

NEUROSCIENCE

How Neuromythologies Support Sex Role Stereotypes

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In a televised newscast this September, a medical correspondent for CBS News, Jennifer Ashton, M.D., explained that “men have six and a half times more gray matter than women do. Gray matter is partly responsible for information processing, so [this] may explain in general [why] men tend to be better in math” (1). Ashton went on to explain that women “have as much as 10 times as much white matter,” which could “contribute to why women are such good multi-taskers.” You don’t need to be a brain scientist to question these data, and you don’t need to know anything about sex differences in brain structures to recognize the long leap from neurons to math achievement or the ability to share attention among tasks. Carefully researched and reasoned, Rebecca Jordan-Young’s *Brain Storm* and Cordelia Fine’s *Delusions of Gender* offer antidotes to neurofallacies such as these.

The ease with which a popular media spokesperson can generalize from gray and white matter (which correspond to, respectively, cell bodies and myelinated axons) to why one sex might be better in math or in tasks that require shared attention is a perfect example of what Jordan-Young describes as an “infomercial” for cherished beliefs.” The physician–news reporter got just about everything wrong. Females and males have, on average, comparable ability in math (although there are more males than females in both the low and high ends of the ability distribution), and we can all get better at doing multiple tasks simultaneously with practice. Perhaps the most glaring flaw in her news report is what she left out: our brains change in response to experience, so any purported brain differences between males and females could have been caused by (and not the cause of) different life experiences. Even though this media sound bite fails on every dimension, it leaves viewers with the message that modern neuroscience can explain common stereotypes about the differences between females and males.

Similar in many ways, both books pro-

test what Fine (a psychologist at Macquarie University) calls “brain scams”: the irresponsible use of findings from the brain sciences to declare that females and males are essentially different and the assumption that we can use brain morphology as an explanation for sex-role stereotypes. Both authors rail against the claim that men are good at math and women are good at interpersonal tasks because they are hard-wired that way—a distinction that psychologist Simon Baron-Cohen has labeled synthesizing (male-typical) and empathizing (female-typical) brains (2). In addition to poking holes in the distinction between these two hypothesized brain types, Fine and Jordan-Young also enjoy critiquing extreme examples from the writings of psychiatrist Louann Brizendine, who promotes the idea that the differences in male and female brains can be seen in our everyday interactions (3). Both authors point out biases in the work of “essentializers” (people who believe that females and males are “essentially” and immutably different), and both emphasize how gender is learned, even at a young age. They take aim at researchers who seem blind to the cavernous

gap between some finding of sex differences in the brain and the relation of such distinctions to complex behaviors.

Although these books are more similar than different, each author has a particular slant to her message. Fine coined the term “neurosexism” to describe the use of neuroscience to support a sexist agenda that proclaims “girls are like this” and “boys are like that” because their brains work in different ways (4). It can aptly describe the work of some sloppy scientists and nonscientist popularizers who claim that they can explain on the basis of the neuroanatomy of male and female human brains why men don’t ask for directions or why women gossip.

The erudite term, however, does not apply to everyone who studies sex differences in the brain. Many of the scientists who study neuroanatomical sex differences are responsible in the way they conduct research and cautious about the conclusions they make.

Despite the large amount of junk science on the topic that is reported in the popular media and in some academic outlets, there are also consistent findings of sex differences that hold up across studies, across species, and across cultures. Most of these are ignored by Fine. This may, in part, reflect the fact that whereas sex differences are reliably found in several areas of research, none of the differences support essentialist claims that girls and boys need separate educations based on their brain types, that one sex is better suited to become engineers, or that one sex is inherently more intelligent—to name just a few of the ideas being promoted under the guise of “science.” For example, in a recent set of

studies that collected data from over 200,000 men and women via a BBC Web site, a test of estimating the orientation of lines and other visuospatial tasks found medium to large sex differences favoring males across 53 countries (5). On the other hand, training studies have found that everyone can improve on visuospatial tasks (6), so any explanation must consider the various ways in which biological and psychosocial factors affect one another.

