientific papers had to go out in the trash. But there was one manila folder I didn't throw out, a folder containing a series of studies done by Professor John Corso at Penn State during the 1950s and 1960s, demonstrating that females hear better than males.³

Four years later, after I finished my residency, my wife and I established a family practice in Montgomery County, Maryland, just outside of Washington, D.C. Years passed. I wasn't thinking much about gender differences. Then in the mid-1990s, I began to notice a parade of second- and third-grade boys marching into my office, their parents clutching a note from the school. The notes read: "We're concerned that Justin [or Juan or Michael or Tyrone] may have attention deficit disorder. Please evaluate."

In some of these cases I found that what these boys needed wasn't drugs for ADD, but rather a *teacher* who understood the hardwired differences in how girls and boys learn. Upon further inquiry, I found that nobody at the school was aware of gender differences in the ability to hear. I reread Professor Corso's papers, which documented that boys don't hear as well as girls. In the next chapter we'll look more closely at evidence for gender differences in hearing.

Think about the typical second-grade classroom. Imagine Justin, six years old, sitting at the back of the class. The teacher, a woman, is speaking in a tone of voice that seems about right to her. Justin barely hears her. Instead, he's staring out the window, or watching a fly crawl across the ceiling. The teacher notices that Justin isn't paying attention. Justin is demonstrating a deficit of attention. The teacher may reasonably wonder whether Justin perhaps has attention deficit disorder.

The teacher is absolutely right about Justin showing a deficit of attention. But his attention deficit isn't due to "attention deficit disorder," it's due to the fact that Justin can barely hear the soft-spoken teacher. The teacher is talking in a tone of voice that is comfortable to her and to the girls in the class, but some of the boys are practically falling asleep. In some cases we might be able to fix the problem simply by putting the boy in the front row.

Once, after I had done such an evaluation and made my recommendations, the parents told me that the school had advised them to seek a second opinion. "It's not that we don't trust you, Dr. Sax," Mom said. "It's just that the school really thinks we should get an opinion from an expert."

I soon learned that the only doctors that this particular school considered to be "experts" were doctors who always prescribed medication. Curious to know whether my experience was unique, I obtained funding from the American Academy of Family Physicians to survey all the doctors in the Washington area. Our survey basically asked one simple question: Who first suggests the diagnosis of ADD? The results: in the majority of cases the diagnosis of ADD is made by the teacher. Not by the parents, nor the neighbors, nor the doctor.⁴

There would be nothing wrong with teachers diagnosing their students as long as they had the training—and the resources, and adequate *time*—to distinguish the boy with ADD from the boy who just doesn't hear as well as most girls do. But after talking to dozens of teachers in our county, I didn't find one who was aware of the studies showing that girls hear better than boys.

"You should write a book, Dr. Sax," one of these parents told me. "Write a book so that teachers know about the differences in how girls and boys hear."

I allowed myself a patronizing smile. "I'm sure that there must already be dozens of such books for teachers, and for parents," I said.

"There aren't," she said.

"I'll find some for you," I said.

That conversation took place about seven years ago. Since then I've read lots of popular books about differences between girls and boys. And guess what. That mom was right.

Not only do most of the books currently in print about girls and boys fail to state the basic facts about innate differences between the sexes, many of them promote a bizarre form of political correctness, suggesting that it is somehow chauvinistic even to hint that any innate differences exist between female and male. A tenured professor at Brown University recently published a book in which she claims that the division of the human race into two sexes, female and male, is an artificial invention of our culture. "Nature really offers us more than two sexes," she claims, adding, "Our current notions of masculinity and femininity are cultural conceits." The decision to "label" a child as a girl or a boy is "a social decision," according to this expert. We should not label any child as being *either* a girl or a boy, this professor proclaimed. "There is no either/or. Rather, there are shades of difference."⁵ This book received courteous mention in the *New York Times* and the *Washington Post*. America's most prestigious medical journal, the *New England Journal of Medicine*, praised the author for her "careful and insightful" approach to gender.⁶

I soon assembled a small library of best-selling books that counsel parents that the best child-rearing is *gender-neutral* child-rearing. These books tell parents that true virtue is to be found in training your child to play with toys traditionally associated with the opposite sex. You should buy dolls for your son, to teach him how to nurture.⁷ You should buy an Erector set for your daughter. The underlying assumptions—that giving dolls to boys will cause boys to become more nurturing, or that giving girls Erector sets will improve girls' spatial relations skills—are never questioned. In fact, no scientific evidence exists to support the claim that gender-neutral child-rearing has any measurable benefit, regardless of which parameter you measure.⁸

On the same bookshelf you can find books that do affirm the

existence of innate differences in how girls and boys learn. But what books! Books with titles like *The Wonder of Boys* and *Girls Will Be Girls* promote antiquated and inaccurate gender stereotypes. "Girls are more emotional than boys." "Boys have a brain-based advantage when it comes to learning math." As we'll see, those familiar notions turn out to be false.

On one hand, you have books claiming that there are no innate differences between girls and boys, and that anybody who thinks otherwise is a reactionary stuck in the 1950s. On the other, you have books affirming innate differences between girls and boys—but these authors interpret these differences in a manner which reinforces gender stereotypes.

These books have only one thing in common. They are based less on fact, and more on their authors' personal beliefs or political agenda—either to deny innate sex differences, or to use sex differences in child development as a justification for maintaining traditional sex roles.

After waiting a few years for somebody else to write a book about girls and boys based on actual scientific research, I finally decided to write one myself. But I made myself a promise. Every time I make any statement about how girls and boys are different, I will also state the evidence on which my statement is based. Every statement I make about sex differences will be supported by good science published in peer-reviewed journals.

There is more at stake here than the old question of nature versus nurture. The failure to recognize and respect sex differences in child development has done substantial harm over the past thirty years—such will be my claim throughout this book. Children today face challenges that are substantially different from those you faced as a child or teenager, fifteen or twenty or thirty or forty years ago. Look at the statistics on drugs and alcohol, for starters. Teenage girls today are four times more likely to drink than their mothers were. They're *fifteen* times more likely to use drugs than their mothers were.⁹ Traditionally, alcohol abuse has been more of a problem for teenage boys than for teenage girls. Not anymore. In a report published in 2004, the

National Research Council reported that young teenage girls are now *more* likely than boys to be drinking alcohol regularly—not because boys are drinking less, but because girls are drinking more.¹⁰

If girls have closed the gender gap with regard to alcohol abuse, boys are still more likely to be getting into trouble with drugs. According to FBI statistics, the number of boys under eighteen arrested for drug abuse offenses has increased by more than 50 percent in the past ten years; boys under eighteen are still five times more likely to be arrested for drug abuse violations than are girls under eighteen.¹¹ In chapter 7, I'll explore how the cultural and professional neglect of sex differences has compounded the drug problem.

But school, not drugs, is the "new" problem for boys. While today's girl is more likely to have problems with drugs and alcohol than her mother was, today's boy is much more likely to be struggling in school than his father was. Boys today are increasingly alienated from school. Recent investigations have shown a dramatic drop over the past twenty years in boys' academic performance in American schools.¹² According to the United States Department of Education, the average eleventh-grade American boy now writes at the same level as the average eighth-grade girl.¹³ Similar gender gaps have been documented in the United Kingdom, Australia, New Zealand, and Canada.¹⁴ And the percentage of boys going on to college, and graduating from college, is falling. The U.S. Department of Education now projects that in the year 2011, there will be 140 women graduating from college for every 100 men—very nearly a 60/40 female-to-male ratio.¹⁵

The future may already have arrived. Several major U.S. colleges and universities, such as New York University and the University of North Carolina, already report that their student body is more than 60 percent female.¹⁶ I'm all in favor of women's colleges, but you have to ask the question: Why are nominally coed schools looking more and more like all-women's colleges? The proportion of boys going on to college is

dropping steadily, as is the proportion of young men who are sticking around long enough to graduate. The high school dropout rate in the United States is now close to 30 percent, and the great majority of dropouts are boys.¹⁷ More and more boys, discouraged by years of failure in elementary school, middle school, and high school, are asking: "Why should I stick around for any more of this?" Later in the book we'll hear from teachers who know how to *use* gender differences to kindle real enthusiasm for learning in both girls and boys.

Still, many educators and policymakers stubbornly cling to the dogma of "social constructionism," the belief that differences between girls and boys derive exclusively from social expectations with no input from biology. Stuck in a mentality that refuses to recognize innate, biologically programmed differences between girls and boys, many administrators and teachers don't fully appreciate that girls and boys enter the classroom with different needs, different abilities, and different goals.

In 2001, Republican Senator Kay Bailey Hutchison joined with Democratic Senator Hillary Clinton to craft new legislation legalizing single-sex education in American public schools. Their statute passed the Senate by a unanimous vote and is now law. Since the passage of their amendment, the number of public schools in the United States offering single-sex educational options has more than tripled.¹⁸ Single-sex education is enjoying surging popularity in Australia, New Zealand, the United Kingdom, and Ireland.¹⁹ At various points throughout the book we will consider the pros and cons of single-sex schools and single-sex activities, such as the Girl Scouts. I will suggest that for at least some children in some circumstances, single-sex activities offer unique opportunities and may even serve to "inoculate" girls and boys against some of the societal ailments that now threaten children and teenagers.

For the past three years I've been invited to schools around the United States and Canada to speak to teachers about differ-

ences in how girls and boys learn. I've been struck by the similarities between good teachers and good parents. They both stay up late at night agonizing how best to help a child. They both may shed tears when they tell me how they've struggled with a particular child. Good teachers and good parents both understand that every child is unique. Both want to help every child achieve his or her full potential. Teachers and parents are *partners* in helping each child grow up to be the woman or man that child was meant to be.

As you read through the book you'll find that I speak to you sometimes as though you're a parent, sometimes as though you're a teacher. In chapter 7, for example, I'll suggest how you might talk with your daughter or son about drugs. In chapter 5, I'll share some tips on teaching math to girls in a way that gets girls excited about learning math, and also some ideas for keeping boys interested in art. I hope you'll read chapter 5 as well as chapter 7, even if you're not a teacher. Because when you get right down to it, every parent *is* a teacher, and education begins at home.

2

FEMALE BRAINS, MALE BRAINS

There is increasing evidence to suggest that the brain is a sexual organ, that brain sex [i.e., the sex of the brain] is paramount in determining human gender identity.

—pediatric endocrinologists Dr. Gaya Aranoff and
Dr. Jennifer Bell, Columbia University, 2004¹

Left Brain Verbal, Right Brain Spatial?

In the late 1800s, French neurologist Charles Edouard Brown-Séquard and British neurologist Henry Charlton Bastian independently discovered that the left side of the brain seems to be specialized for language. A man who suffers a stroke affecting the left side of the brain is much more likely to lose language functions than a man who suffers a stroke on the right side of the brain. The right side of a man's brain seems to be specialized for spatial functions such as navigation or mental imagery. But does this rule—left brain verbal, right brain spatial—apply to women as well as it applies to men?²

The modern era of research in gender differences may be said to have begun in 1964, when Herbert Lansdell reported the existence of anatomic sex differences in the organization of female and male brains.³ Over the next two decades, a series of studies demonstrated that while the left hemisphere of the brain is

clearly specialized for language functions in *men*, that asymmetry is much less noticeable in *women*.⁴ Research with people who have suffered a stroke provided further support for the notion that male brains and female brains are organized differently, with functions more compartmentalized in male brains and more globally distributed in female brains. For example, men who suffer a stroke involving their brain's left hemisphere suffer a drop in verbal IQ of, on average, about 20 percent (from 111.5 to 88.7); men who suffer a stroke which affects their brain's *right* hemisphere suffer virtually no drop at all in their verbal IQ. If you damage a man's left hemisphere, he loses a big chunk of his language abilities; damage a man's right hemisphere, and his language ability is not affected. That sort of information provides strong evidence that the left hemisphere of a man's brain is very important for language, while the right hemisphere of a man's brain is not.

Women are different. Women who suffer a stroke affecting their brain's left hemisphere suffer a drop in their verbal IQ, on average, of about 9 percent (from 113.9 to 103.6); women who suffer a stroke affecting their brain's right hemisphere suffer a similar drop in verbal IQ, about 11 percent (from 113.9 to 101.0).⁵ Women use both hemispheres of their brain for language. Men don't.

By the mid-1980s it was clear that the hemispheric compartmentalization of function that is so obvious in men's brains—left brain verbal, right brain spatial—applies less well or not at all to female brains. At that time most scientists believed that these differences in the brain derived from hormonal differences. Harvard neurologist Norm Geschwind and others suggested that male hormones were responsible for the hemispheric specialization seen in male brains.⁶

The belief that hormones are responsible for sex differences in the brain led many scientists to believe that sex differences must be small in the brains of children. After all, prepubescent children don't manufacture sex hormones in large quantities.

Were those scientists right?

Probably not. Research in laboratory animals, for starters, has demonstrated large, innate, genetically determined sex differences in the brain. One striking illustration of this principle was published in 2004 by scientists at UCLA. They examined a bird that was a lateral gynandromorphic hermaphrodite: in other words, a bird that was half-female and half-male. Every cell on the right side of this bird's body was male; every cell on the left side of this bird's body was female. This bird had a testicle on the right and an ovary on the left. If you look at a picture of this



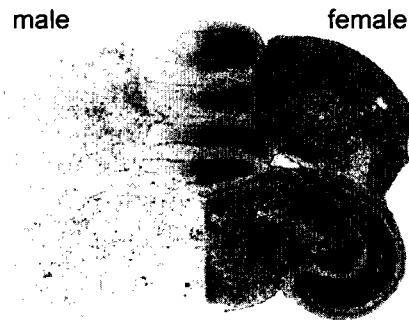
Hermaphrodite bird provides a clue to the importance of hardwired sex differences.

bird, you will notice that it has male plumage on the right and female plumage on the left. This bird's blood contains a mix of female and male hormones: female hormones manufactured by the ovary and male hormones from the testicle.