Consider a biopsychosocial model in which individuals are predisposed by their biology to learn certain skills more readily than others while everyone selects experiences that are biased by prior learning histories,

Brain Storm

The Flaws in the Science of Sex Differences

by *Rebecca M. Jordan-Young*

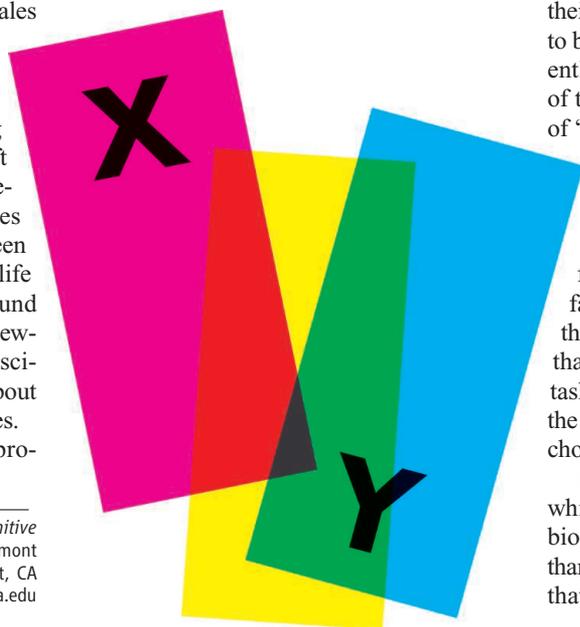
Harvard University Press, Cambridge, MA, 2010. 408 pp. \$35, £25.95, €31.50. ISBN 9780674057302.

Delusions of Gender

How Our Minds, Society, and Neurosexism Create Difference

by *Cordelia Fine*

Norton, New York, 2010. 368 pp. \$25.95, C\$32.50. ISBN 9780393068382.



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opportunities afforded in their environments, and beliefs about appropriate behaviors for females and males. Experiences change neural structures, which in turn alter how individuals respond, and so on. As many stereotypes about sex differences reflect group differences between males and females, by learning and endorsing them, individuals may also be selecting environments and experiences that increase or reduce these differences.

A relatively recent paradigm shows just how complicated sex differences can be. Several different researchers examined the way sex differences vary as a function of the gender equality across societies. Consider the finding that, in more gender-equal societies, females perform as well as males in mathematics (7), much better than males in reading (7), and much worse than males in visuospatial tasks (5). No simple theory, such as the hypothesis that sex differences reflect societal norms or that gender-equal societies will reduce all sex differences, can explain this pattern of results.

Not all claims of biological influences are wrong or wrong-headed. On the simplest level, there is a genetic basis for some types of mental retardation that are more common among males than among females. There are numerous gonadal hormone receptors in the brain, and such hormones do influence some sex-typed behaviors, both prenatally and, to a lesser extent, after puberty. Both books lack a more nuanced approach that might teach readers how to distinguish solid research on hormonal and genetic influences of male and female behavior from overhyped and simple-minded claims. It is much more difficult to delve into the sometimes messy details that good research must address than it is to take a one-sided approach that highlights only the bad work. Unfortunately, it is also less entertaining to read about a balanced approach to complex questions. Nonetheless, the more balanced view more accurately reflects the current state of research on sex differences.

The subtitle of *Brain Storm* characterizes its focus on “the flaws in the science of sex differences.” There are many, but like Fine, Jordan-Young (a sociomedical scientist at Barnard College) sometimes fails to distinguish between valid research claims and psychobabble. Throughout the book, the author explores three main themes: sex, gender, and sexuality. She wisely reminds us that context is a critical variable in understanding these three strands of human experience, and like Fine, she emphasizes socialization.

She takes particular aim at research findings from girls afflicted with congenital adrenal hyperplasia, a family of autosomal

recessive disorders that impair the synthesis of cortisol in the adrenal glands. Most cases involve an enzyme deficiency that causes the adrenal glands to excrete excessive levels of masculinizing hormones throughout gestation. Jordan-Young notes the contradictory findings from this atypical population, and she suggests that the unique experiences of these girls could underlie their unusual gender responses. She also assails the notorious case of a child who was raised as a girl after an accident destroyed his penis during routine circumcision when he was seven months old. Her criticisms are well-founded, but she also ignores much relevant high-quality research by scientists who take care in their work and in the scope of their claims. For some examples: Jay Giedd (National Institute of Mental Health) has found sex differences in normal brains at every stage of development (8). Larry Cahill (University of California, Irvine) has shown that sex and brain lateralization are important influences on emotion and memory (9). Bruce McEwen (Rockefeller University) has spent decades carefully documenting estrogen and other hormonal effects on neural development (10).

Cleverly written with engaging prose, *Delusions of Gender* and *Brain Storm* contain enough citations and end notes to signal that they are also serious academic books. Fine and Jordan-Young ferret out exaggerated, unreplicated claims and other silliness regarding research on sex differences. The books are strongest in exposing research conclusions that are closer to fiction than science. They are weakest in failing to also point out differences that are supported by a body of carefully conducted and well-replicated research. The question is not whether female and male brains are similar or different, because they are both. The questions we need to answer are: How can we understand the ways in which we are similar and different? And how can we use that knowledge to help everyone achieve their fullest potential?

References

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