Now let's take a look at this bird's brain. If the theory popular in the 1970s and 1980s were correct, we shouldn't see big differences between the left and right sides of this bird's brain. The brain of this bird is nourished with blood that contains an equal

mix of female and male hormones. So, if hormones are responsible for sexual differentiation of the brain, then the left and right sides of the brain should look the same.

But they don't. The left and right sides of this bird's brain are



Male brain tissue is intrinsically different from female brain tissue.

dramatically different. Scientists who have studied this bird have concluded that female brain tissue and male brain tissue are "intrinsically different," as a result of females and males having a different complement of sex chromosomes—and regardless of the mix of hormones in the blood.

Maybe that's true for birds, but what about humans? In fact, recent research suggests that female brain tissue is "intrinsically different" from male brain tissue in our species just as in other animals. In 2004 an all-star team of fourteen neuroscientists from the University of California, the University of Michigan, and Stanford University published their findings demonstrating a dramatically different expression of proteins derived from the X chromosome and the Y chromosome in human female and male brains. In men, many areas of the brain are rich in proteins that are coded directly by the Y chromosome. Those proteins are absent in women's brain tissue. Conversely, women's brain tissue is rich in material coded directly by the X chromosome; these particular transcripts of the X chromosome are absent

from men's brain tissue.⁸ These sex differences, then, are *genetically programmed*, not mediated by hormonal differences.

These scientists analyzed thirty samples of human brain tissue collected from different areas of the brain and different individuals. The scientists were not told the sex of the individuals from whom the specimens were taken. But just by analyzing the expression of two different genes in the brain tissue, they were able to correctly identify the sex of every one of the thirty specimens, female versus male. Female brain tissue and male brain tissue are intrinsically different.

Stop and think about this for a moment. This new research shows that females get more from their X chromosomes than males do,⁹ and that the Y chromosome in men is directly responsible for differences in the brain. Differences. Not one better than the other. Not one worse than the other. Just different.

Scientists continue to recognize that sex hormones do affect the brain. However, this recent research has also demonstrated that the direct effect of the sex chromosomes on brain tissue need not be mediated by hormones. It's genetically programmed. It's present at birth.

Sex differences in brain anatomy are all well and good, but do they matter? Do those sex differences in brain anatomy mean that there are sex differences in brain *function*? Are there significant differences in how girls and boys hear, or how they see, or how they learn? And if so, are those differences present at birth? Or not?

Lessons from the Nursery

Janel Caine, a graduate student at Florida State University in the late 1980s, was interested in studying the effects of music therapy on premature babies. Some researchers believed that playing soft music in a baby's crib might help relax the baby, which might improve the baby's appetite, so the baby would grow faster. Janel Caine wanted to test that hypothesis. She ob-

tained permission from parents of twenty-six premature babies to play soft music in the babies' cribs. She also enrolled twenty-six other premature babies, matched in age and weight to the first set, but those babies didn't get to hear any music. Sure enough, she found that babies who had music played in their crib grew faster, had fewer complications, and were able to be discharged home from the hospital about five days earlier on average than babies who didn't receive music therapy.

Janel Caine's master's thesis is still on file deep in the stacks of Florida State University's Robert Manning Strozier Library. Go to that library and ask to borrow her thesis. Flip to the back and you'll see the results broken down by gender. When you review those data tables, you'll find something unexpected. Girl babies who received music therapy left the hospital nine and a half days earlier on average than girl babies who did not. But *boy* babies who received music therapy did not leave the hospital *any* earlier than boys who did not! Music therapy was very beneficial for the girls, but not at all beneficial for the boys. Curiously, Ms. Caine never mentioned this gender difference in her results, neither in her thesis¹⁰ nor in her subsequent publication.¹¹

A more recent study with even younger, more premature babies, confirmed both Ms. Caine's overall findings as well as the gender difference in the results. In this later study, young women hummed the Brahms lullaby over and over to some premature babies, but not others. Overall, babies who had women humming to them were discharged on average six days earlier than babies who didn't. This time the gender difference in the results was even larger. Premature girl babies who were hummed to left the hospital *twelve days earlier* on average than girl babies who weren't. But premature boy babies who were hummed to didn't leave the hospital any earlier than boy babies who weren't.¹²

Why the difference? Why did music therapy work so well for the girls and not at all for the boys? The most plausible explanation is simply that boy babies don't hear the music as well, or in the same way that girl babies do.

There's good evidence now, from several different sources, that newborn baby girls really do hear better than newborn baby boys. Pediatric audiologists Barbara Cone-Wesson, Glendy Ramirez, and Yvonne Sininger have done careful studies of the hearing of newborn babies. When any baby or child (or adult for that matter) hears a sound, there's an immediate reaction, called an acoustic brain response. Cone-Wesson and her colleagues decided to measure the acoustic brain response of more than sixty newborn girls and boys. For a 1,500 Hz tone played to the right ear, they found that the average girl baby had an acoustic brain response about 80 percent greater than the response of the average baby boy.¹³ (The range of sounds around 1,500 Hz is especially important, because that range of sound is critical for understanding speech.)¹⁴

This finding—that newborn baby girls hear differently than boys, especially at higher frequencies—was recently confirmed by Jane Cassidy, a professor at Louisiana State University. Professor Cassidy used a different technique than Cone-Wesson, Sininger, and Ramirez had used to evaluate hearing in newborns: specifically, Professor Cassidy used a technique known as transient evoked otoacoustic emissions.* Professor Cassidy, studying 350 newborn baby girls and boys, found that the girls' hearing was substantially more sensitive than the boys', especially in the 1,000- to 4,000-Hz range, which is so important for speech discrimination.¹⁵ Other studies have demonstrated that teenage girls (for example) do in fact hear better than boys do.¹⁶ The female-male difference in hearing only gets bigger as kids get older.¹⁷

These built-in gender differences in hearing have real consequences. As we've seen, music therapy works for girl babies but not for boy babies—although perhaps it might work for baby boys if the volume was adjusted or if other characteristics of the music were altered. Janel Caine used the Brahms lullaby, "Rock-

*We humans, like all mammals, hear because little "hairs" on cells in our inner ear are very sensitive to sound. Those "hair cells" wiggle when they detect a sound. That wiggling generates a subtle acoustic response, which is the transient evoked otoacoustic emission.

a-Bye Baby," "Twinkle Twinkle Little Star," and similar songs. The later study, as we saw, used only the Brahms lullaby. Maybe boys would do better with Wagner's "Ride of the Valkyries" or Gregorian chant or Bruce Springsteen or Snoop Dogg. We just don't know.

The difference in how girls and boys hear also has major implications for how you should talk to your children. I can't count the number of times a father has told me, "My daughter says I yell at her. I've never yelled at her. I just speak to her in a normal tone of voice, and she says I'm yelling." If a forty-three-year-old man speaks in what he thinks is a "normal tone of voice" to a seventeen-year-old girl, that girl is going to experience his voice as being about ten times louder than what the man is hearing.¹⁸ He is yelling at her, but he doesn't realize it. The father and his daughter are experiencing the same sound in two different ways.

The gender difference in hearing also suggests different strategies for the classroom. More than thirty years ago, psychologist Colin Elliot demonstrated that eleven-year-old girls are distracted by noise levels about *ten times* softer than noise levels that boys find distracting.¹⁹ That boy who's *tap-tap-tapping* his fingers on the desk might not be bothering the other boys, but he is bothering the girls—as well as the (female) teacher. One reason for that difference, of course, is that eleven-year-old girls *hear* better. If you're teaching girls, don't raise your voice—and try to keep the classroom free of extraneous noise. Girls won't learn as well in a loud, noisy classroom. When we come back to this topic later in the book, we'll discover that the rules are different when you're teaching boys.

The Eye of the Beholder

Most girls and women interpret facial expressions better than most boys and men can.²⁰ Researchers at Cambridge University wondered whether female superiority in understanding facial expressions was innate or whether it developed as a result of so-

cial factors such as parents encouraging girls to interact with other girls while the boys shoot each other with ray guns. These researchers decided to study newborn babies *on the day they were born*.

Their plan was to give babies a choice between looking at a simple dangling mobile or at a young woman's face—more precisely, a live young woman, right there with the baby. The young woman smiled at the baby but didn't say anything. The mobile dangled and twisted but made no noise.

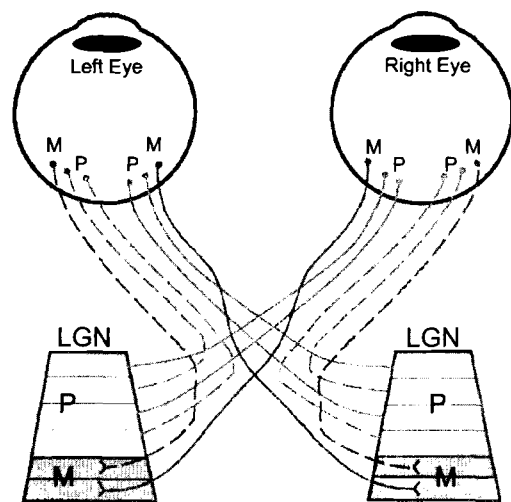
Was there a gender difference in what the babies preferred to look at? All 102 babies in the study were videotaped and their eye motions analyzed by researchers who didn't know the sex of the baby. The boy babies were much more interested in the mobile than in the young woman's face. The girl babies were more likely to look at the face. The differences were large: the boys were more than twice as likely to prefer the mobile. The researchers concluded that they had proven "beyond reasonable doubt" that sex differences in social interest "are, in part, biological in origin."²¹

The results of this experiment suggest that girls are born prewired to be interested in faces while boys are prewired to be more interested in moving objects. The reason for that difference has to do with sex differences in the anatomy of the eye.

The retina is that part of the eye that converts light into a neurological signal. The retina is divided into layers. One layer contains the photoreceptors, the rods and the cones. Rods are sensitive to black and white. Rods are color-blind. Cones are sensitive to color.

The rods and cones send their signals to the next layer, the ganglion cells. Scientists have known for many decades that some ganglion cells are very large (magnocellular), while others are small (parvocellular). Most papers on this topic just refer to them as M and P ganglion cells.

P cells and M cells have very different jobs. M cells are wired primarily to rods, with little input from cones; they are essentially simple motion detectors. M cells are distributed all across

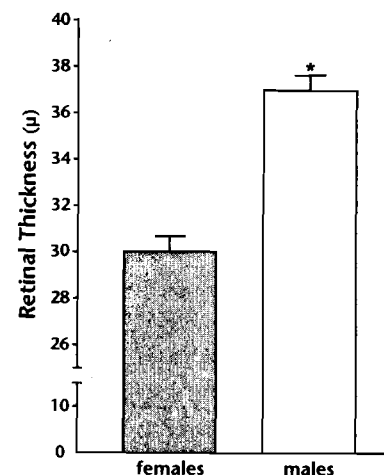


The visual system is organized differently in girls and boys.

the retina, so they can track objects anywhere in the visual field. You can think of the M cells as being wired to answer the questions "Where is it now and where is it going?" P cells are wired (in our species) to all three varieties of cones, but have much less input from the rods. P cells are concentrated in and around the fovea, the center of the field of vision. You can think of the P cells as answering the question "What is it?" P cells compile information about texture and color; M cells compile information about movement and direction.²²

The P cells send information via their own special division of the thalamus to a particular region of the cerebral cortex that appears to be specialized for analysis of texture and color. The M cells send their information via a separate pathway to a different region of the cerebral cortex, a region that is specialized for analysis of spatial relationships and object motion. And guess what? *Every step in each pathway, from the retina to the cerebral cortex, is different in females and males.*²³

The real surprises have come from microscopic analyses of



Because the female retina is rich in the smaller P cells, while the larger M cells predominate in the male retina, the male retina is much thicker than the female retina. Note the small variation within the sexes and the large difference between the sexes.

the eye performed in the past five years. Using recently developed techniques, scientists have found that the human retina is full of receptors for sex hormones.²⁴ Anatomist Edwin Lephart and his associates have found that the male retina is substantially thicker than the female retina.²⁵ That's because the male retina has mostly the larger, thicker M cells while the female retina has predominantly the smaller, thinner P ganglion cells.

We're not talking about small differences between the sexes, with lots of overlap. We're talking about large differences between the sexes, with no overlap at all. Every male animal had a thicker retina than any female retina, due to the males having more M cells (see the accompanying graph).

Suppose you give crayons and a blank sheet of paper to young girls and young boys. Let them draw whatever they like. You'll find that girls will prefer colors like red, orange, green, and beige, because those are the colors that P cells are prewired to be most sensitive to. Boys prefer to simulate motion in their

Summary of Differences between P Cells and M Cells

	P CELLS	M CELLS
Are wired predominantly to . . .	Cones	Rods
Are located mostly in . . .	The center of the retina (center of the field of vision)	All throughout the retina (entire field of vision, peripheral and central)
Are best adapted to detect . . .	Color and texture	Location, direction, and speed
Answer the question:	"What is it?"	"Where is it now? Where is it going? How fast is it moving?"
Ultimately project to:	Inferior temporal cortex	Posterior parietal cortex
Predominate in:	Females (more P cells than M cells)	Males (more M cells than P cells)

pictures. Boys prefer colors such as black, gray, silver, and blue because that's the way the M cells are wired.²⁶

Studies in young children have demonstrated that girls are better at tasks involving object discrimination—answering the question "What is it?"—whereas boys are better at tasks involving object location—"Where is it?" Similar sex differences in abilities have recently been demonstrated in young monkeys as well.²⁷

Sex differences in toy preferences start to make more sense once you understand this research. A richly textured doll will be more appealing than a moving truck if your system favors the P cells, as is the case in females. So we shouldn't be surprised that young females—whether human or monkey—prefer dolls over trucks, while young males, human and monkey, prefer trucks over dolls.²⁸ Nor should we be surprised when—in the Cambridge study referenced above—the girl babies look at the young woman's face, while boy babies look at the mobile.

Girls Draw Nouns, Boys Draw Verbs

Ms. Kanovsky teaches kindergarten. She's given each of her students a blank sheet of paper and told them to draw anything they like, using the colored crayons available to all the children. The teacher walks around the room encouraging each child. She stops by five-year-old Anita. Anita has about a dozen crayons spread out around her picture of three people. The people are facing the viewer, all smiling. Anita's picture is rich in reds, browns, oranges, and flesh tones. "That's wonderful, Anita," Ms. Kanovsky says. "Who are those people in the picture?"

"That's me," Anita says, pointing to one of the figures. "That's my brother Carlos, and that's my Mommy."

"That's really great, Anita," Ms. Kanovsky says. "Good job."

Five-year-old Matthew—the same Matthew we met in chapter 1—is frantically scribbling with a black crayon. "What's that?" Ms. Kanovsky says.

"It's a rocket about to smash into the Earth," Matthew says gleefully. "See! There's the rocket! There's the Earth!"

Ms. Kanovsky sees that Matthew has used only one crayon, the black crayon, for both the rocket and the Earth. There's no color, no people, no trace of any human anywhere. "That's nice, Matthew," Ms. Kanovsky says without conviction (despite her best efforts). "How about adding a little color? And is there anyone in the rocket?"

There is one thing that five-year-olds, both girls and boys, are very good at: figuring out what the grown-ups like. In this situation, I guarantee you that Matthew understands that his picture doesn't please Ms. Kanovsky the way Anita's picture does. In her defense, Ms. Kanovsky is applying the criteria she was taught. "Encourage children to draw people-centered pictures, using lots of colors." That's what Ms. Kanovsky learned when she was earning her bachelor's degree in early elementary education. But that old recommendation doesn't take into account what's been learned in the last twenty years about differences in the way girls and boys see the world.

Researchers who have studied the pictures drawn by young

girls and young boys have found that girls typically draw pictures of people (or pets or flowers or trees), arranged more or less symmetrically, facing the viewer. Girls usually use ten or more colors in their pictures (remember all the crayons Anita had strewn around her picture?), and they are more likely to use the colors that researcher Yasumasa Arai calls "warm" colors—red, green, beige, and brown.²⁹ Boys typically draw *action*: a rocket hitting its target, an alien about to eat somebody, a car about to hit another car. Boys typically use at most six colors and they prefer what Yasumasa Arai calls "cold" colors such as blue, gray, silver, and black. Boys are also much more likely to employ a third-person perspective, looking at the action from a remote vantage point rather than from a perspective facing the vehicle or the animal actually doing the action.³⁰ Psychologist Donna Tuman summarizes the difference this way: girls draw nouns, boys draw verbs.³¹

If we consider what we know about P cells and M cells, these differences aren't surprising. Of course boys draw action, using black, gray, silver, and blue. That's the way the M cells are wired. Of course girls draw more richly colored subjects with a preponderance of red, orange, beige, yellow, and so on. That's the way P cells are wired.

At least 95 percent of kindergarten teachers are women. Most are not aware of these differences . . . because nobody has ever told them. Instead, the teachers often act like Ms. Kanovsky, encouraging children to draw pictures of people, using lots of colors. Five-year-olds like Anita and Matthew quickly figure out that Anita is doing it "right" and Matthew is doing it "wrong." Matthew will soon discover that he's not very good at trying to copy Anita, that is, trying to draw pictures of people, using lots of colors. Matthew will quickly decide that he's no good at art. Only five years old, Matthew has decided that "art is for girls." Other experiences he will have (which we will get to later in the book) will teach him that he's no good at anything else that's going on in a twenty-first-century "gender-neutral" kindergarten. The teacher wants him to sit still and be quiet and listen,

while he wants to run around and jump and yell. After a few weeks he's not going to see the point of going to school at all. That's when the tantrums begin.

Ms. Kanovsky wasn't aware of the hardwired differences between the visual world of girls and the visual world of boys. Ironically, the result of her lack of awareness of gender differences is a reinforcement of traditional gender stereotypes. "Art is for girls." A more informed, gender-aware approach might have broken that stereotype.

Ask for Directions?

Let's look at another difference in how girls' and boys' brains work: geometry and navigation. Researchers have found that females and males use fundamentally different strategies for those tasks. Ask a woman how to get to a friend's house and she may tell you something like, "Go down King Street till you see the McDonald's. Then make a left, go past the hardware store and the Exxon station until you see the elementary school. Make a right just past the elementary school and go down Scottsdale Boulevard. Their house is the fourth from the intersection, on the left. It's a split-level house painted *lime green*. You won't believe that house. The shutters and trim are painted *fuchsia*. Lime green and fuchsia. It looks like a gingerbread house after some kind of glow-in-the-dark *mold* has started to grow on it. That's their house. Just *please* don't tell them what I said about it. About the gingerbread and the mold, I mean."

A man giving directions to the same house might say, "Go south on King Street about two miles, then turn so you're heading east on Duke Street. After about a mile on Duke Street, turn south again onto Scottsdale Road. Their house is half a block down Scottsdale, on the east side of the road. They just painted it. Green and pink, I think."

Women typically navigate using landmarks that can be seen or heard or smelled. Men are more likely to use absolute direction such as north and south or absolute distance such as miles

or city blocks.³² A study published in 2003 demonstrated that this gender difference in navigation is well established by five years of age.³³ Those different strategies correlate with different brain regions. Neuroscientists have found that young women and young men use different areas in the brain when they navigate: young women use the cerebral cortex while young men use the hippocampus, a nucleus deep inside the brain that is not activated in women's brains during navigational tasks.³⁴

These sex differences may actually be *more* pronounced in children and adolescents than in adults. Later on we'll see how these differences affect best practices for teaching subjects like geometry and number theory to girls and boys.

Trucks, Rockets, Dolls, and Crayons

Over the past twenty years the scientific foundation underlying the belief that all children are androgynous at birth has crumbled away. Dr. John Money's claim that a boy could be raised as a girl has been shown to be fabrication pure and simple, indeed just the opposite of what really happened . . . as related eloquently by the child himself, David Reimer, just a few years before he committed suicide in May 2004 at the age of thirty-eight.³⁵

Another good example of how these old ideas have collapsed has to do with the kinds of toys girls and boys choose to play with. During the "Dark Ages"—that period from the mid-1960s to the mid-1990s during which it was politically incorrect to suggest that there were innate differences in how girls and boys learn and play—most experts insisted that children's toy preferences are socially constructed. The experts believed that a two-year-old boy prefers to play with trucks rather than dolls because (they believed) the boy's behavior is governed by the following syllogism, which they called a *gender schema*:

- 1) I am a boy.
- 2) Boys are supposed to play with trucks, and not with dolls.
- 3) Therefore I will play with trucks and not with dolls.

There are several major problems with the social learning/gender schema theory, the biggest being that it doesn't fit the facts. Child psychologist Lisa Serbin and colleagues at Concordia University studied 77 one-and-a-half-year-old toddlers, girls and boys. They found that these little children—boys especially—had not a clue which gender they belonged to, even when the psychologists used the simplest nonverbal prompts. Kids this age just cannot reliably assign themselves to the correct gender, and they score only slightly above chance in assigning other kids to the correct gender. Nevertheless, Serbin's group found that children's toy preferences are firmly in place by this age, especially among boys. When the experimenter offered a boy a truck or a doll, the boy chose the truck. In fact, the boys preferred trucks over dolls more strongly than girls preferred dolls over trucks.³⁶ That ought to be surprising if you buy into social learning/gender schema theories, because eighteen-month-old girls were more likely than boys to be able to classify themselves and other children by gender. If the social learning/gender schema theories were correct, the girls should show a stronger preference for gender-typical toys, because girls this age have a more mature understanding of gender. But the reality is just the opposite.

Another group, led by child psychologist Anne Campbell, looked at toddlers as young as *nine months* of age—and they found the same results. Nine-month-old boys strongly preferred "boy toys" such as balls, trains, and cars.³⁷ Nine-month-old girls preferred "girl toys" such as dolls and baby carriages, although the girls' preference was (again) not quite as strong as the boys' preference. Campbell's study is especially striking because she showed very clearly that kids this age have no clue what gender they belong to. Boys and girls show gender-typical toy preferences long before they understand gender. Dr. Campbell has recently said, politely, that "the impact of cognitive variables may have been overestimated."³⁸ In other words, eighteen-month-old boys don't choose to play with trucks rather than dolls because they know they're "supposed" to. They choose trucks because they'd rather play with trucks.

Gerianne Alexander, a psychologist with the Yale Child Study Center, recently showed that male monkeys prefer to play with toy cars while female monkeys prefer to play with dolls.³⁹ Again, if you recall our earlier discussion of the differences between M cells and P cells, this shouldn't come as a surprise.

In fact, gender differences in play behavior are present in just about every mammal that's been studied.⁴⁰ More than twenty years ago, scientists knew that young male rats engage in much more rough-and-tumble play than do young female rats. In one study, scientists damaged the amygdala of young rats. (The amygdala, a small nucleus at the base of the brain, plays an important role in emotion and affect.) That damage dramatically decreased rough-and-tumble play among the males but had no effect on females, suggesting that the gender difference in play behavior was due at least in part to sex differences in the amygdala.⁴¹ The fact that gender differences in play behavior are found in so many other species is another nail in the coffin for the idea that similar preferences in human children are entirely due to culture.

Today we know that innate differences between girls and boys are profound. Of course, not all girls are alike and not all boys are alike. But girls and boys do differ from one another in systematic ways that should be understood and made use of, not covered up or ignored.

Girls and boys play differently. They learn differently. They fight differently. They see the world differently. They hear differently. When I started graduate school in 1980, most psychologists were insisting that those differences came about because parents raised girls and boys in different ways. Today we know that the truth is the other way around: parents raise girls and boys differently because girls and boys are so different from birth. Girls and boys behave differently because their brains are wired differently.

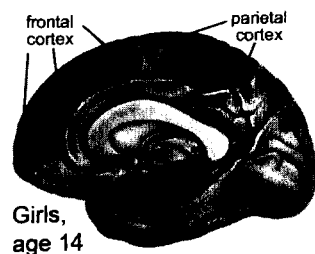
Feelings

Deborah Yurgelun-Todd and her associates at Harvard have used sophisticated MRI imaging to examine how emotion is processed in the brains of children from the ages of seven through seventeen. In young children, these researchers found that negative emotional activity in response to unpleasant or disturbing visual images seems to be localized in phylogenetically primitive areas deep in the brain, specifically in the amygdala. (A phylogenetically primitive area of the brain is one that hasn't changed much in the course of evolution: it looks pretty much the same in humans as it does in mice.) That may be one reason why it doesn't make much sense to ask a seven-year-old to tell you why she is feeling sad or distressed. The part of the brain that does the talking, up in the cerebral cortex, has few direct connections to the part of the brain where the emotion is occurring, down in the amygdala.

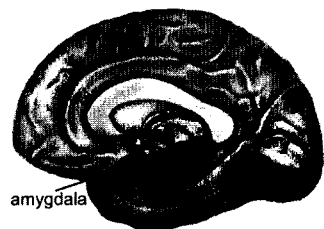
In adolescence, a larger fraction of the brain activity associated with negative emotion moves up to the cerebral cortex. That's the same division of the brain associated with our higher cognitive functions—reflection, reasoning, language, and the like. So, the seventeen-year-old is able to explain why she is feeling sad in great detail and without much difficulty (if she wants to).

But that change occurs *only in girls*. In boys the locus of brain activity associated with negative emotion remains stuck in the amygdala.⁴² In boys there is no change associated with maturation. Asking a seventeen-year-old boy to talk about why he's feeling glum may be about as productive as asking a six-year-old boy the same question. A recent study from a team of German researchers duplicated this finding in young adults: in young women, brain activity associated with negative emotion was mostly up in the cerebral cortex, whereas in young men it remained stuck down in the amygdala.⁴³

Emotions—both positive and negative—are processed differently in girls' brains than in boys'.⁴⁴ We'll talk about this partic-

Girls,
age 14

As girls mature, brain activity associated with emotion moves out of the amygdala and into the cerebral cortex.



Boys, age 14

As boys mature, brain activity associated with emotion remains in the amygdala.

ular sex difference at greater length later on in the book. For now, let's pause to think about the implications of this difference. In boys, as in men, the part of the brain where emotions happen is not well connected to the part of the brain where verbal processing and speech happens—unlike the situation in teenage girls and in women. There's been much talk in recent years about the need to increase the “emotional literacy” of boys.⁴⁵ Such people maintain that boys would be better off if we encouraged them to talk more about their feelings. That sort of talk betrays (in my judgment) a lack of awareness of basic sex differences in the underlying wiring of the brain. Asking a teenage boy to talk about how he *feels* is a question guaranteed to make most boys uncomfortable. You're asking him to make connections between two parts of his brain that don't normally communicate. This is a very different task for a boy than for a girl. As one thirteen-year-old boy said, “My English teacher wants me to write about my ‘feelings.’ I don't know what my ‘feelings’ are, and I can't write about them. Anyway, my feelings are none of their business! I hate school!”⁴⁶

The Sorry Burden of the Past

There's a long history of people misinterpreting scientific research and misusing that research to reinforce gender stereotypes . . . usually at the expense of girls and women. One hundred years ago, German physician Paul Julius Möbius wrote a bestseller entitled *Regarding the Physiological Weak-Mindedness of Women*. Möbius compared the cranial capacity of women and men of the same height. He showed that if you examined the skull of a five-foot-nine-inch-tall woman and compared it to the skull of a man the same height, you would find, on average, that the volume capacity of her skull—and hence the size of her brain—was about 8 to 10 percent smaller than the man's.⁴⁷

Women do have slightly smaller brains than men, on average, even after controlling for body size. To Möbius, that fact seemed irrefutable evidence that women are “physiologically weak-minded.” Möbius assumed that intellect was a simple function of brain size: the bigger the brain, the greater the intellect. He was not aware of other differences that distinguish female and male brains from each other. All these differences are roughly as robust, statistically, as the difference in average brain size:

- Women have higher brain blood flow per gram of tissue than men have.⁴⁸
- In some critical areas of the brain, women have larger brain cells that receive more inputs than are found in corresponding areas in men's brains.⁴⁹
- For many tasks, brain imaging studies show that women use the most advanced areas of the brain, the cerebral cortex, whereas men doing the same task use more “primitive” areas of the brain such as the globus pallidus, the amygdala, or the hippocampus.⁵⁰

Even Dr. Möbius's most basic assumption—that brain size correlates with intelligence—applies differently to women and men. In men that assumption has some validity. Men with high

IQs do, on average, have slightly larger brains (after adjusting for body size) than do men who score lower on IQ tests. But that correspondence may not hold true for women. Studies suggest that women with high IQs do not have larger brains than women with low IQs.⁵¹ In a recent Harvard Medical School study of teenagers, there was a positive correlation between brain size and intelligence for teenage boys, but there was no correlation between brain size and intelligence for teenage girls.⁵²

"The more you use it, the bigger it will be." One widely held belief about brain anatomy is that the more you use a particular area of the brain, the larger that area of the brain will be. (Dr. Möbius's assumption that overall brain size correlates with overall intelligence is a corollary of this belief.) For men that assumption appears to have some validity. Consider the area of the brain involved in music, for instance. In men, the "music" area of the brain is larger in musicians than in nonmusicians. But in women there is no such association: the brains of women musicians are not demonstrably different from the brains of women who are not musicians, according to a 2003 study from Harvard Medical School.⁵³

The bottom line is that the brain is just organized *differently* in females and males. The tired argument about which sex is more intelligent or which sex has the "better" brain is about as meaningful as arguing about which utensil is "better," a knife or a spoon. The only correct answer to such a question is: "Better for what?" A knife is better than a spoon if you want to cut through a piece of meat, while a spoon is better if you're facing a bowl of chicken broth.

Let's pursue that analogy for a moment. You can offer the same nutrients in different forms. You can accomplish similar nutritional aims with meat loaf and with beef stew. If your child has a spoon but no knife, then you'll want to give your child some beef stew. If your child has a knife but no spoon, then you'll give your child some meat loaf.

Likewise, the differences between what girls and boys can do are not large. But the differences in how they do it can be very

large indeed. For example, as we'll see later, you can teach the same math course in different ways. You can make math appealing to girls by teaching it one way, or you can make it appealing to boys by teaching it in another way. Girls and boys can both learn math equally well if you understand those gender differences.

Gender Differences vs. Gender Stereotypes: Barbie Liberation!

It's Christmas morning. Seven-year-old Zachariah Zelin rips the gift wrap off a present and squeals with delight when he sees a Talking G.I. Joe action figure. But this G.I. Joe is a little bit different. Standing in army fatigues, machine gun and hand grenades at the ready, this G.I. Joe exclaims in a high-pitched, girly voice, "Math is hard!" and "Want to go shopping?" and "Will we ever have enough clothes?"

The Barbie Liberation Organization (BLO) had struck again. The BLO is a group of activists dedicated to proving the inanity of prevailing gender stereotypes. These activists infiltrated toy stores and surreptitiously switched the voice boxes of G.I. Joe with the Talking Teen Barbie. So somewhere in Zachariah Zelin's town, there must have been a girl whose Barbie yelled—in a deep, gruff voice—"Vengeance is mine!" and "Dead men tell no lies."⁵⁴

I don't condone the vandalism of the BLO. But I think the image of a G.I. Joe saying "Math is hard!" in a sweet feminine voice should make us reconsider our own beliefs about gender. In our culture you'll often encounter widespread assumptions about differences between boys and girls, such as the belief that math is harder for girls than for boys. Many of those assumptions are wrong—by which I mean that there is good science to refute them. Here are some examples of false beliefs about gender differences:

- Boys are "naturally" better at math and science than girls are.

- Girls are “naturally” more emotional than boys are.
- Girls are “naturally” collaborative, while boys are competitive.

Each of these statements is false. (We’ll consider evidence supporting this assertion at appropriate points throughout the book.) These prevalent stereotypes often confuse parents and teachers when they come to hear me speak. Parents often assume that I endorse these inaccurate gender stereotypes just because my topic is innate gender differences.

One parent approached me after one of my presentations and told me about her children. Her son Noah loves to sew and also does macramé. He’s very careful about his appearance. He doesn’t like to get his clothes messed. Her daughter Stephanie on the other hand is a real tomboy. Stephanie plays soccer, climbs trees, and doesn’t mind rolling in the mud. How do children like Stephanie and Noah affect the arguments I’m making here?

Girls and boys who show gender-atypical behaviors and preferences deserve special consideration. We’ll devote much of chapter 9 to such children. But the bottom line is that essentially all of the differences I will tell you about apply equally to such children.

The differences we’ve considered in how girls and boys hear and see appear to apply to all children, regardless of whether they play with dolls or trucks or both. One illustration of that principle comes from our discussion earlier in this chapter of differences in the visual systems of girls and boys. In girls, the P system predominates, giving girls more sensitivity to small differences in color. It’s easy to understand, then, why teenage girls will describe a shirt as being lime green or forest green or emerald or jade, while teenage boys will just say the shirt is . . . green. Researchers at Auburn University wondered whether more feminine girls would make more subtle color distinctions than less feminine girls. Is it blue, or is it navy blue or sky blue or periwinkle?

These researchers interviewed and tested each girl in their study to see where she scored on a scale of femininity. They then looked to see whether there was a correlation between a girl’s femininity and the subtlety of her color distinctions. They found no correlation. Girls make more elaborate and more subtle color distinctions than boys do, *regardless of whether the girls are very feminine or not feminine at all.*⁵⁵ Tomboys have more in common with very feminine girls than they have with boys, at least when it comes to how they see the world.

Every child is unique. I’m *not* saying that all boys are the same or that all girls are the same. But the fact that each child is unique and complex should not blind us to the fact that gender is one of the two great organizing principles in child development—the other principle being age. Trying to understand a child without understanding the role of gender in child development is like trying to understand a child’s behavior without knowing the child’s age. Pick up a book with a title like *What to Expect from Your Two-Year-Old*. That book is very different from *What to Expect from Your Eight-Year-Old*. Of course, nobody is saying that all two-year-olds are alike or that all eight-year-olds are alike. While recognizing diversity among two-year-olds, we can still have a meaningful discussion of the ways in which two-year-olds and eight-year-olds differ, categorically, in terms of what they can do, what they’re interested in, how they relate to their parents, and so on.

At least with regard to how children hear and speak, gender may be even more fundamental to learning than age is. When noted linguist and Georgetown University professor Deborah Tannen compared how girls and boys of different ages use language, she “was overwhelmed by the differences that separated the females and males at each age, and the striking similarities that linked the females, on one hand, and the males, on the other, across the vast expanse of age. In many ways, the second-grade girls were more like the twenty-five-year-old women than like the second-grade boys.”⁵⁶

Brain research bears out Professor Tannen’s findings. In a re-

cent study of human brain development, scientists found that differences in the brain associated with biological sex—female compared with male—were substantially more significant than differences in the brain associated with age—younger compared with older.⁵⁷

The analogy to age differences provides a good way to think about sex differences. No two girls are alike, just as no two boys are alike. Stephanie who likes to roll in the mud and play soccer is very different from seven-year-old Zoe. Zoe's favorite hobby is playing with her Barbies. Zoe also insisted on joining the Junior Poms (a sort of cheerleading group). Zoe was asking for lipstick at age five. Her mother, Barbara, a sincere old-school feminist, was horrified. "Where is this coming from?" she asked me, bewildered. "I only own one lipstick and I haven't used it in six months. And I loathe and despise Barbies. I've never even bought one for Zoe. She gets all that trash as gifts from her aunts and uncles."

Despite the superficial differences, Stephanie may share more with Zoe than you might imagine. In their ability to listen, in their willingness to affiliate with adults, and in their emotional development, Stephanie probably has more in common with Zoe than she has in common with her brother or with any boy.

Sex Differences vs. Sexual Orientation

How about gay versus straight? Does what I say about boys apply to gay boys as well as straight boys? How about lesbian girls and straight girls? We're going to talk at length about lesbian, gay, bisexual, and transgender individuals in chapter 9. Basically, I will argue that sex differences—female compared with male—are far more profound than any differences attributable to sexual orientation. For example: the superior hearing of girls compared with boys still holds true regardless of whether you're talking about gay boys or straight boys, or lesbian girls or straight girls.⁵⁸ Likewise, sex differences in how children relate to

parents don't appear to be influenced significantly by sexual orientation.

My bottom line is that *sex, female or male*, is more fundamental than sexual orientation, gay or straight. A lesbian girl and a straight girl have much more in common with each other, as a rule, than a lesbian girl has in common with a gay boy—in terms of how they learn, how they play, how they fight, and how they relate to their friends, to their parents, and to the world in general.

Recent studies suggest that male-female differences are more fundamental than gay-straight differences even when we're talking about sexual attraction and sexual behavior. UCLA psychologist Anne Peplau recently reviewed the published research on human sexuality in gay and straight women and men.⁵⁹ She found that for both gay and straight women, "Women's sexuality tends to be strongly linked to a close relationship. For women, an important goal of sex is intimacy; the best context for pleasurable sex is a committed relationship. This is less true for men," whether they are gay or straight. Straight men often buy pornography. Gay men often buy pornography. But few women, whether lesbian or straight, buy pornography. Few women will spend eight dollars to purchase a magazine featuring photographs of the genitals of strangers. You can't have a committed relationship with a picture in a magazine.

In addition, Peplau found that most men's sexual self-concept has an aggressive dimension, whether that man is gay or straight. There is no corresponding element of aggression in women's sexual self-concepts, according to Peplau, either in lesbian women or in straight women. Rape is a crime committed almost exclusively by men—both by straight men (against women) and by gay men (against other men). Women seldom rape, regardless of their sexual orientation.

An international consortium of psychologists recently published a survey of over 16,000 individuals from 52 countries, including Eastern and Western Europe, North and South America,

Africa, Australia, South Asia, East Asia, and Japan. Comparing women and men across all cultures and continents, these psychologists found “universal” sex differences in sexual motivation and sexual interest. To give just one example, they asked women and men, gay and straight, whether they would like to have more than one sexual partner in the next month. Among heterosexual men, 25 percent said yes, they would like to have more than one sexual partner in the next month. Among homosexual men, 29 percent answered yes. Among heterosexual women, just 4 percent answered yes; among lesbian women, just 5 percent answered yes. These authors concluded that men “desire larger numbers of sexual partners than women in every major region of the world regardless of relationship status, sexual orientation, or whether the person is actively seeking [a partner].”⁶⁰

We’ll come back to this topic at greater length in chapter 9. But as a general rule, male-female differences are more consistent and more fundamental than differences in sexual orientation or sexual identity.



The secret to getting the most fun out of life is: to live dangerously. Build your cities on the slopes of Vesuvius! Send your ships into unknown seas! Live at war with your peers and with yourself!

—Friedrich Nietzsche, 1887¹

Tossing the Ring

Let’s suppose you’re a college freshman taking introductory psychology. One of the course requirements includes “volunteering” as a subject in a study. You choose the ringtoss study, because the course guide says it will take only twenty minutes and no needles are involved.

You show up for the study. The technician shows you what you’re supposed to do. There’s a one-foot pole standing upright on the floor. You are given six rubber rings, each about the size of a horseshoe. The technician tells you to toss the rings at the pole, one ring at a time. The object of the game is to land the ring right on the pole.

“Where do I stand?” you ask, noticing that the floor is marked off one foot from the target, two feet, five feet, ten feet, fifteen feet, and twenty feet.

“Anywhere you like,” the assistant says.